FLORA OF IDUKKI DISTRICT, KERALA - STUDIES ON DIVERSITY OF POLYPETALOUS AND MONOCHLAMYDEOUS FAMILIES

Thesis submitted to the University of Calicut
in partial fulfillment of the requirement of
the degree of Doctor of Philosophy
in

Botany

by

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December-2023

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CERTIFICATE

This is to certify that the thesis entitled **Flora of Idukki District, Kerala- Studies on Diversity of Polypetalous and Monochlamydeous Families** submitted to the University of Calicut by **VISHNU MOHAN** in partial fulfilment of the Degree of Doctor of Philosophy in Botany is a bonafied record of research work done under my guidance and supervision in the Department of Botany, University of Calicut. No part of this work has been presented elsewhere for any Degree or Diploma previously.

Calicut University Campus
02.12.2023

SANTHOSH NAMPY
(Supervising Teacher)

DECLARATION

I hereby declare that the thesis entitled **Flora of Idukki District, Kerala-Studies on Diversity of Polypetalous and Monochlamydeous Families** submitted to the university of Calicut by **VISHNU MOHAN** in partial fulfilment of the Degree of Doctor of Philosophy in Botany of the University of Calicut, incorporates the results of original work done by me in the department of Botany, University of Calicut under the supervision of Prof. Santhosh Nampy. No part of this work has been presented elsewhere for any Degree or Diploma previously.

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02.12.2023

ACKNOWLEDGMENTS

Gratitude is the language of heart. When the language is from the heart, emotions prevail and when the emotions prevail words fail.

The thesis presented here is the fulfilment of a long cherish dream, and is accomplished with the love, support and blessings of well-wishers surrounding me. I owe great many thanks to several peoples who directly and indirectly extended support and contributions during the journey of my Ph.D.

First and foremost, I thank to the ***God****, the Almighty for his showers of blessings throughout my life and ever more during the tenure of my thesis.*

At the outmost, I pronounce my deep sense of gratitude to my mentor and supervisor, ***Dr. Santhosh Nampy****, Professor and former Head, Department of Botany, University of Calicut for his trust, ambient guidance and motivation during the whole period of the study. I thank him for patiently being with me providing valuable suggestions in very difficult stages of my work period. The patients and consideration he has shown to corrects my faults are admirable. He was always accessible and willing to extend any help for the successful completion of the assigned work. Giving thanks to him through words will be belittling his efforts even then; I thank him from the bottom of my heart.*

I express my sincere gratitude to ***Prof. C.C. Harilal****, Head and* ***Prof. Jos T Puthur*** *&* ***Prof. Dr. V. V. Radhakrishnan****, former Head Department of Botany, University of Calicut for providing the facilities.*

I gratefully acknowledged Ret. ***Prof. Dr. P. Manimohan****, Ret. Prof.* ***Dr. K. V. Mohanan****, Ret.* ***Prof. Dr. M. Sabu****,* ***Senior Prof. Dr. Jhon E. Thopil****,* ***Prof. Jos T Puthur*** *&* ***Prof. Dr. V. V. Radhakrishnan****,* ***Prof. Dr. C. C. Harilal****,* ***Prof. Dr. A. Yusuf****,* ***Prof. Dr. P. Sunoj Kumar****,* ***Dr. A. K. Pradeep****,* ***Dr. M. Shamina*** *Department of Botany, University of Calicut for their dedicating classes in Ph.D. course work. A special word of thanks to* ***Dr. Manju C. Nair****,* ***Dr. C. Pramod****,* ***Dr. Deepna Latha*** *and* ***Dr. Resmi*** *Associate and Assistant professors, Department of Botany, University of Calicut for the support, friendly approach rented during the work.*

I am thankful to former and current non-teaching office staff of Department of Botany University of Calicut, ***Dr. P.M Prakasan, Soni Krishnan*** *and* ***Sandhya K.*** *(Former and current Librarian),* ***Mr. Subash Babu****,* ***Mrs. Sreedevi*** *and* ***Smitha M.*** *(Former & Current Section Officers),* ***Mr. Vijayan****,* ***Mr. Ajith****,* ***Mr. Jabbar****,* ***Mr. Bijesh****,* ***Mr. Sudhi****,* ***Mr. Jestin****,* ***Mrs. Naseeba****,* ***Mrs. Sandhya*** *&* ***Shadiya V.*** *(Office Assistants) for their various help during my work period. Mr. Shaji, Mr. Santhosh (Art & Photography division)*

*I am gratefully acknowledged **Prof. M. Naser**, Director of Research and Former Directors of Research, University of Calicut for providing me amenities for the completion of doctoral studies. I am also grateful to the **members of Doctoral Committee**, Department of Botany, University of Calicut for their valuable suggestions and critical comments during all the stage of research. I greatly thank **Mr. C.K. Shijith** (PRO, University of Calicut) for his valuable support and encouragements during the course of my study.*

*I am grateful to **Kerala State Council for Science Technology and Environment** and **Government of Kerala for Centralized Grants Disbursal System** for financial assistance for the successful completion of my work.*

*I am thankful to the **Chief Conservator of Forests Kerala** for granting permission to specimen collections. Great support and co-operation of forest officials and watchers of Idukki district are deeply acknowledged.*

*I gratefully acknowledged **Richard V Lansdown** (Chair IUCN SSC Freshwater Plant Specialist Group, UK), **Dr. Gustavo Hassemer** (Professor, Federal University of Mato Grosso do Sul Three Lagoons, Brazil), **Dr. Shen Xiang Yu** (Professor, Chinese Academy of Sciences), **Dr. Jan Prančl** (Researcher, Institute of Botany of the ASCR Czech Republic) and **Prof P.M. Radhamany**, (senior prof. department of Botany, University of Kerala) for their expert opinion and collaboration.*

*I wish to thank the **directors/In charges** and **curators** of the herbarium of the Botanical Survey of India-Coimbatore (MH), Kerala Forest Research Institute (KFRI) Institute of Forest Genetics and Tree Breeding (IFGTB) and Calicut University herbarium, Malappuram (CALI)*

*I have no words to express my sincere gratitude to my guru **Dr. P. Bhanumathi**, Director, AMHA (Association for Mentally Handicapped Adults) and Ret. Prof. Department of Zoology, Sree Kerala Varma College Thrissur, for enlighten me for choosing correct path of my life. You have been more than a teacher to me; you've been a role model and an inspiration. Your dedication to nurturing my growth and your unwavering belief in my abilities have been the driving force behind my success. Your insights, wisdom, and willingness have not only enriched my academic pursuits but have also shaped my character*

*I very much indebted to **Dr. G. Jayakrishnan**, Ret. Professor, and other faculties of the Department of Botany, and **Dr. Geetha K.** Ret. Prof. Department of English, Sree Krishna College, Guruvayoor for their constant support and love.*

*I would like to thank **Dr. Ajith Kumar** & **Sheela Francis** Ret. Prof. and other teaching and non-teaching staffs Department of Botany, Sree Kerala Varma college, Thrissur for the countless and continuous support towards me.*

I have great pleasure to extend my sincere thanks to ***Dr. Renjith Layola M.R.,*** *Botanist, Central National Herbarium, Botanical Survey of India, Howrah, West Bengal,* ***Mr. Basil****, Preservation officer BSI, Andaman for their help and support and* ***Mr. Arun Prasanth****, Pune University for your prompt support.*

A special thanks to ***Dr. Archana*** *(Asst. Prof. Department of Botany, Providence Women's College, Kozhikode),* ***Dr. Sameena P.P., Dr. Santhosh Kumar****,* ***Dr. Abdul Faizal, Dr, Prashob P., Dr. Nidheesh Roy, Dr. Juliya Garvasees****,* ***Dr. Sahina M. Shanavas, Ms. Niranjana M.R., Miss****.* ***Aswathiraj K.P., Miss. Sreelakshmi P.K., Miss Sruthi O.M., Miss. Vineesha P.M. and Mr. Prasanth P. Prabhu*** *for their countless support rented during my research.*

I express my sincere thanks to my former and current research scholars of taxonomy division ***Dr. Shinoj K., Dr. Geethika, Dr. Soumya S., Dr. Jayakrishnan, Dr. Mufeed B., Mrs. Jiji P, Mrs. Jeomol K.K., Mrs. Ashna Toms, Mr. Alan Thomas, Mr. Krishnaraj, Miss. Amrutha A., Ms. Drisya V., Miss. Ambika T., Miss. Haritha P. Barathan, and Mr. Rajeesh E.P.*** *for their friendly atmosphere rented during the work.*

I am thankful to all former and current ***fellow scholars*** *of various divisions of Botany department for their co-operation and support.*

I wish to extend my warmest thanks to my dearest seniors and fellow ***labmates*** ***Dr. Sheba M. Joseph, Dr. Shahina Shanavas, Dr. Manudev K.M., Dr. Janisha A.P., Dr. Veena V., Dr. Syam Radh S., Dr. ArunKumar P., Dr. Resmi S., Mrs. Dani Francis, Mrs. Sreekutty T.K, Mr. Akhil M.K., Ms. Harishma K.H., Ms. Krishnapriya M.P., Miss. Priyanka T., Miss. Aneesha, Ms. Aparna, Miss Vaishavi T.*** *and* ***Ms. Sreya M.*** *for their constant support and lively atmosphere.*

In this short note, I'd like to express my sincere gratitude to my close companions ***Dr. Ramyasree, Dr. Resmi C, Dr. Aswathi P, Mrs. Dani Francis, Miss. Amrutha A, Mr. Sarath G Nair, Mr. Rajeesh E. P., Mr. Mohammed Irfan T.K., Mr. Gokul, Mrs. Litty R, Mrs. Sreekutty T.K., Ms. Manju S.P. and Mr. Aneesh S.*** *for your unwavering support and encouragement during my research journey. Your friendship has always been a source of strength for me. You've listened to me vent about the challenges and celebrated my small victories. Your confidence in me and readiness to support me at all times and in all situations were deeply appreciable. You guys made this journey more enjoyable. I'm very grateful to you guys.*

I am deeply thankful to ***Pushpamma*** *for her motherly affection and care during my course of period. I would like to express my heartfelt gratitude for the delicious meal you provided. Your generosity and thoughtfulness have truly touched my heart. The food was not only nourishing but also incredibly tasty. Your kindness means the*

world to me, and I am thankful for your support during this time. Thank you again for the wonderful meal."

I would not been possible without the sincere co-operation of ***Mrs. Dani Francis****. I wanted to take a moment to express my heartfelt appreciation for the invaluable assistance you provided in the lab. Your expertise, willingness to share your knowledge, and your dedication to our research made a significant difference. Your help not only made the work more manageable but also enhanced its quality. I am grateful to you and your family.*

No words to express my sincere gratitude to my dearest brother ***Dr. Vishnu V.S.*** *(Assistant Professor, Department of Plant Science, University of Kannur, Mananthavadi campus. I wanted to take a moment to express my profound gratitude for the sacrifices you made during my research journey. Your unwavering support and understanding you've made on my behalf have been instrumental in my success. I am thankful to you and your family.*

I couldn't imagine the completion of my research work, if I was not blessed with such a caring and loving family. It is the prayers of my ***Achan, Amma, Chechi, Aliyan & my nephews*** *helped me to withstand the adversities faced during the study. I'm thankful to my family for the entire support and care over me.*

VISHNU MOHAN

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പ്രബന്ധsp-സംഗ്രഹം

ഇടുക്കി ജില്ലയിലെ സസ്യജാലങ്ങൾ-പോളിപെറ്റലസ്, മോണോക്ലമീഡിയസ് കുടുംബങ്ങളിലെ സസ്യവൈവിധ്യങ്ങളെ കുറിച്ചുള്ള പഠനം

കേരളത്തിലെ പതിനാല് ജില്ലകളിൽ വിസ്തൃതി കൊണ്ടും സസ്യവൈവിദ്യം കൊണ്ടും മുന്നിട്ടുനിൽക്കുന്ന ഒരു ജില്ലയാണ് ഇടുക്കി. മനോഹരങ്ങളായ ഗിരിനിരകളാൽ എന്നെന്നും ഹരിതാഭമായി നിൽക്കുന്ന ഭൂപ്രദേശത്തെ സസ്യസമ്പത്തെക്കുറിച്ചു സമഗ്രമായ പഠനം ഇതുവരെ നടന്നിട്ടില്ല എന്നത് സസ്യശാസ്ത്ര ഗവേഷകനായ എന്നെ ചിന്തിപ്പിക്കുകയും ആ ചിന്തയിൽ നിന്നും ഈയൊരു പ്രബന്ധം ഉരുത്തിരിയുകയുമായിരുന്നു.

50 ശതമാനത്തിലധികവും സംരക്ഷിത വനഭൂമിയായിട്ടുള്ള ഇടുക്കി ജില്ലയുടെ സമ്പൂർണ സസ്യവൈവിധ്യത്തിലേക്ക് ഒരു മുതൽക്കൂട്ടായി അവിടെയുള്ള ഒരു വിഭാഗം (Polypetalae & Monochlamydeae) സപുഷ്പികളുടെ പഠനമെന്ന ഗവേഷണത്തിന്റെ പ്രാഥമികോദ്ദേശ്യം ഈ പ്രബന്ധത്തിലൂടെ നിറവേറിയിരിക്കുകയാണ്.

വർഷങ്ങൾ നീണ്ട പഠനഫലമായി പോളിപെറ്റാലെ വിഭാഗത്തിൽ 64 സസ്യകുടുംബത്തിൽ 271 ജനുസ്സുകളിലായി 599 സസ്യവർഗങ്ങൾ ഉണ്ടെന്നും, മോണോക്ലമിഡിയെ വിഭാഗത്തിൽ 21 സസ്യകുടുംബങ്ങളിലായി 100 ജനുസ്സുകളും അവയിലുൾപ്പെടുന്ന 212 തരം സസ്യങ്ങളുമുണ്ടെന്നും കണ്ടെത്താൻ കഴിഞ്ഞു.

പഠനവിധേയമായ ചെടികളുടെ വർഗ്ഗത്തിൽ 59 ഓളം അധിനിവേശ സസ്യങ്ങളും ഉൾപ്പെടുന്നു എന്നത് ആശങ്കാവഹമായ കാര്യമാണ്. അക്കൂട്ടത്തിൽ 16 തരം ചെടികൾ പ്രാദേശികമായ സസ്യസമ്പത്തിനെ തുടച്ചുനീക്കാൻ ശേഷിയുള്ളവയാണ് എന്ന വസ്തുത ഈ ആശങ്കയെ കൂടുതൽ ഭീകരമാക്കുന്നു. IUCN ന്റെ കണക്കു പ്രകാരം പഠനവിധേയമായ സസ്യവർഗ്ഗത്തിൽ വംശനാശ ഭീഷണി നേരിടുന്ന 117 സസ്യയിനങ്ങളുണ്ട്. (49-EN, 31-VU, 24-NT, 13-CR)

കേരളത്തിലെ സപുഷ്പി വൈവിധ്യത്തിന്റെ 20 ശതമാനത്തോളം സംഭാവന നൽകുന്ന ജില്ലയിൽ നിന്നും അഞ്ച് പുതിയ സസ്യവർഗങ്ങളെ (*Impatiens grandispora* Nampy & M.Vishnu, *Impatiens nidholapathra* M.Vishnu & Nampy, *Impatiens raktakesara* M.Vishnu & Nampy, *Polygala idukkiana* Vishnu & Nampy & *Callitriche idukkiana* Vishnu & Nampy) കണ്ടെത്തുവാൻ സാധിച്ചത് ഗവേഷണ നാൾവഴികളിലെ പൊൻതൂവലുകളായിരുന്നു. കൂടാതെ *Lablab purpureus* (L.) Sweet subsp. *uncinatus* Verdc. എന്ന ശാസ്ത്രനാമത്തിൽ അറിയപ്പെടുന്ന സസ്യയിനത്തെ ജില്ലയിൽ നിന്നും തിരിച്ചറിഞ്ഞത് ഏഷ്യൻ ഭൂഖണ്ഡത്തിൽ നിന്നുമുള്ള ആദ്യത്തെ കണ്ടെത്തലായി. അതുപോലെ *Callitriche wightiana* Wall. in Wight & Arn. എന്നയിനത്തെ കേരളത്തിൽ നിന്നും ആദ്യമായി കണ്ടെത്തുവാൻ കഴിഞ്ഞതും മികച്ച ഗവേഷണ നേട്ടമായി കണക്കാക്കപ്പെടുന്നു.

ഈ പ്രബന്ധത്തിൽ പൊളിപെറ്റാലെ-മോണോക്ലമിഡിയെ വിഭാഗത്തിൽപ്പെടുന്ന സപുഷ്പി സസ്യങ്ങളെ തിരിച്ചറിയാനുള്ള മാർഗ്ഗരേഖയും (key), ഓരോരോ സസ്യങ്ങളുടെ വിതരണ മേഖലകളെക്കുറിച്ചും, പുഷ്പ-ഫല കാലങ്ങളെ കുറിച്ചുമുള്ള വിവരങ്ങളും രേഖപ്പെടുത്തിയിട്ടുണ്ട്.



Thesis Abstract

Flora of Idukki district Kerala- Studies on the diversity of Polypetalous and Monochlamydeous families

Idukki, situated in the heart of Kerala is best known for its emerald hills and pristine valleys. Forests, grasslands and wetlands dot this sanctuary of nature's wonders. Needless to say, Idukki is a treasure trove of botanical wonders. It houses myriad plant species, each one unique on its own. Among this lush symphony, Polypetalae and Monochlamydeae, two groups of flowering plants, stand as shining jewels in Idukki's botanical crown.

Yet, amidst this botanical paradise, a shadow looms. Human activities and natural calamities have encroached upon Idukki's delicate ecosystems, threatening the very existence of its botanical treasures. Deforestation, habitat fragmentation, and the invasion of alien species have cast a pall over this verdant realm.

In response to this ecological crisis, this thesis embarks on a journey of discovery, delving into the intricate world of Polypetalae and Monochlamydeae in Idukki. It meticulously documents the diversity of these plant groups, providing detailed descriptions, phenology, and conservation status.

The study reveals a staggering richness of plant life, with 979 taxa identified, representing a staggering 20% of Kerala's angiosperm diversity. Among these, Polypetalae reign supreme with 599 species, while Monochlamydeae contribute 212 species, each group a testament to nature's boundless creativity.

The thesis revealed a startling fact: 16 of the 59 exotic taxa recorded in Idukki are highly aggressive and could displace the native flora. Moreover, the International Union for Conservation of Nature (IUCN) assessed 49 taxa as Endangered, 31 as Vulnerable, 24 as Near Threatened, and 13 as Critically Endangered.

On a brighter note, the study also identified five new taxa, previously unknown to science. Additionally, two other taxa were recorded for the first time in Kerala and Asia. These discoveries highlight the unique and precious botanical heritage of Idukki.

This thesis is a comprehensive guide to Idukki's botanical wealth, a testament to the district's ecological significance. It paints a vivid portrait of the district's plant diversity, highlighting its threats and offering a roadmap for conservation.

May this thesis serve as a clarion call to protect Idukki's botanical heritage, ensuring that future generations can marvel at the wonders of this verdant paradise.





Introduction

INTRODUCTION

दश कूप समा वापी, दशवापी समोह्नद्रः।

दशह्नद समः पुत्रों, दशपुत्रो समो द्रमुः।

"*One step is equal to ten wells, one pond is equal to ten step wells, one son is equal to ten ponds and one tree is equal to ten sons.*"

(Source: Vrksayurvedah-5)

From the dawn of civilization, man has relied primarily on plants for his needs, such as food, clothing, housing, fuel, medicine, paper, etc. A plant provides a healthier environment and platform for all living beings for the betterment of nature. It also plays a fundamental role in upholding and sustaining the delicate and insubstantial ecosystem equilibrium and nature. Because plant species are important to human survival as ecosystem components and as direct providers of food and shelter, they have great value. In other words, plants are needed to human survival and are not optional for life. Since life originated on earth millions of years ago, diversity of life forms has been the outcome of organic evolution steering to speciation. There are 18,664 taxa of flowering plants (17,500 to 17,000 species) in India, including 5725 endemics, which makes India rich in biodiversity; there is only 2.4 % of the total global land area. (Nayar, 1996). According to Karthikeyan *et al.* (2009), India has 17,527 species of angiosperms under 2991 genera and 251 families. As primary producers of natural ecosystems, the plants are capable of selecting the biota that is adapted to the characteristics of a particular habitat and successional series. The Himalayas in the northeast and the rugged Western Ghats in South India are two of India's most biologically

diverse regions. The fact that these regions are currently regarded as one of the 36 global "hotspots" shows how seriously many species that have already become rare, endangered, or endemic are at risk of becoming extinct. The primary reason of this was the migration of people seeking terrain for plantations and agriculture from lowlands to highlands. This is a consequence of the population explosion after 1950's in post-independent India. In this scenario, protecting biodiversity and utilizing the medicinal and other commercial possibilities of each plant species are important.

Plant species have a significant role in maintaining ecological equilibrium; hence comprehensive floristic inventory and ecological research are necessary. Floristic studies are crucial in understanding the state of biodiversity and guaranteeing an area's ecological stability by enacting strict conservation measures for such threatened endemic species. The word "floristic" was initially used in 1898 to describe the phytogeographical study of plants and plant groups. Flora is the plant life that grows in a specific area, usually the naturally existing or indigenous plant life. The term 'flora' refers to morphological descriptions of plants and identification aids such as botanical keys, pictures, or photographs that illustrate the characteristics that separate different plants and their distribution pattern in a specific location. Floras are grouped into four types: continental, national, regional or state, and local. Despite the fact that there are remnants of floristic studies from 370 BC, the canonical book on flora encompassing worldwide plant species was *'Species Plantarum*' (Linnaeus, 1753) that provided information on over 7000 species.

A region's floristic diversity is important since it is used to assess the ecological health of the area. District wise floristic studies were completed by various workers for Kerala (Manilal & Sivarajan, 1982; Mohanan, 1984; Ansari, 1985; Ramachandran & Nair, 1988; Antony, 1989; Babu, 1990; Vajravelu, 1990; Mohanan & Henry, 1994; Sasidharan & Sivarajan, 1996; Anilkumar *et al*., 2005; Sunil & Sivadasan, 2009; Narayanan, 2010, Sunil, 2016), except for Idukki districts. Hence the present research aims to prepare an inventory on the angiosperm diversity of Idukki district. Considering the vastness, rugged topography and rich biodiversity of the district, and the constraints that go with a Ph.D. programme, the current research work was aimed to document the diversity of Polypetalae and Monochlamydeae of Idukki district.

STUDY AREA

The Idukki district is referred to as the "Spices Garden of Kerala" and gets its name from the Tamil and Malayalam term *Idukku* (ഇടുക്ക്), which means narrow gorge. Geographically, this gorgeous high range district is renowned for its unparalleled scenic beauty, which includes lush green tropical forests, stunning steep hills, and radiant valleys coexisting with rivers, streams, lakes, and numerous expansive plantations and agricultural fields.

Geography

Idukki, the largest in Kerala, has a geographic area of 4,612 km^2, accounting for 11.86% of the state of Kerala. The district shares its eastern boundary with Tamil Nadu's Theni district and West by the Ernakulum and

STUDY SITE


ERNAKULAM DISTRICT
TAMIL NADU
KOTTAYAM DISTRICT
PATHANAMTHITTA DISTRICT
DEVIKULAM TALUK
DEVIKULAM C.D. BLOCK
ADIMALI C.D. BLOCK
THODUPUZHA TALUK
ELAMDESOM C.D. BLOCK
IDUKKI C.D. BLOCK
THODUPUZHA C.D. BLOCK
UDUMBANCHOLA TALUK
NEDUMKANDAM C.D. BLOCK
KATTAPPANA C.D. BLOCK
PEERUMADE TALUK
AZHUTHA C.D. BLOCK
NUMBER OF TALUKS : 4
" CD. BLOCKS : 8
" STATUTORY TOWNS : 1
" OUT GROWTHS : 0
" CENSUS TOWNS : 0
" VILLAGES : 64
BOUNDARY, STATE
" DISTRICT
" TALUK
" C.D. BLOCK
HEADQUARTER : DISTRICT, TALUK AND C.D BLOCK
VILLAGES HAVING 10000 AND ABOVE POPULATION WITH NAME
URBAN AREA WITH POPULATION SIZE :- II
NATIONAL HIGHWAY
STATE HIGHWAY
OTHER IMPORTANT ROADS
RIVER AND STREAM

Kottayam districts of Kerala. Pathanamthitta district forms its southern border, and Thrissur (Kerala) and Coimbatore (Tamil Nadu) districts, respectively form its Northern and northernmost borders. It is around 115 kilometers long between North to South and 67 kilometers wide between East to West and it is located between 9° 15' and 10° 21' of North latitude and 76° 37' and 77° 25' of East longitudes.

The Idukki district was founded on January 26, 1972. The district has two revenue divisions with headquarters at Idukki and Devikulam. There are currently 4 Taluks in the district: Devikulam, Udumbanchola, Thodupuzha, and Peerumade. These have further been subdivided into eight Community Development Blocks, 51 Grama Panchayats, and 64 revenue villages for administrative convenience. The State Archaeology Department has been conducting excavations in many locations, including Marayoor in the Anchunad Valley of the Devikulam Taluk, Thengakkal close to Vandiperiyar, Bison Valley, and Thondermalai. The dolmens and menhirs found in these locations demonstrate the sophisticated civilization and rich culture of the Megalithic period's inhabitants.

Considering that spices like pepper, cardamom, and others grow more abundantly in this region than everywhere else in the State, it is crucial to note that this district played a significant part in the historic spice trade.

Land pattern

The district's central and southern regions are home to the Western Ghat High Range, has an altitude range of 600–1200 metres make up the majority of the land area (56.23%) (Fig 2.3). Adimali, Idukki, Nedumkandam,

Kattappana, and Azutha blocks in this area have a variety of structural traits. The whole Devikulam block, a restricted forest region of the Azutha block with an extent of 1043.89 sq. km (23.95%), is the top Western Ghat highland zone. 7.76 % of the district's area is in the upland zone, mostly in the forested areas of the Azutha block and in the transition zone between the Devikulam, Adimali, and Elamdesom blocks. The mid-upland region, which extends along Elamdesom block, the southern part of Thodupuzha block, and the western edge of Azutha block, makes up 4.98% of Idukki's total area. Midland takes up 7.07% of the total area, mostly in the western portion of the Idukki district, which includes the Thodupuzha, Elamdesom blocks, and Thodupuzha municipality.

Table I

Idukki District Land Pattern

Sl. No.	Altitude (Above Mean Sea Level)	Land pattern	Land area in Sq.Km	Land area in %
1	20—100 m	Midland	308.23	7.07
2	100—300 m	Mid-upland	217.14	4.98
3	300—600 m	Upland	338.13	7.76
4	600—1200 m	Western Ghats High Range	2450.61	56.23
5	Above 1200 m	Top Western Ghats High Range	1043.89	23.95



A. & B. Kanthalloor; C. Choondal; D. Kattadikkadavu; E. Anamudi shola; F. Mankulam; G. Chinnar



A. Meesappulimala; B. Anayirangal dam; C. Chinnar; D. Kumarikulam; E. way to Anamudi peak; F. Periyar Tiger Reserve; G. Meeesappulimala



A. Kallarkutty; B.-F. Meesappulimala; G. Erattayar; H. Kanthalloor



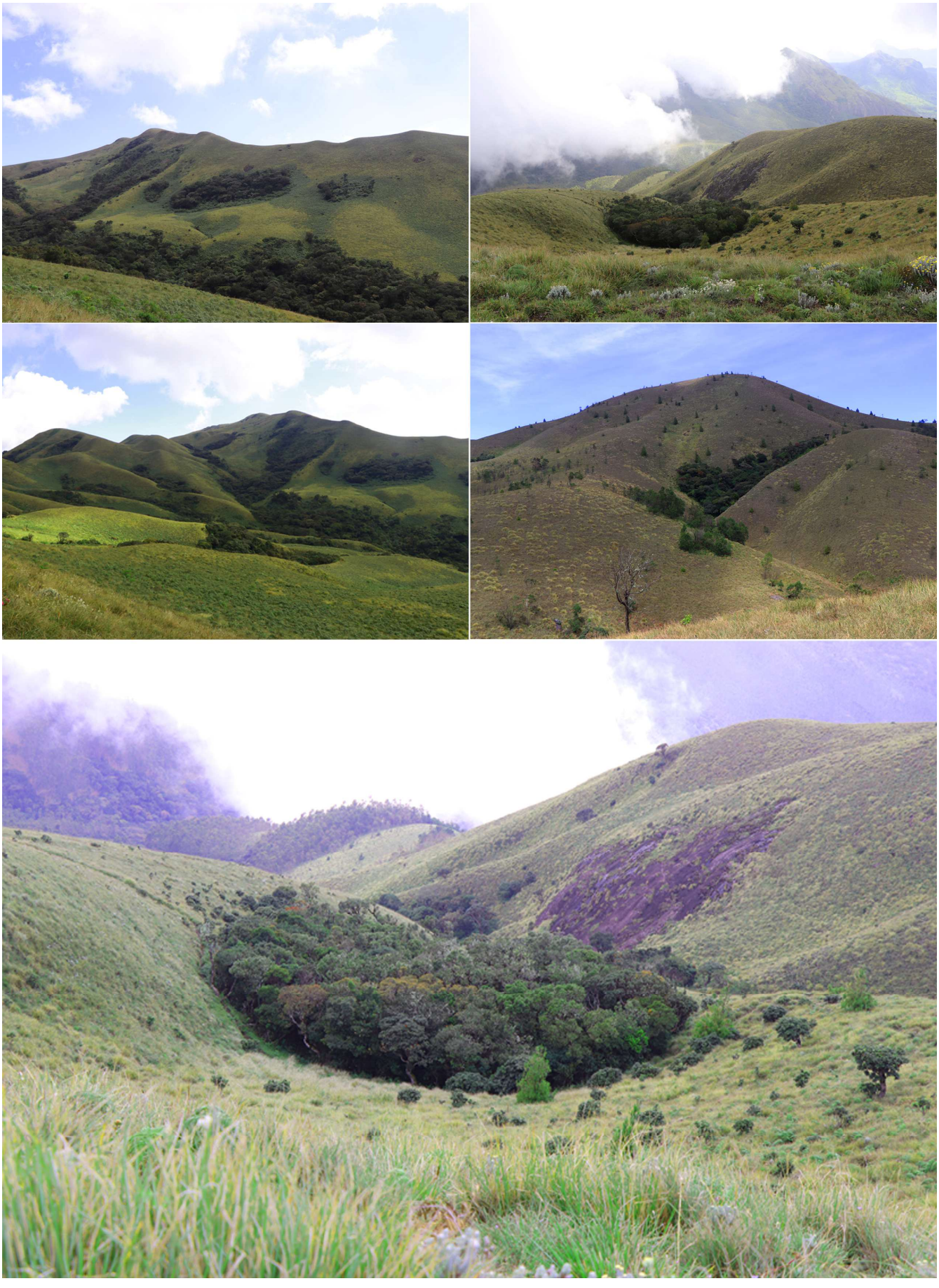
A. Way to Anakkulam; B. Panchalimedu; C. Anakkulam; D. Mankulam; E. Meesappulimala



A. Kanketty; B. Meesappulimala; C. Nallathannikallar; D. & E way to Meesappulimala; F. Nallathannikallar



A.-C. Meesappulimala; D. Parunthanpara



Shola forest habitat

River

The river Periyar, which rises in the Sivagiri highlands in the southeast of the study area and flows northwest across the whole area, drains over 80% of the district. At several places along the river, it is used for irrigation and electrical generation. Along the Periyar River are the Mullaperiyar Dam, the Idukki hydroelectric project, and the Idamalayar hydroelectric project. Several Periyar River tributaries are crossed by the construction of Kundala Dam, Mattupetty Dam, Ponmudi Dam, Munnar head works, and Kallarkutty Dam. It originates from Peerumedu, flows through dense forests and reaches Koruthodu. From there, it forms the boundary between Kottayam and Idukki districts. It then crosses Sabarimala's traditional trekking path at the Kalaketti area before joining with the Pamba River at Kanamala (Pambavalley). The Thodupuzha River, a tributary of the Muvattupuzha arises from the Tangakkanam hills. It passes mostly through the taluk of Thodupuzha. The Karinthiri River gets two tributaries on its left and right as it flows through the Mankulam panchayat in the study area. A minor tributary of the Manimala River flows near Mundakkayam, sharing a border with the Kottayam district. Muthira Puzha follows the taluk borders of Thodupuzha, Devikulam, and Udumbanchola as it continues through the center of the Idukki district. It is an extension of the Periyar River, which meets the Ponmudi and Idukki reservoirs in the north and south, respectively.

One of the three east-flowing rivers in the state is the Pambar River. The river has begun its journey in the Devikulam taluk at an altitude of 1950 m above mean sea level. It is referred to as Thalayar locally in its early

reaches. The river flows through Kerala State for around 25 kilometers before entering Tamil Nadu State (Kerala State Gazetter, 1986). Iravikulam, Myladi, Thirthamala, Chengalar and Thenar are the main tributaries of Pambar. The Pamba River runs east-west and descends at an elevation of 1650 meters on the Peermedu plateau of the Azutha block in the Idukki district. It runs along the southern edge of the study area and stretches forth from Anavattam, covering an area of approximately 0.32 square kilometers (sq. Km).

Mountains

There are 12 peaks in the area that are higher than 2000 meters above mean sea level. They are Anamala, Eravimala, Tathamala, Chenthavara, Kumarickal, Karimkulam, Devimala, Perumala, Ghudoor, Kabhula, Devikulam, and Anachal. Anamudi (Anamala) having 2695 meter elevation from sea level is the highest mountain of the Western Ghats, is located in Munnar Grama Panchayat.

Vegetation

Evergreen and semi-evergreen forests, moist deciduous forests, dry deciduous forests, mountain tropical/temperate forests, grasslands, and forest plantations are the main vegetation types found in Idukki district.

Rain fall

The main determinants of climatic variability are rainfall and temperature, and extreme rainfall can cause soil erosion and land degradation. Both the southwest and northeast monsoons provide rain to the region. The area gets roughly 2800 mm of rain on average. The western slope of the Munnar plateau has the most rainfall as one moves toward the ghats.

The southwest monsoon, which occurs October and December and contributes 60.4% of the annual rainfall, is the main source of rain. 24.4% of the yearly rainfall is contributed by the North East monsoon from March to June, while the remaining 15.2% is from January to May (CGWB, 2008). The table displays Idukki's seasonal average rainfall from 2010 through September 2020.

Table II

Monthly rainfall recorded in millimeters from 2010–2020 are given below

Year	January	February	March	April	May	June	July	August	September	October	November	December
2010	30.57	3.17	16.17	91.1	97.58	101.98	66.21	71.33	154.08	137.09	258.68	42.32
2011	18.08	60.39	44.99	140.25	79.6	60.72	48.37	91.22	58.79	205.29	102.81	36.44
2012	6.71	9.61	41.51	130.12	94.85	31.74	35.01	98.04	53.26	195.46	61.59	18.36
2013	4.98	49.45	66.53	81.53	60.45	45.84	20.3	76.78	55.42	126.6	89.1	28.37
2014	5.3	18.67	44.57	71.95	117.51	32.24	29.51	79.56	90.77	226.09	75.57	52.74
2015	3.34	9	52.4	122.27	121.24	43.14	23.1	35.22	80.28	118.65	144.32	92.54
2016	1.54	5.37	7.6	59.34	79.5	40.28	24.77	22.27	16.24	113.51	27.16	18.53
2017	20.58	1.43	117.95	55.72	86.22	42.26	15.85	43.48	78.79	83.18	103.97	30.92
2018	6.86	15.06	54.28	87.82	153.78	45.73	25.93	87.97	70.2	276.6	207.1	35.8
2019	14	24.7	13.5	56.7	103.9	55.3	235.9	337.3	219	548.6	327	172
2020	19.7	12.4	79.9	106.3	253.5	282.7	188.4	266.9	225.6			

Soil

Forest soils are developed from crystalline rocks of the archean age under forest cover. They occur along the eastern part of the state, generally above 300 m above Mean Sea Level (MSL). The soils are generally immature due to the slow weathering process. Gneissic boulders under different stages of withering are noticed in the subsoil. The soil texture ranges from sandy clay loam to clay with reddish brown to very dark brown color. Hill soil mainly occurs above an elevation of 80 m MSL. These soils typically have a loam to clay loam texture and contain 10 to 50 percent gravel on average. In the subsurface, there are also visible stones and rocks. The colour of the soil ranges from reddish brown to yellowish red/strong brown. Often, an increase in clay content is seen as the profile descends. The geography makes the region appropriate for all dryland crops, including fruit trees, coconuts, and rubber. Crops including bananas, peppers, pineapples, and vegetables can be produced on foot slopes (Department of Soil Survey & Soil Conservation, Kerala)

Forest divisions

Idukki district has the largest area under forest and the entire eastern side of the district is covered with dense forests and falls into five Forest divisions. Kottayam, Munnar, Kothamangalam, Mankulam divisions and Marayoor Sandal division.

National parks and Protected areas

Among the districts of Kerala, Idukki has the highest number of protected areas, which includes Periyar Tiger Reserve, Kurinjimala Sanctuary, Chinnar Wildlife Sanctuary, Eravikulam National Park, Anamudi

Shola National Park, Pampadum Shola National Park, Mathikettan Shola National Park, and Thattekad Bird Sanctuary. Periyar National Park and Wildlife Sanctuary (PNP) is a protected area in the districts of Idukki and Pathanamthitta.

The Chinnar Wildlife Sanctuary (CWS) is home to variety of xerophytes species make up the distinctive thorny scrub woodland that makes up this sanctuary. Unlike other sanctuaries of Kerala, which receive ample rainfall, Chinnar gets barely exiguous showers yearly. The Eravikulam National Park stands out for the stark beauty of its rolling grasslands and shoals, spread over 97 sq. km. in the Kannan Devan hills. Anamudi, the highest peak (2695 m) south of Himalayas, stands majestically in the core area of the national park. Anamudi shola National Park consists of three shola reserve forests: Mannavan shola, Pullaradi shola and Idivara shola. In Pampadum Shola National Park, the keystone species "Nilgiri martin" was recorded to be highly abundant in the area. Thattekad Bird Sanctuary was established in 1983 in the Kothamangalam region of the Idukki district and is home to around 500 species of rare birds and spreads over an area of 25 sq. km.

RELEVANCE OF THE STUDY

Idukki is one of the most biodiversity-rich districts of Kerala, comprising six wildlife sanctuaries and five national parks with more than 2800 flowering plants, of which about 1000 species are endemic. About 97% of the district's total area is covered by rugged mountains and more than 50% of the area is covered by forest. In recent years, the plant diversity of Kerala has been facing a severe threat of destruction for several reasons, primarily due to

the indiscriminate destruction of natural vegetation by anthropogenic activities and also natural calamities. Hence several species have become extinct and are on the edge of extinction (IUCN, 2022). As an unexplored area, the number of plant species in this area is expected to be high and a complete floristic study in the district is needed. Considering the vastness, rugged topography and rich biodiversity of the district, and the constraints that go with a Ph.D. programme, the current research work was aimed to understand the diversity of Polypetalae and Monochlamydeae with the following objectives.

OBJECTIVES

1. Survey, collection and documentation of the polypetalous and monochalamydeous species of Idukki district.
2. Preparation of an up-to-date taxonomic account on the polypetalous and monochlamydeous families of Idukki district.
3. Assessment of rare, endangered and threatened polypetalous and monochlamydeous taxa in the area.

Review of Literature



REVIEW OF LITERATURE

Biodiversity, which is essential for the survival of practically all living things, includes plants. Floristic research and documentation are important for cataloguing the plant world's biodiversity and assessing the benefits and uses of bio-potential.

Vedas (Rigveda, Yajurveda, Samaveda, and Atharvaveda) are the earliest recorded accounts of Indian flora, dating back to around 3000 BCE. Valmiki, the renowned Rishi, documented the medicinal properties of plants in his epic Ramayana. Indications of the utilization of herbal medicines like black pepper, cinnamon, turmeric, and cardamom have been discovered during the Indus Valley excavations. Hiuen Tsang (629 AD), Masudi of Baghad (890-956 AD), and Abul Feda (1273-1331 AD) all make allusions to India's abundant plant life.

The green wealth of India, particularly in the southern part of the Western Ghats, has piqued the curiosity of many European nations, including Spain, the United Kingdom, and Portugal. Garcia De Orta (1565) is credited with penning the earliest published Floral book on the vegetation of the Western Ghats, titled Coloquis dos Simples (a checklist of medicinal plants of India).

Dutch admiral of Malabar, Hendrich Adrian Van Rheede (1636-1691) realized the significance of the region's spices and medicinal plants, therefore he made it his mission to collect and catalog plants. Over the course of 30 years, with the help of local traditional vaidyas *viz*., Itti Achuthen, Appu Bhat, Ranga Bhat, and Vinayaka Panditt, he meticulously documented the indigenous uses of 781 plant species, each with characteristic sketches, habits, habitat, medicinal, and other uses.

William Roxburgh (1820-1824), who pioneered floristic investigation in India, wrote *Flora Indica* and *Hortus Bengalensis*. William Carey revised and published volume one of Roxburgh's *Flora Indica* in 1820, and volume two in 1824, with substantial observations and additions by Wallich.

Robert Wight (1838–1853) mostly devoted himself to the study of the flora of Indian Peninsula between the years 1819 and 1853. In 1834, he conducted significant collecting in the Andhra Pradesh, Tanjore, Courtallum, Dindigul, Nagapatam, Salem, Pulney hills, and most of the Nilgiris districts of the Presidency of Madras. The extensive and intricate but little-known flora of South India was documented and depicted by him. In 1834, he collaborated with Walker-Arnott to publish the *Prodromus Florae Indiae Orientalis* based on the specimens he brought to England. His exhaustive botanical classic, *Iconses Plantarum Indiae Orientalis* (1838-1853.), published in six volumes and completed in fifteen years, depicts the flora of South India in 2101 drawings.

The classical works of Beddome (1868-74) on angiosperm flora of India are: *Icons Plantarum Indiae Orientalis* published during the period 1868-1874 and *The Flora Sylvatica for Southern India* during the period 1869-1874 are the significant contributions.

The phanerogams of India with phytogeographical information are best described in Joseph Dalton Hooker's *Flora of British India*, which he published between 1875 and 1897 in seven volumes.

James Sykes Gamble documented floristic wealth between 1883 and 1889 throughout the Madras Presidency and published *Flora of the Presidency of Madras* in London as 3 volumes in 1915–1936. The botanical community generally agrees that *Flora of the Presidency of Madras* is among the finest regional floras of India.

Theodore Cooke, with the assistance of a few aides, covered the *Presidency of Bombay* (including Sind and Baroda) between 1901 and 1908. Thirty years of effort in India resulted in the three-volume *Flora of the Presidency of Bombay*, an invaluable resource for identifying and describing plants.

The Flowering Plants of Travancore State, which includes the southern districts of Kerala, Tirunelveli, and the Kanyakumari districts of Tamil Nadu (Rama Rao, 1914), is another significant taxonomic study from South India. A

survey of the *Flora of the Anamalai Hills* in the Coimbatore district, Madras Presidency (Fischer, 1921), *The Flora of the South Indian Hill Stations* (Fyson, 1932), *The shola of Palghat Division: a study in the ecology and silviculture of the Tropical Rain Forests of Western Ghats* (Aiyar, 1932), *A preliminary survey of forests of India* (Champion, 1968), *Phytogeography of south Indian hill stations and some observations in the succession of vegetations around Kodaikanal* (Meher-Homji, 1969), *Orophytes of South India and Himalayas* (Blasco, 1971), *A synoptic Flora of Mysore district* (Rao & Razi, 1981), *The Flora of Tamil Nadu Carnatic* (Matthew, 1983), *The Flora of the Palni Hills, South India* (Matthew, 1999), *Flora of Tamil Nadu grasses* (Kabir & Nair, 2009), T*axonomic monograph on* Impatiens *L. (Balsaminaceae) of Western Ghats, South India- the key genus for endemism* (Bhaskar, 2012), etc are some of the major studies from South India.

In Kerala, the flora of twelve districts were completed so far: *Flora of Calicut* by Manilal and Sivarajan (1982), *Fora of Quilon* by Mohanan (1984), *Flora of Kasaragod* by Ansari (1985), *Flora of Cannanore* by Ramachandran and Nair (1988), *Flora of Kottayam* by Antony (1989),, *Flora of Malappuram* by Babu (1990), *Flora of Palghat* by Vajravelu (1990), *Flora of Thiruvananthapuram* by Mohanan and Henry (1994), *Flowering Plants of Thrissur Forest* by Sasidharan and Sivarajan (1996), *Flora of Pathanamthitta* by Anilkumar *et al*. (2005), *Flora of Alappuzha District* by Sunil and Sivadasan (2009) and Flora of Wayanad by Narayanan (2009).

The *Hortus Malabaricus* was translated and reinterpreted in English and to Malayalam by Manilal (2003, 2008).

Compared to other districts of Kerala, the taxonomic studies of Idukki is not yet complete. The available scattered and fragmentary floristic studies of the district include, Beddome's (1882) first botanical collection from Peerumedu and adjacent Anamudi. Rama Rao (1914) cited various places of this area in his work; Barnes (1939) had studied the Geraniaceae of high ranges; Iyppu (1955) and Chandrasekharan (1962) have studied the forest types of Idukki district; Sebastine and Vivekananthan (1967) and Shetty and

Vivekananthan (1971) published brief accounts on the flora of Anamudi and Devikulam while Vivekananthan (1978) studied the vegetation of Periyar tiger reserve and also enumerated 12 rare and threatened plants of the area. Studies by Shetty and Vivekananthan (1968, 1969, 1970, 1972, 1973, 1975 & 1991), Sharma *et al*. (1974), Nayar (1974), Nagendran *et al*. (1975), Sreekumar *et al*. (1983a, 1983b), Nair and Sreekumar (1985) and Pandurangan and Nair (1993, 1995) resulted in the discovery of several new taxa from the district. Shetty and Vivekananthan (1972) reported the occurrence of some rare and little-known taxa. Mohanan *et al*. (1984) and Balasubramanyan *et al*. (1989) reported some rare and interesting plants from the Idukki hydro-electric project area andPooyamkutty hydroelectric project area respectively. Protected areas of the high ranges were studied for the floristic wealth and ecological aspects by various workers (Jomy, 2000; Sasidharan, 1996 & 2000; Biju, 2004; Kishore, 2003; Shetty & Vivekananthan, 1968, 1969, 1970, 1973, 1975). Gopalan (1973) and Nayar (1986) studied the problems associated with the encroachment and subsequent eviction taken place in Cardamom hill Reserve during 1958-1970. Sivanandan *et al*. (1986) studied the new encroachment and their impacts in the floristic aspects of the Cardamom hill Reserve. Sasidharan (1999) studied the flora of Chinnar Wildlife Sanctuary and Jomy (2012) gave a preliminary account on the flowering plant diversity of Cardamom hill Reserve.

Recently, many new taxa were described and illustrated from different regions of Idukki district, which include *Hydnocarpus longipedunculatus* Robi, Sasidh. & Jose (Robi *et al*., 2014), *Eriocaulon biappendiculatum* Manudev, Robi & Nampy (Manudev *et al*., 2015), *Hedychium matthewii* S.Thomas, B.Mani & S.J.Britto (S. Thomas *et al*., 2015), *Tripogon idukkianus* Sunil & Pradeep (Sunil *et al*., 2015), *Sida pradeepiana Tambde & Sardesai* (Tambde *et al*., 2016), *Symplocos nicolsonii* (Jagadeesan *et al.,* 2016), *Lepidagathis benojiana Jithin & Jose* (Jithin & Jose, 2017), *Impatiens mankulamensis K.M.P.Kumar, R.Jagad. & Nagaraj and I. panduranganii K.M.P.Kumar, R.Jagad & G.Prasad* (Prabhukumar *et al*., 2017), *Impatiens brittoi* B.Mani & S.Thomas (Mani & Sinjumol, 2017), *Peperomia ekakesara* Syam Radh &

Nampy (Syam & Nampy, 2018) *Impatiens josephia* S.Thomas, B.Mani & S.J.Britto (Mani *et al*., 2018), *Begonia bracteolata* N.Krishna, Pradeep & B.Mani (Krishna *et al*., 2018), *Memecylon idukkianum* Nampy & Syam Radh (S.Syam Radh & Santhosh Nampy, 2019), *I. eravikulamensis* (Salish *et al*., 2019) *Eriocaulon vamanae* Dani & Nampy (Francis *et al.,* 2020), *Impatiens grandispora* Nampy & M.Vishnu and *I. nidholapathra* M.Vishnu & Nampy (Vishnu *et al*., 2020), *Impatiens periyarensis* B.Mani, S.Thomas & Britto (Mani *et al*., 2020), *Asyneuma cupulare* Divya & Nampy (Divya *et al.,* 2021), *Parasopubia raghavendrae* Divya & Nampy (Venugopal *et al*., 2021), *Impatiens raktakesara* M.Vishnu & Nampy (Mohan *et al*., 2021), *Burmannia munnarensis* Dani & Nampy (Francis *et al*., 2021), *Impatiens danii* Sindhu Arya, V.Suresh & V.S.A.Kumar (Sindhu *et al.,* 2021), *Peperomia albertiea* (Arjun & Jameson 2022), *Eriocaulon pandeyana* Nampy, Harishma & Vishnu (Harishma *et al*., 2022), *Polygala idukkiana* M.Vishnu & Nampy (Vishnu & Nampy, 2022), *Kalanchoe dineshii* Syam Radh & Nampy (Radh S.S & S. Nampy 2022).

The available data on floristic studies of the district are not enough to elucidate the actual picture of the floristic structure of this highly undulating area.

Materials & Methods



MATERIALS AND METHODS

Explorations

Extensive field explorations were conducted frequently, covering all seasons from 2017 to 2022. Different habitats, such as grasslands, evergreen forests, shola forests, peaks, etc. were surveyed repeatedly at different seasons. Plants growing in home gardens and under cultivation were excluded, but those introduced and naturalized and those planted as vital component of social forestry were incorporated into the research.

Collection of samples

Twigs (2-4 nos) with good vegetative and reproductive characters were collected in polythene bags, tightened with rubber bands to prevent desiccation, and preserved for laboratory studies and herbarium preparation. For small herbaceous plants, more number of specimens (up to six) were collected. Specimens of both male and female plants were used for dioecious species. The branches were trimmed using secateurs, and the subterranean portion of the herbs was collected with a digger.

Field data collection

Following specimen collection, characters (information such as the specimen's name, collection number, location, date, and description of any floral components that could alter after drying) were noted in field record. The latitude, longitude as well habitat of each species were noted by a 72H GPS (Garmin Switzerland). Duplicate specimens were also collected. Habit photographs were taken with a EOS 77D (Canon, Japan and α55 (Sony, Japan) DSLR cameras.

Processing of samples

The collected specimens were preserved using 70% methylated alcohol/ 5% formaldehyde solution by wet method (Fosberg & Sachet, 1965). Reproductive parts were pickled in the bottle containing preservation liquid (70% methylated alcohol/ 5% formaldehyde solution by wet method) for future examination in the laboratory.

Pressing

The collected specimens were kept within the newspaper. Floral parts were spread out. If the specimens are longer than the herbarium sheet, they must be folded in V and N or Z shapes. Needless overlying leaves and other parts were removed. In the case of palmately compound large leaves, split it in half lengthwise and one half is only taken. If it is pinnately compound, a portion was only considered. A bulgy succulent part needs to be cut longitudinally, in order to evaporate the moisture.

The specimens, were covered by blotters on either side. After all the specimens were pressed, the straps were tightened to further apply pressure.

Re-pressing

The blotters were changed if they are moistened after that the specimens were retained with the fresh blotters.

Drying Techniques

The most common technique is to dry using artificial heat. For that, we use Labomed (United States) Hot air oven is used. Usually, 60℃ is the temperature at which specimens are dried. Regularly monitor the specimens to change the blotting papers according to the moisture content. When the plants were dry, the pressures must be released.



Field exploration in different parts of the study area



Specimen collection



Team acombines for the field exploration

Herbarium preparation

The preparation of the herbarium specimens followed the standard guidelines. (Bridson & Forman, 1989).

Certain delicate plants, like *Impatiens nidholapatra*, were difficult to mount on the sheet. In that instance, mounting sheet is placed beneath specimen that are floating, and the sheet is gradually raised until the specimen is laying on the paper and out of the water. After that, the sheet is raised, gently sloping the surface to allow for water runoff. The plants were laminated with plastic sheets to keep them in place, and the preparation is once again mounted on the herbarium sheets.

Labeling

The size of label is 11 × 14.5 cm. Collection Number, Date of Collection, Altitude, Locality, Scientific name, Family, Notes, Name of collector(s)- and determined by will be noted in the label.

Poisoning of Herbarium

Herbarium specimens should be safeguarded from pest and insect damage by taking preventative measures. Insect repellants such as naphthalene balls or para dichlorobenzene are occasionally kept in minute quantities in the herbarium cabinets. The use of mercuric chloride provided long-term protection.

Description making

The collected specimens were critically analyzed using Luxeo 4Z stereo-zoom microscope (Labomed, United States). For the description of taxa, the terminology followed Lawrence (1951), Simpson (2006) and Beentje (2010). The following order was used for illustrating each species' description: habit, leaves, inflorescence, flower, calyx, corolla, stamens, ovary, fruit and seed. The flowering and fruiting periods are given after the description. The information about the specimens examined were provided in order of geographic distribution.

Illustrations and photoplates

Interesting specimens were analyzed and photographed under a stemi stereomicroscope (Zeiss, Germany) equipped with an axiocam 105 color camera. Photoplates were prepared by using Adobe photoshop CS6. Illustrations were made with Rotring isograph pen equipped with 0.1 mm and 0.2 mm nibs on Gateway paper using camera lucida.

Identification of collected specimens

The specimens were identified using pertinent literature: (*The Flora of British India* (Hooker, 1872-1897); *The Flora of Presidency of Madras* (Gamble & Fischer, 1915-1936); *Flora of India* (Sharma *et al*., 1993; Sharma & Balakrishnan, 1993; Sharma & Sanjappa, 1993; Hajra *et al*., 1995, 1997; Sing *et al*., 2000; Balakrishnan *et al*., 2012); *The Flora of Kerala* (Daniel, 2005), etc., and cross-compared with authentic herbarium specimens of the Madras Herbarium (MH) and Calicut University (CALI). Selected specimens were compared with protologues and the type specimens were consulted in a few required cases.

Assessment of conservation status

The conservation status of newly described plants was assessed by using IUCN guidelines 2022 and the status of the remaining taxa will be checked from the IUCN website (https://www.iucnredlist.org/).

Taxonomic key preparation

An artificial diagnostic (dichotomous parallel) key was prepared in order to identify the families, genera under each family, and species under each genus, wherever required. The genera under each family, and species under each genus are arranged alphabetically.

Seed micromorphology

Seed micromorphology was examined using Gemini 300 Scanning Electron Microscope (Zeiss, Germany). The samples were fixed in FAA and dehydrated by passing through an ethanol series. The dehydrated

specimens were critical point dried, mounted onto stubs, and coated with gold and palladium.

Herbarium depositions

Processed herbarium specimens were deposited in Calicut University Herbarium (CALI).

Presentation of data

The families were arranged according to the classification of Bentham & Hooker (1862−1883), Key to the family, key to the genera, key to the species and key to the infraspecific taxa are given. The genera and the species under each genus are arranged in alphabetic order.



Results

RESULTS

Systematic treatment

Key to the families of polypetalae

1. Stamen hypogynous; arising directly from receptacle……2
1. Stamen epi- or peri- gynous; arising from calyx……..45
2. Sepals and petals imbricate……3
2. Sepals and petals valvate……..39
3. Sepal free……4
3. Sepal united at base……25
4. Stamens more than 12; if fewer, then sepals and petals 4 with a 2-valved capsule or a berried fruit……5
4. Stamens 10 or fewer……12
5. Sepals 2 – 3……6
5. Sepals 4 or more……7
6. Petals sepal like; trees, shrubs or climbers……Mangnoliaceae
6. Petals not sepal like; herbs……..Portulacaceae
7. Sepals deciduous……8
7. Sepals persistent……11
8. Carpels quite free; ovule 1, ascending or pendulous placentas…… ……..……Ranunculaceae
8. Carpels cohering; ovules 2–many, parietal or intruded placentas……9
9. Herbs or shrubs or trees; sepals 4; ovary and fruit borne on a long Gynophore……..…Capparidaceae
9. Trees or shrubs; sepals 5; ovary and fruit sessile……10
10. Placentation parital……...Bixaceae
10. Placentation axial……Theaceae
11. Leaves alternate……..13
11. Leaves opposite, sometimes whorled……..14

12. Carpels 1–many; disc absent; style free……..Dilleniaceae

12. Carpels 3–10; disc present; style connate……..Ochnaceae

13. Herbs or shrubs; leaves herbaceous, gland-dotted; flowers bisexual, 5-Merous..……Hypericaceae

13. Trees; leaves coriaceous, not gland-dotted; flowers unisexual or polygamous, 4-merous…….Guttiferae

14. Flowers 3-merous……15

14. Flowers 4–5-merous……16

15. Dioecious, scandent herbs or shrub; anther dehiscing by slits; carpels 3…... ……Menispermaceae

15. Bisexual, erect shrubs; anther dehiscing by valves; carpel 1…….. …….Berberidaceae

16. Petals 4; stamens 6…….Cruciferae

16. Petals 5; stamens as many as or twice as many as the sepals and petals ……17

17. Ovary single celled; sepals persistent……18

17. Ovary 2 or more-celled; sepals deciduous……..20

18. Stamens as many as the sepals; placentas parietal……19

18. Stamens twice as many as the sepals; placenta free-central…….. ……...Caryophyllaceae

19. Leaves stipulate; sap non pungent…….Violaceae

19. Leaves exstipulate; sap pungent……..Pittosporaceae

20. Filaments of anthers free (except in some Geraniaceae)……21

20. Filaments of anthers united……24

21. Leaves stipulate……...22

21. Leaves exstipulate……Sapindaceae

22. Seeds pendulous……..23

22. Seeds erect……..Staphyleaceae

23. Leaves compound, opposite; stamens 10……Zygophyllaceae

23. Leaves simple or if compound, then alternate; stamens 5……..Geraniaceae

24. Flowers irregular; sepals 5, unequal; stamens 8; ovary 1–3-celled; style Single……...Polygalaceae

24. Flowers regular; sepals 4–5 equal; stamens 5 or 10; ovary 3–5-celled; style 3–5……Linaceae

25. Stamens 3–12; leaves gland-dotted……26

25. Stamens 5 to many; leaves not gland-dotted……Dipterocarpaceae

26. Leaves pellucid gland-dotted……Rutaceae

26. Leaves not as above……27

27. Leaves opposite, simple; stamen 10; disc obscure……Malpighiaceae

27. Leaves alternate; stamens 5; disc large……28

28. Stamens alternipetalous……29

28. Stamens antipetalous……36

29. Ovules and seeds pendulous or horizontal; filament united into a tube…30

29. Ovules and seeds erect or ascending; filament not as above……34

30. Leaves compound……31

30. Leaves simple……...32

31. Leaflets opposite; filament free……Simarubiaceae

31. Leaflets alternate: filament united……...Meliaceae

32. Petals 2-lobed; raphe of seed ventral……Dichapetalaceae

32. Petals entire; raphe of seed dorsal……..33

33. Petals valvate……Icaciaceae

33. Petals imbricate……..Aquifoliaceae

34. Ovary 1-celled; fruit drupaceous ……..Anacardiaceae

34. Ovary 3–5 celled; fruit not as above……35

35. Sepals and petals 4–5; stamens 4–5; seeds arillate, albuminous ……Celastraceae

35. Sepals and petals 5; stamens 3; seeds not arillate, non-albuminous ……Hippocrateaeae

36. Petals valvate……...37

36. Petals imbricate……Sabiaceae

37. Leaves exstipulate; ovules and seeds pendulous; fruits 1-celled, 1-seeded……38

37. Leaves stipulate; ovules and seeds erect or ascending; fruits 2-celled, 2–6 seeded……..Vitaceae

38. Flowers in open racemes or cymes; ovary 3–5-celled; trees or climbers with tendril……...Olacacea

38. Flowers in closed racemes or spike; ovary 1-celled; climbers without tendril……Opiliaceae

39. Flowers 3-merous; sepals free, rarely united……..Annonaceae

39. Flowers 4–6-merous; sepals united into lobes ……40

40. Filament of anther united into column or cup……41

40. Filaments of anthers free, rarely slightly connate at base……42

41. Stamens numerous; anther 1-celled……Malvaceae

41. Stamens usually 15, sometimes fewer; anther 2-celled…….Sterculiaceae

42. Leaves imparipinnate; stamens twice as many as the petals……..… ……..Burseraceae

42. Leaves simple; stamens not as above……43

43. Stamen usually numerous, free from petals……44

43. Stamens 4–5, adnate to the base of the petals……Rhamnaceae

44. Anther opening by slits; petals not ciliate or laciniate; fruit capsular or separating by cocci ……Tiliaceae

44. Anther opening by pores or valves; petals ciliate or laciniate; fruit a drupe with single stone…..……Elaeocarpaceae

45. Stem herbaceous or woody, if fleshy, not flattened or articulated……46

45. Stem fleshy, flat, articulated……..Cactaceae
46. Ovary of 1 or more free carpels, or if carpel united, then more than 1-celled ……..47
46. Ovary syncarpous, usually free from the calyx……62
47. Ovules attached to the inner angle or the bases of the carpels or cells; ovules many……..48
47. Ovules pendulous from the apex of the carpels or cells; ovules few……59
48. Leaves stipulate; style terminal; flowers irregular with 10 or fewer stamens, or regular with numerous stamens; carpels solitary excentric……Leguminosae
48. Leaves exstipulate; style not terminal or ovules at the base of the carpel; carpels several…..……..49
49. Flowers bisexual, rarely polygamous……..50
49. Flowers unisexual……58
50. Carpels and styles distinctly free……51
50. Carpels and styles united throughout……54
51. Stamens many or if only 4–5, then styles basal; style not terminal……Rosaceae
51. Stamens 5–10; style terminal……52
52. Carpels quite free; sepals and petals 4–5; fruit follicular……53
52. Carpels united; or if free, then petals 0; fruit capsular……Aizoaceae
53. Ovules 2 in each cell, ascending from the base; leaves alternate; trees or climbing shrubs……Connaraceae
53. Ovules many; leaves opposite, rarely the upper alternate; fleshy herb ……Crassulaceae
54. Calyx-lobes imbricate; fruit a fibrous berry……55
54. Calyx-lobes valvate; fruit a capsule……57
55. Stamens many; anthers opening by slits; petals imbricate in bud……56

55. Stamens 3–12; anthers usually opening by pores; petals contorted in bud…….…….. ……Melastomaceae

56. Leaves opposite, usually gland-dotted……..Myrtaceae

56. Leaves alternate, not gland-dotted……Lecythidaceae

57. Petals usually crinkled; ovary free from the calyx-tube; or slightly adnate at the base……Lythraceae

57. Petals not crinkled; ovary completely or half adnate to the calyx-tube ……Onagraceae

58. Flowers symmetrical, stamens few, usually 3; style united or free only at apex; fruit not winged; climbers or prostrate plants, usually bearing tendrils……Curcurbitaceae

58. Flowers not symmetrical, stamens many; style free or united only at the base; fruit often winged; erect herbs or shrubs, tendrils absent ……..Begoniaceae

59. Ovules 2 or more in each cell; or if only 1 then aquatic herb……60

59. Ovule 1 in each cell; flower bisexual……...61

60. Herbs, often aquatic; flowers unisexual; styles 4; 1 seeded…..Haloragaceae

60. Trees or shrubs; flowers bisexual; style 1; more than 1 seeded ……Combertaceae

61. Trees or shrubs, sometimes scandent; fruit fleshy, indehiscent; carpels more than 2, devoid of glandular tubules……Araliaceae

61. Herbs; fruit not fleshy, dehiscent; carpels with glandular tubules ……Umbelliferae

62. Small herbs; leaves covered with glandular hairs; flowers with styles quite distinct……Droseraceae

62. Climber with tendrils; glandular hairs absent; flowers with distinct corona……..Passifloraceae

RANUNCULACEAE Juss.

Gen. Pl. 231. 1789, *nom. cons.*

Annual to perennial herbs, shrubs or linanas (*Clematis*). Leaves alternate (often) or opposite (*Clematis*), simple or compound. Flowers solitary, or in cymes, racemes or panicles, terminal or axillary. Calyx polysepalous or partially gamosepalous. Corolla polypetalous, partially gamopetalous. Androecium with many free stamens, maturing centripetally. Ovary superior, ovules 2-many. Fruits follicles or achenes, dry or fleshy (rarely).

The family includes 50 genera worldwide (POWO, 2023); four genera and eight species in the study area.

Key to the genera

1. Plant climbers; leaves opposite ..... *Clematis*
1. Plants herbs; leaves alternate 2
2. Sepals four ..... *Thalictrum*
2. Sepals more than four.....3
3. Petals present; leaves not lobed.....*Ranunculus*
3. Petals absent; leaves thri lobed..... *Eriocapitella*

Clematis L.

Sp. Pl. 1: 543. 1753.

Key to the species

1. Petals present..... *C. zeylanica*
1. Petals absent.....2
2. Flowers less than 1.5 cm across; leaves bipinnate .....*C. gouriana*
2. Flowers more than 2.5 cm across; leaves 3-5 foliate 3
3. Sepals white, elliptic, up to 9 mm long.....*C. munroiana*
3. Sepals violet, lanceolate-oblong, up to 3.3 cm long..... *C. pettimudiensi*

Clematis gouriana Roxb. ex DC., Syst. Nat. 1: 138. 1817; Hook.f., Fl. Brit. India 1: 4. 1872; Gamble, Fl. Madras 3.1915; N.P.Balakr. in P. Daniel (ed.), Fl. Kerala 1: 113. 2005.

Woody climbing shrubs. Stems angular, puberulous. Leaves opposite, bipinnate, 5-foliate; leaflets ovate, 6–7 × 3–3.5 cm, acuminate at apex, rounded

at base, entire, sparsely pubescent below, glabrous above, papery; petioles twinning, 3–6 cm long, glabrous, wiry. Flowers in axillary and terminal panicles, fragrant 1.2 cm across; peduncles 2–6 cm long, narrow, glabrous;



pedicels 1–1.5 cm long, slender, glabrous. Sepals 4, free, oblong-ovate, 5–6 × 2–3 mm, truncate at apex, entire, puberulous out, glabrous within, petaloid. Petals 0. Stamens numerous; filaments *c.* 1 mm long, stout, glabrous. Carpels numerous, pubescent, pubescent; style *c.* 2 mm long, slender, erect, narrow; stigma sticky. Achenes oblong, pubescent, lanceolate.

Distribution: Native range of this species is Indian Subcontinent to S. Central China, Philippines and New Guinea (POWO, 2023); *Habitat*: Moist deciduous forests and grasslands; *Fl. & Ft.*: November-March.

Specimens examined: Kanjiyar, 19.12.1982, *C.N. Mohanan* 76161 (MH); Kulamavu, 08.02.2018, *Vishnu Mohan* & *Santhosh Nampy* 175423 (CALI); Kumily, 25.12.1974. *K. Vivekananthan,* 45695; Meenmutty, 20.02.1983, *C.N. Mohanan* 76265 (MH); Methaganam-PTR, *s.d., Jomy Augustine* 13048 (CALI); MSNP, Prethakkalam, 25.02.2016, *S. Syam Radh & Santhosh Nampy* 145179 (CALI); Thekkady, 14.02.1995, *Jomy Augustine* 14818 (KFRI).

Clematis munroiana Wight, Illu. Ind. Bot. 1: 5. 1840; Gamble, Fl. Madras 3. 1915; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 114. 2005.

Climbing shrubs. Stems grooved, glabrous, angular, stiff, rigid, glabrous. Leaves trifoliate, opposite; leaflets ovate-lanceolate, 8–10 × 3–3.5 cm, obtusely acuminate at apex, rounded at base, margin distantly serrate, glabrous, lined; petioles 3–5 cm long, glabrous, twinning. Flowers on 3-flowered axillary panicles, fragrant; peduncles 5–10 cm long, slender, glabrous; pedicels *c.* 8 cm

long, glabrous. Sepals 4, elliptic, 6–9 × 2–3 mm, acuminate at apex, entire, maroon, tomentose out, glabrous within, white, petaloid. Petals 0. Stamens numerous; filaments constricted below, glabrous. Carpels numerous, ovoid; style 2–3 mm long, pubescent; stigma sticky. Achenes ovate, compressed, densely pilose.

Distribution: Native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: March-October.

Specimens examined: Devikulam, 27.07.1982, *Nambiar* 1821; Kadalar, 31.03.1978, *Nambiar* 292 (KFRI); Odamala, *s.d., Jomy Augustine* 17797 (CALI).

Clematis pettimudiensis K.M.P. Kumar, Jagadeesan & G. Prasad Phytotaxa 326 (4): 289–294. 2017.

Climbing shrubs. Stems subangular, 6–8-ribbed, glabrous, green–purple. Leaves simple, opposite; lamina ovate-lanceolate, 8–13 × 4–5.5 cm, apiculate apex, cuneate-truncate at base, shortly crenulate, glabrous, membranous; petioles twining, 4.5–5.2 cm, subangular, ribbed, distally broader, glabrous. Flowers axillary, 1–2 flowered; peduncle 10–12 cm long; pedicels 6–8 cm long, subangular, glabrous. Bracts 2, ovate-lanceolate, 2–2.3 × 0.5–0.7 cm, mucronate at apex, attenuate at base, shortly crenulate, glabrous. Flowers (–3.5) 5–6 cm across. Sepals 4, lanceolate-oblong, 3–3.3 × 0.3–0.5 cm, apiculate at apex, truncate at base, white ciliate, villous, violet. Stamens 36–42, spreading; filaments 1–2.5 cm long, white, glabrous, ribbed; staminodes 10–15, 1–2 cm long, white, glabrous. Carpels 6–8 mm long; stigma straight. Achenes ovoid-oblong, compressed, silky hairy.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: July-November.

Specimens examined: Pettimudi-Eravikulam, 19.08.2011, *K.M. Prabhukumar, R. Jagadeesan, Binu Prakash & G. Prasad* 9466 (MH).

Clematis zeylanica Poir. in J.B.A.M. de Lamarck, Encycl. Suppl. 2. 296. 1811. *Naravelia zeylanica* (L.) DC., Syst. Nat. 1: 167. 1817; Hook.f., Fl. Brit. India 1: 7. 1872; Gamble, Fl. Madras 1: 3. 1915; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 115. 2005.



Climbing shrubs. Stems terete, pubescent, stiff. Leaves opposite, 3-foliate, terminal leaflets modified into 3-fid tendril; lateral leaflets broadly ovate-elliptic, 8–14 × 4–6 cm, acute or acuminate at apex, rounded at base, entire, pubescent beneath, glabrous above; petiolules 0.4–0.7 cm long, glabrous, stout; petioles 2–4 cm long, glabrous, slender. Flowers in axillary-terminal panicles, fragrant; peduncles 3–7 cm long, slender, glabrous; pedicels 0.5–1.3 cm long, slender, glabrous. Sepals 4, ovate-elliptic, 3–4 × 1–1.5 mm long, rounded at apex, entire at margins, pubescent out, glabrous within, petaloid. Petals 10–12, free, spathulate, 6–8 × 2–4 mm, rounded at apex, entire, glabrous inside, pubescent out. Stamens numerous; filaments 4–7 mm long, erect, glabrous. Carpels numerous; style *c.* 3 mm long, erect, stout; stigma clavate, sticky. Achenes pubescent with long coiled pilose stigma.

Distribution: Native range of this species is Indian Subcontinent to China (S. Yunnan) and Indo-China (POWO, 2023); *Habitat*: Moist deciduous forests, also in the plains; *Fl. & Ft.*: October-April.

Specimens examined: Calvary mount, 14.10.1982, *C.N. Mohanan* 74618 (MH); Devikolam, 08.12.2019, *Vishnu Mohan* & *Santhosh Nampy* 162123 (CALI); Idukki reservoir, 24.12.1983, *A.G. Pandurangan* 66461 (MH); Kumili, 23.11.1988, P.P. *Sudhirkumar* 2821; Thekkady, 22.11.1988, *E. Jayakumar* 2381; Meenmutty, 15.02.1982, *C.N. Mohanan* 73285 (MH); Methamangalam, *s.d., Jomy Augustine* 13046 (CALI).

Eriocapitella Nakai

J. Jap. Bot. 17: 267. 1941.

Eriocapitella rivularis (Buch.-Ham. ex DC.) Christenh. & Byng, Global Fl. 4: 75. 2018. *Anemone rivularis* Buch.-Ham. ex DC., Syst. Nat. 1: 211. 1817; Hook.f., Fl. Brit. India 1: 9. 1872; Gamble, Fl. Madras 1: 4. 1915.

Anemone wightiana Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 3. 1834.



Perennial herbs, up to 30 cm tall. Stems glabrous, shining, smooth. Leaves palmately 3-lobed; leaflets reniform-pentagonal, 4–8 × 3–7 cm, cordate at base; middle lobe 3-parted; lateral lobes unequally 2-parted, pubescent; petioles 5–15 cm long, puberulent, sheathing at base. Flowers in terminal compound cymes; peduncles 10–15 cm long, slender, erect, glabrous; pedicels 0.5–1.4 cm long, slender, pubescent. Involucral bracts 3, elliptic-ovate, 5–6 × 2–3 mm, acute at apex, entire, sparsely pubescent out, glabrous within; bracteoles ovate, 3–3.5 × 1–1.25 mm, acute at apex, entire, sparsely pubescent out, glabrous within. Sepals 5–10, elliptic-obovate, 6–10 × 3–6 mm, acute-rounded at apex, entire, abaxially puberulent, petaloid. Petals 0. Stamens numerous; filaments 3–5 mm long, erect, glabrous. Carpels narrowly ovoid; style often uncinate, hooked; stigma sticky. Achenes fusiform, glabrous.

Distribution: Native range of this species is Indian Subcontinent to Central China, Sumatera (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: June-March.

Specimens examined: Eravikulam, 11.05.1980, *N. Sasidharan* 125 (KFRI); Meesappulimala, 25.11.2018, *Vishnu Mohan* & *Santhosh Nampy* 165423 (CALI); Vattavada, 29.03.1978, *Nambiar* 248 (KFRI); *Ibid*., 05.11.2015, *S. Syam Radh* & *Santhosh Nampy* 145107 (CALI).

Ranunculus L.

Sp. Pl. 1: 548. 1753.

Key to the species

1. Leaflets ovate-elliptic; petals in 2 rows..... *R. reniformis*

1. Leaflets obovate; petals in a single row..... *R. wallichianus*

Ranunculus reniformis Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 3. 1834; Hook.f., Fl. Brit. India 1: 16. 1872; Gamble, Fl. Madras 1: 5. 1915.



Perennial erect herbs, up to 40 cm tall. Stems grooved, slender, pubescent. Leaves radical and cauline; leaflets ovate-elliptic, 6–7 × 5–6 cm, acute at apex, cordate at base, crenate, sparsely pubescent below; petioles 1–3 cm long, glabrous, grooved above, sheathing at base. Flowers axillary, solitary or in panicles, non-fragrant; peduncles 10–20 cm long, slender, sparsely pubescent; pedicels 10–14 cm long narrow, glabrous. Sepals 5, obovate, 6–9 × 3–5 mm, rounded at apex, entire, sparsely pubescent out, glabrous within. Petals in 2 series, obovate-orbicular, 8–12 × 4–8 mm, rounded at apex, smooth, glabrous, with a nectary at base. Stamens numerous; filaments *c.* 2 mm long, stout, glabrous. Carpels numerous, glabrous; style 2–3 mm long, curved; stigma sticky. Achenes in heads.

Distribution: Native range of this species is W. India (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: April-November.

Specimens examined: Munnar, 29.11.1979, *Nambiar* 1094 (KFRI); Vaguvarai, 18.10.1989, *P. Bhargavan* 90962 (MH); way to Anamudi, 13.04.2019, *Vishnu Mohan* & *Santhosh Nampy* 175623; Vattappara-MSNP, 30.12.2014, *Syam Radh S* 137949 (CALI).

Ranunculus wallichianus Wight & Arn., Prodr. Fl. Ind. Orient. 1: 4. 1834; Hook.f., Fl. Brit. India 1: 20. 1872; Gamble, Fl. Madras 5. 1915; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 117. 2005.

Prostrate perennial herbs, up to 25 cm tall. Stems terete, pubescent, stout. Leaves pinnately 3–5-lobed; leaflets obovate, 6–8 × 2–3 cm, deeply dissected, serrate, pubescent; petioles 5–18 cm long, glabrous, grooved above, sheathing at base. Flowers solitary, leaf-opposed, non-fragrant; pedicels 2–5 cm long, slender, densely pubescent. Sepals 5, free, elliptic-oblong, 4–5 × 2–2.5 mm, rounded at apex, entire, sparsely pubescent. Petals 5, free, elliptic-obovate, 5–8 × 2–3 mm, rounded at apex, entire, glabrous. Stamens numerous; filaments *c.* 4 mm long, erect, glabrous, stout. Carpels many; style *c.* 3 mm long, stout; stigma sticky, fleshy. Achenes ellipsoid, shortly tubercled, beak short.

Distribution: Native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: June-December.

Specimens examined: Anamudi shola, 27.11.1979, *Nambiar* 1024 (KFRI); Eravikulam, 18.10.1989, *P. Bhargavan* 918110 (MH); Mankulam, 16.09.2018, *Vishnu Mohan & Santhosh Nampy* 1678999; Melmanalar, *s.d.*, *Jomy Augustine* 12970 (CALI); PTR, 13.12.1993, *Jomy Augustine* 12970 (KFRI).

Thalictrum L.

Sp. Pl. 1: 545 1753.

Thalictrum javanicum Blume, Bijdr. Fl. Ned. Ind. 1: 2. 1825; Hook.f., Fl. Brit. India 1: 13. 1872; Gamble, Fl. Madras 4. 1915.

Thalictrum glyphocarpum Wight & Arn., Prodr. Fl. Ind. Orient. 1: 2. 1834.



Erect perennial herbs, up to 30 cm tall. Stems terete, slender, narrow, glabrous, shining. Leaves alternate; leaflets widely orbicular, 1–2 × 0.8–2 cm, crenate apex, rounded at base, entire, glabrous; petiolules 0.3–0.6 cm long, filiform, slender, glabrous. Stipules auricled, 2–2.4 × *c.* 1 mm, acuminate at apex, entire,

glabrous. Flowers in terminal panicled cymes, non-fragrant; peduncles 9–25 cm long, narrow, glabrous; pedicels *c.* 5 cm long, filiform. Sepals 4, free, petaloid, orbicular-ovate, 2.5–3 × 1.5–2 mm, rounded at apex, obtuse at base, entire, woolly hairs at apex. Petals 0. Stamens many, free; filaments *c.* 3 mm long, glabrous. Ovary superior, style curved; style *c.* 2 mm long, stout; stigma sticky. Achenes few, ellipsoid, sessile glabrous, with hooked style.

Distribution: Native range of this species is Himalaya to China and Tropical Asian Mountains (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: June-October.

Specimens examined: Meesappulimala, 16.09.2018, *Vishnu Mohan & Santhosh Nampy* 1678999 (CALI); PTR, 21.09.1993, *Jomy Augustine* 12430 (KFRI); Srambi kotta, *sd., Jomy Augustine* 12430 (CALI).

DILLENIACEAE Salisb.

Parad. Lond. 2: ad t. 73. 1807, *nom. cons.*

Trees, shrubs, or woody climbers, rarely herbs. Leaves simple, rarely pinnatisect or pinnately compound, usually spirally arranged, rarely opposite, petiolate; stipules absent; lamina leathery, herbaceous, or membranous, margin entire or serrate. Flowers bisexual, rarely unisexual, actinomorphic. Sepals (3 or) 4–5(–18), persistent, usually leathery or fleshy. Petals (2 or) 3–5 (–7), crumpled in bud. Stamens numerous (or 1–10). Gynoecium (1 or) 2–7 (–20)-carpellate, superior; carpels free or hemisyncarpous; stylodia free, apically stigmatic. Fruit a follicle, polyfollicle, berry, or capsule, or indehiscent and enclosed by fleshy sepals.

Eleven genera and 450 species world over (POWO, 2023); one species occur in the study area.

Dillenia L.

Sp. Pl. 535. 1753.

Dillenia pentagyna Roxb., Pl. Coromandel 1: 21. 1795; Hook.f., Fl. Brit. India 1: 38. 1872; Gamble, Fl. Madras 8 1915; N.P.Balakr. & G.V.S.Murthy in P.Daniel(ed.), Fl. Kerala 1: 117. 2005.



Trees, up to 25 m tall. Branchlets woody, terete; bark grey, smooth. Leaves simple, alternate, whorled towards tip; lamina oblong-lanceolate, 30–43 × 10–25 cm, obtuse at apex, attenuate at base, serrate, glabrous above, puberulent beneath; petioles 2–6 cm long, glabrous, stout, clasping at base. Stipules absent. Flowers bisexual, in axillary fascicles, fragrant; pedicels 50–60 mm long, slender, glabrous. Bracts ovate, 5–7 × 6–8 mm, rounded-acute at apex, ciliate, pubescent out, glabrous within. Sepals 5, ovate, 8–10 × 4–6 mm, rounded-acute at apex, entire, glabrous. Petals 5, elliptic-obovate, 10–20 × 6–14 mm, obtuse at apex, entire, glabrous, membranous. Stamens numerous in 2 rows; filaments 15–20 mm long, erect, slender, glabrous. Ovary adnate, glabrous; styles *c.* 4 mm long; stigma crested, sticky. Berries, drooping, subglobose, fleshy. Seeds numerous, glabrous.

Distribution: The native range of this species is Indian Subcontinent to China and S. Sulawesi (POWO, 2023); *Habitat*: Deciduous forests: *Fl. & Ft.*: December-June.

Specimens examined: Meenmutty, 28.05.1982, *C.N. Mohanan* 74078; *Ibid.*,15.12.1982, *C.N. Mohanan* 73266; Thekkady, 15.03.1973, *B.D. Sharma* 43885; Vandiperiyar, 25.05.1965, *K. Vivekananthan* 24340 (MH).

MAGNOLIACEAE Juss.

Gen. Pl. 280. 1789, *nom. cons*.

Trees or shrubs. Stipules 2, connate and adnate to or free from petioles, splitting and caducous. Leaves simple, spirally arranged, rarely distichous. Flowers terminal or terminal on axillary brachyblasts, solitary. Spathaceous bracts. Tepals 6–9(–45), in 2 to many whorls, 3(–6) per whorl, usually fleshy, sometimes outer ones (perules) nearly leathery or reduced and sepal-like.

Carpels and stamens many. Androecium usually at basal part of torus; filaments thick and short, sometimes elongated; connective usually exserted and forming a long or short tip; anthers linear. Gynoecium at apical part of torus, sessile or with a gynophore; carpels folded. Fruit dehiscing along dorsal and/or ventral sutures.

Two genera and 38 species in the world (POWO, 2023); one species in the study area.

Magnolia Plum. ex L.

Sp. Pl. 535. 1753.

Magnolia nilagirica (Zenker) Figlar, Proc. Int. Symp. Magnoliac. 1: 23. 2000.

Michelia nilagirica var. walkeri (Wight) Hook.f. & Thomson in Hook.f. Fl. Brit. India 1: 44 1872.

Michelia nilagirica var. *wightii* Hook.f. & Thomson in J.D.Hooker, Fl. Brit. India 1: 44 1872. N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 128. 2005.

Trees, up to 30 m tall. Branchlets woody, terete, tomentose on young parts, lenticellate. Leaves simple, alternate, crowded towards apex; lamina elliptic-obovate, 5–10 × 3–5 cm, acuminate at apex, cuneate at base, entire, glabrous above, villous beneath, coriaceous; petioles 1.5–2 cm long, tomentose, stout, grooved above. Stipules oblong, 1.5–2 × *c.* 1 cm long, acuminate at apex, entire, coriaceous, woolly. Flowers bisexual, fragrant, axillary or terminal, solitary; pedicels 0.8–1 cm long, stout. Bracts ovate, spathaceous, 30–40 × 20 mm, acute at apex, entire, pubescent out, glabrous within. Tepals 9–12, obovate-lanceolate, 30–50 × 12–15 mm, acuminate at apex, entire, glabrous. Stamens numerous, crowded at the base of gynophore; filaments reduced, flat. Carpels many, ovoid, sessile, pubescent; style *c.* 2 mm long, curved. Capsules globose. Seed one, scarlet.

Distribution: The native range of this species is W. & S. India and Sri Lanka (POWO, 2023); *Habitat*: Shola forests: *Fl. & Ft.*: December-August.

Specimens examined: Meenmutty, 15.12.1982, *C.N. Mohanan* 73266 (MH); *Ibid.*, 28.05.1982 *C.N. Mohanan* 74078 (MH); Thekkady, 15.03.1973, *B.D. Sharma* 43885 (MH); Vandiperiyar, 25.05.1965, *K. Vivekananthan* 24340 (MH).

ANNONACEAE Juss.

Gen. Pl. 283. 1789. *nom. cons.*

Trees, shrubs or wines. Leaves alternate, simple entire, more or less distichous. Flowers bisexual or rarely unisexual. Thalamus convex shaped. Bracts and bracteoles sometimes present. Sepals 3 or rarely 2–1, free or connate. Petals 6, usually thick, biseriate, hypogynous, greenish, purple-red, brown-yellow. Stamens many, closely packed on torus. Filaments short or 0. Carpels numerous or rarely few, free or rarely coherent. Styles short or 0. Fruit sessile or stalked. Seeds 1-many, with abundant ruminate albumen and a minute basal embryo.

The family is of particular importance because of edible fruits of some species of *Annona.* It includes 111 genera in the world (POWO, 2023); 10 genera and 17 species in Idukki district.

Key to the genera

1. Plants climbers or stragglers……..2
1. Plants erect shrubs or trees ……3
2. Plants climb by means of leaf-opposed hooks……*Artabotrys*
2. Plants climb by means of axillary tendrils……*Uvaria*
3. Flowers solitary or in pairs……4
3. Flowers usually more than 2, in cymes or fascicles ……5
4. Carpel one……*Cyathocalyx*
4. Carpels many……6
5. Inner petals shorter than outer ones……*Sageraea*
5. Inner petals longer than outer ones……7
6. Carpels less than 12……*Meiogyne*
6. Carpels more than 12……8
7. Outer petals distinctly clawed; fruitlets ovoid……*Goniothalamus*
7. Outer petals not clawed; fruitlets moniliform……*Desmos*
8. Stamens 6–12……*Orophea*
8. Stamens more than 12……9
9. Outer petals smaller than sepals……*Monoon*
9. Outer petals similar or almost longer than sepals……*Milliusma*

Artabotrys R.Br.

Bot. Reg. 5: t. 423. 1820.

Artabotrys zeylanicus Hook.f. & Thomson, Fl. Ind. 1: 128. 1855; Hook.f., Fl. Brit. India 1: 54. 1872; Gamble, Fl. Madras 14. 1915; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 139. 2005.

Climbing shrubs. Stems woody, terete, glabrous; bark brownish black, smooth. Leaves simple, alternate; lamina elliptic-oblong, 10–18 × 5–7 cm, oblong, acute at both ends, entire, glabrous, coriaceous; petioles 0.5–0.8 cm long, glabrous, stout, grooved above. Hooks leaf opposed, woody. Flowers in axillary cymes, fragrant; peduncles compressed; pedicels 1–2 cm long, stout, glabrous. Bracts ovate, 3–5 × *c*. 2 mm, acute at apex, truncate at base, entire, sparsely pubescent. Sepals 3, broadly ovate, *c.* 8 × 6 mm, acute at apex, entire, pubescent out, glabrous within, thick. Petals 6, oblong-lanceolate, 25–30 × *c.* 7 mm, acuminate at apex, cordate-truncate at base, entire, sparsely pubescent out, glabrous within, thick. Stamens many, compressed; filaments glabrous. Carpels several, tomentose; style *c.* 1 mm long, erect, glabrous; stigma sticky. Fruitlets sessile, globose, densely packed.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests, also in the plains; *Fl. & Ft.*: September-June.

Specimens examined: Adimali, 23.08.1980, *R. Rajan* 66553; Kumarikulam, 10.02.1981, *P. Bhargavan* 70171; Kuttikkanam, 24.11.1967, *K. Vivekananthan* 29329; Pachakkanam, 02.10.1976, *K. Vivekananthan* 48388; Panamkutty, 03.05.1984, *C.N. Mohanan* 81723; Pooyamkutty, 02.10.2013, *P. Bhargavan* 92048 (MH); Sivaloda, 16.10.1993 *Jomy Augustine* 12519 (KFRI); Valara, 20.03.1983, *R. Rajan* 73095 (MH).

Cyathocalyx Champ. ex Hook.f. & Thomson

Fl. Ind. 1: 126. 1855.

Cyathocalyx zeylanicus Champ. ex Hook.f. & Thomson, Fl. Ind. 1: 127. 1855; Hook.f., Fl. Brit. India 1: 53. 1872; Gamble, Fl. Madras 13. 1915; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 141. 2005.

Medium sized evergreen trees, up to 10 m tall. Branchlets woody, terete, glabrous; bark greyish-brown, smooth. Leaves simple, alternate; lamina elliptic, 10–20 × 4–9 cm, cuneate or acute at apex, rounded at base, entire, glabrous, coriaceous; petioles 0.7–1 cm long, pubescent when young, glabrous when old, slender. Flowers solitary, or in pairs, extra axillary, bisexual, fragrant; pedicels *c.* 0.5 cm long, brown pubescent when young. Bracts absent. Sepals campanulate, 3-lobed; lobes widely orbicular, *c.* 1 × 2 mm, acute at apex, entire, pubescent out, glabrous within. Petals 6 (3+3), ovate-lanceolate, 25–40 ×7–8 mm (outer), 35–50 × 4–6 mm (inner) acute-acuminate at apex, fused by their very bases, entire, golden pubescent out, puberulous within. Stamens numerous; filaments stout, glabrous. Ovary pubescent, solitary; style *c.* 1 mm long, erect, stout; stigma peltate, dark red. Berries, ovoid, fleshy, glabrous. Seeds compressed.

Distribution: The native range of this species is SW. India, Sri Lanka and Myanmar (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: January-August.

Specimen examined: Adimali, 28.03.1980, *R. Rajan* 66555 (MH).

Desmos Lour.

Fl. Cochin. 1: 352. 1790.

Desmos chinensis Lour., Fl. Cochinch. 1: 352. 1790.

Desmos lawii (Hook.f. & Thomson.) Saff., Bull. Torrey Bot. Club 39: 506. 1912; M.Mohanan in P.Daniel, Fl. Kerala 1: 143. 2005. *Unona lawii* Hook.f. & Thomson, Fl. Ind. 132. 1855; Hook.f., Fl. Brit. India 1: 59. 1872; Gamble, Fl. Madras 15. 1915.

Perennial scandent shrubs, up to 4 m tall. Young stems pubescent, glabrous when old; bark greyish brown. Leaves simple, alternate; lamina ovate-lanceolate, 2.5–9 × 1.5–4 cm, acute at apex, rounded at base, smooth, glaucous below, glabrous above, coriaceous; petioles 0.4–0.8 mm long, hispid, stout. Flowers solitary, axillary and extra axillary, non-fragrant; pedicels 2–4 cm long, slender, glabrous. Bracts elliptic, *c.* 4 × 2 mm, rounded at apex, truncate

at base, smooth, hispid out, glabrous within. Sepals 3, lanceolate, *c.* 5 × 2 mm, acuminate at apex, ciliate, glabrous in, hispid out, thin, yellowish green. Petals 3+3, free, lanceolate, 20–25 × 4 mm (outer) 25–35 × 1–4 mm (inner), acuminate at apex, smooth, pubescent, thick, yellow; outer petals not clawed. Stamens numerous; filaments 1–2 mm long. Carpels many, densely brown tomentose, oblong; style reduced; stigma globose, capitate, sticky. Fruitlets fusciform, *c.* 7 × 6 mm, stipitate, beaked. Seeds globose.

Distribution: Native range is S. China to tropical Asia. (POWO, 2023); *Habitat*: Evergreen & semi evergreen forests; *Fl. & Ft.:* October-April.

Specimens examined: Kulamavu, 25.04.1984, *C.N. Mohanan* 81602 (MH); Sabarimala, *s.d., Jomy Augustine* 12367 (CALI).

Goniothalamus (Blume) Hook.f. & Thomson

Fl. Ind. 1: 105. 1855, nom. cons.

Key to the species

1. Style monofid…… *G. rhynchantherus*
1. Styles bifid……2
2. Leaves obovate; inner petals glabrous except tip……..*G. wightii*
2. Leaves ovate; inner petals densely pubescent……*G. wynaadensis*

Goniothalamus rhynchantherus Dunn, Bull. Misc. Inform. Kew 1914: 182. 1914; Gamble, Fl. Madras 19. 1915; Debika Mitra in B.D.Sharma *et al.*, Fl. India 1: 237. 1993; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 146. 2005.

Trees, up to 5 m tall. Branchlets woody, terete, glabrous; bark smooth, black. Leaves simple, alternate, distichous; lamina elliptic-ovate, 10–15 × 4–6 cm, acuminate at apex, acute at base, entire, glabrous, coriaceous, shining above; petioles *c.* 0.5 cm long, glabrous, grooved above, swollen at base. Stipules absent. Flowers in axillary cymes, fragrant; pedicels 15–40 mm long, stout, glabrous. Sepals 3, broadly ovate, connate at base, 7–8 × 8–9 mm, acute at apex, wider at base, smooth at margins, appressed pubescent out, glabrous in. Petals 3+3; obovate, 15 × 5 mm (outer) distinctly clawed, 20 × 5 mm (inner), acute at apex, hispid at base, entire. Stamens numerous; filaments stout, *c.* 1 mm long, glabrous. Carpels many, densely pubescent; style *c.* 3 mm long,

subulate, pubescent; stigma pointed. Fruitlets many, ovoid, sometimes constricted, glabrous; seed one, ovoid, shiny, reddish-brown.

Distribution: Native range is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* March-June.

Specimen examined: Arjunankotta, *s.d.*, *Jomy Augystine* 13169 (CALI).

Goniothalamus wightii Hook.f. & Thomson, Fl. Ind. 1. 106. 1855; Hook.f., Fl. Brit. India 1: 76. 1872; Gamble, Fl. Madras 1: 18. 1915; Mohanan in P.Daniel, Fl. Kerala 1. 148. 2005; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 148. 2005.



Small trees, 15 m tall. Stems woody, terete; branches puberulous when young, glabrous when old; bark brownish black; lenticellate. Leaves simple, alternate; lamina obovate, 5–15 × 1.5–3.5 cm, acuminate at apex, cuneate at base, entire, glabrous, coriaceous; petioles 0.4–0.5 cm long, glabrous, grooved above, stout. Flowers in axillary fascicle, non-fragrant; pedicels *c.* 0.5 cm long, sparsely pubescent. Bracts ovate, 3–4 mm long, acute at apex, truncate at base, entire, pubescent, thin. Sepals 3, broadly ovate-orbicular, *c.* 3 × 5 mm, acute at apex, entire, pubescent out, glabrous within, thin. Petals 3+3, thick, ovate, 7–15 × 5–9 mm (outer) distinctly clawed, 3–6 × 4–5 mm (inner) glabrous except tip, acute at apex, entire, reddish pink, thick. Stamens numerous; filaments *c.* 3 mm long, densely hairy, stout. Carpels many, ovoid, densely hairy; style bifid, glabrous; stigma bifid, hairy. Fruitlets ovoid, apiculate at apex. Seed one, black, glabrous.

Distribution: Native range is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: December-March.

Specimens examined: Edamalakkudi, 16.03.2019, *Vishnu Mohan & Santhosh Nampy* 168968 (CALI); Mlappara, 06.02.1981, *P. Bhargavan*

69889 (MH); Nakshathra Kutthu, 04.12.2018, *Vishnu Mohan & Santhosh Nampy* 168852; Pachakkanam, *s.d.*, *Jomy Augustine* 12317 (CALI); *Ibid.,* 19.03.1973, *B.D. Sharma* 43943; Thannikkudi, 11.02.1981, *P. Bhargavan* 70174; *Ibid.,* 15.12.1981, *C.N. Mohanan* 72825 (MH).

Goniothalamus wynaadensis (Bedd.) Bedd., Icon. Pl. Ind. Or. 13. 1870; Hook.f., Fl. Brit. India 1: 74. 1872; Gamble, Fl. Madras 19. 1915; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 148. 2005. *Atrutegia wynaadensis* Bedd., Madras J. Lit. Sci. ser. 3, 1: 37. 1864.

Shrubs to small trees, 5–8 m tall. Branchlets woody, terete, young parts minutely fusco-pubescent, becoming glabrous. Leaves simple, alternate; lamina ovate, 10–24 × 3–5.5 cm, abruptly acuminate at apex, attenuate at base, entire, glabrous; petioles 0.6–0.8 cm long, glabrous, stout. Flowers in axillary cymes, non-fragrant; pedicels *c.* 0.5 cm long, slender, sparsely pubescent. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Sepals 3, orbicular, *c.* 3 × 3 mm, obtuse at apex, entire, glabrous. Petals 6 (3+3); ovate, 7–13 × 3 mm (outer) distinctly clawed, 15–20 × *c.* 5 mm (inner) densely pubescent, acute at apex, entire, thick. Stamens many; filaments *c.* 2 mm long, slender. Carpels many, oblong, hairy; style 3–4 mm long, bifid, erect; stigma bifid. Fruitlets many, ovoid, shortly stalked. Seed one.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: August-March.

Specimen examined: Valara, 19.03.1982, *R. Rajan* 73074 (MH).

Meiogyne Miq.

Ann. Mus. Bot. Lugduno-Batavi 2: 12. 1865, *nom. cons.*

Key to the species

1. Lamina lanceolate; carpels oblong……*M. pannosa*

1. Lamina oblong; carpels ovoid……..……..…..*M. ramarowii*

Meiogyne pannosa (Dalzell) J.Sinclair, Sarawak Mus. J. 5: 604. 1951; Debika Mitra in B.D.Sharma *et al.*, Fl. India 1: 266. 1993; M.Mohanan in P.Daniel, Fl. Kerala 1: 149. 2005. *Unona pannosa* Dalzell, Hook.'s J. Bot. Kew.

Gard. Misc. 3: 207. 1851; Hook.f., Fl. Brit. India 1: 58. 1872; Gamble, Fl. Madras 14. 1915.

Ever green small trees, up to 8 m tall. Branchlets woody, pubescent on young stage, glabrous when old. Leaves simple, alternate; lamina lanceolate, 4.5–7.5 × 1.8–3 cm, obtusely acuminate at apex, acute at base, entire, glabrous, coriaceous; petioles *c.* 0.5 cm long, pubescent, grooved above. Flowers solitary, axillary or terminal, non-fragrant; pedicels *c.* 2 mm long, stout, golden brown hairy. Sepals 3, free, widely ovate, 5–6 × 4–5 mm, acuminate at apex, entire, tomentose out, glabrous within, thick, green. Petals 6 (3+3), elliptic-lanceolate, *c.* 8 × 5 mm (outer), *c.* 5 × 4 mm (inner), acuminate at apex, entire, smooth, golden brown silky tomentose, fleshy. Stamens numerous; filaments 1–1.5 mm long, stout, densely pubescent. Carpels 10, oblong, soft velvitish; style 2–3 mm long, erect, pubescent; stigma capitate, sticky. Fruitlets ovate, short stalked, pubescent.

Distribution: The native range of this species is W. & S. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: Throughout the year.

Specimens examined: Deviar, *s.d.*, *Jomy Augustine* 12133 (CALI); Kulathure, 14.01.1984, *Rev. Fr. Kadaril* 183; Meenmutty, 12.12.1983, *A.G. Pandurangan* 66437; *Ibid.,* 19.02.1983, *C.N. Mohanan* 76256; Valara, 19.03.1982, *R. Rajan* 73071 (MH).

Meiogyne ramarowii (Dunn) Gandhi C.J.Saldanha & D.H.Nicolson, Fl. Hassan Distr.: 38 1976. *Unona ramarowii* Dunn, Bull. Misc. Inform. Kew 1914: 183. 1914; Gamble, Fl. Madras 15. 1915. *Meiogyne ramarowii* (Dunn) Gandhi in Saldanha & Nicolson, Fl. Hassan Dist. 38. 1976.

Evergreen shrubs-small trees, up to 6 m tall. Branchlets woody, terete, pubescent when young, glabrous when old; bark brownish, lenticellate. Leaves simple, alternate; lamina oblong, 9–13 × 3.5–6 cm, acuminate at apex, obtuse at base, entire, glabrous above, slightly hirsute below, coriaceous; petioles 0.5–1 cm long, hirsute, grooved above, stout. Flowers solitary, axillary, non-fragrant; pedicels 0.3–0.5 cm long, stout, woody, hispid. Bracts absent. Sepals 3, broadly ovate, *c.* 7 × 5 mm, acute at apex, entire, hispid, thick. Petals 3+3, oblong-lanceolate, 20–30 × 5 mm (outer), 30–40 × 5 mm (inner), acute at apex,

entire, densely hispid, thick, greenish yellow; outer petals not clawed. Stamens numerous; filaments *c.* 3 mm long, sub-sessile, stout, glabrous. Carpels ovoid, puberulous; style reduced; stigma capitate. Fruitlets oblong, shortly stalked, tomentose, red. Seeds many, elliptic, black.

Distribution: Native range is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-August.

Specimens examined: Kattappana, 12.06.1983, *A.G. Pandurangan* 79203 (MH) Koruthode, *s.d.*, *Jomy Augustine* 162661 (CALI); Thekkady, 15.03.1973, *B.D. Sharma* 43876; Sabarimala, 27.09.1972, *B.D. Sharma* 42059; Uppuparai, 18.12.1974, *K. Vivekananthan* 45358 (MH).

Miliusa Lesch. ex A.DC

Mem. Soc. Phys. Geneve 5: 213. 1832.

Key to the species

1. Pedicels > 2 cm long; sepals linear lanceolate……*M. tomentosa*

1. Pedicels < 1 cm long; sepals broadly ovate…….…… *M. indica*

Miliusa indica Lesch. ex A. DC., Mem. Soc. Phys. Geneve 5: 212. 1832 M.Mohanan in P.Daniel, Fl. Kerala 1: 152. 2005.

Miliusa indica var. *tomentosa* (Thwaites) Hook.f. & Thomson in Hook.f Fl. Brit. India 1: 86 1872.



Evergreen small trees or shrubs. Branchlets woody, appressed pubescent when young, glabrous when old; bark greyish brown. Leaves simple, alternate; lamina lanceolate-elliptic, 3.5–6 × 1.5–3 cm, acuminate at apex, obtuse at base, ciliate, glabrous above, pubescent below, coriaceous; petioles 0.2–0.5 cm long, pubescent, swollen at base, grooved above. Flowers solitary, axillary; pedicels 0.5 cm long, drooping, narrow, hispid. Bracts 2, elliptic, 2–3 × *c.* 1 mm, acute at apex, rounded at base, entire, pubescent out, glabrous

within. Sepals broadly ovate, 2–2.5 × *c.* 1 cm, acute at apex, ciliate at margins, glabrous. Petals 6 (3 + 3), sepaloid; elliptic-ovate-lanceolate, 15–20 × *c.* 8 mm (outer), 6–8 × 3–4 mm (inner), acute at apex, entire, glabrous, thick. Stamens more than 12; filaments *c.* 1 mm, erect, pubescent. Carpels more than 12, linear-elliptic, glabrous; style 2 mm long, stout, glabrous; stigma sticky. Fruitlets ovoid, beaked, glabrous.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: March-August.

Specimens examined: Karimanal, 09.03.2017, *Vishnu Mohan* & *Santhosh Nampy* 152053; Mathikettan Shola National Park, Sivanpara, 28.07.2016. *S. Syam Radh & Santhosh Nampy* 149182; Painvu, 06.08.2017. *Vishnu Mohan & Santhosh Nampy* 154309; Upper Manalar, *s.d.*, *Jomy Augustine* 13730 (CALI); *Ibid.,* 14.05.1994, *Jomy Augustine* 13730 (KFRI).

Miliusa tomentosa (Roxb.) Finet & Gagnep., Bull. Soc. Bot. France 4: 153. 1906; Debika Mitra in B.D.Sharma *et al.*, Fl. India 1: 221. 1993; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 153. 2005. *Uvaria tomentosa* Roxb., Pl. Coromandel 1: 31. 1795. *Saccopetalum tomentosum* (Roxb.) Hook.f. & Thoms., Fl. Ind. 152. 1855, in J.D.Hooker, Fl. Brit. India 1: 88. 1872; Gamble, Fl. Madras 22. 1915.

Deciduous trees up to 10 m tall. Stems woody, bark longitudinally grooved, tomentose when young, glabrous when old. Leaves simple, alternate, distichous; lamina ovate-lanceolate, 3–12 × 2–4 cm, acute at apex, rounded at base, entire, tomentose above when young; petioles 0.2–0.4 cm long, slender, pubescent. Flowers solitary, non-fragrant; pedicels *c.* 3 cm long, very slender, tomentose. Sepals 3, linear-lanceolate, *c.* 5 × 1.5 cm, acute at apex, entire, tomentose out, glabrous within. Petals 3+3; outer petals ellipsoid, linear-lanceolate, 20–40 × 10–20 mm (outer), 15–20 × 5–10 mm (inner), acute at apex, entire, tomentose out, glabrous within, thick. Stamens more than 12; filaments *c.* 3 mm, long, erect, glabrous. Carpels more than 12, stalked,

broadly ovate, brown tomentose; style reduced; stigma capitate. Fruit an aggregate of berries; fruitlets sub-globose, tapering to base.

Distribution: Native range is Indian Subcontinent (POWO, 2023); *Habitat*: Moist and dry deciduous forests; *Fl. & Ft.*: October-May.

Specimen examined: Thekkady, *s.d.*, *Jomy Augustine* 16972 (CALI).

Monoon Miq.

Ann. Mus. Bot. Lugduno-Batavi 2: 15. 1865.

Key to the species

1. Leaves brown tomentose beneath; pedicels < 2 cm long……. *M. fragrans*

1. Leaves glabrous beneath; pedicels > 2 cm long……..... *M. coffeoides*

Monoon coffeoides (Thwaites ex Hook.f. & Thomson) B.Xue & R.M.K. Saunders, Taxon 61(5): 1030. 2012. *Guatteria coffeoides* Thwaites ex Hook.f. & Thomson, Fl. Ind. 141. 1855. *Polyalthia coffeoides* (Thwaites ex Hook.f. & Thomson) Bedd. in Icon. Pl. Ind. Or.: 11 1869; Gamble, Fl. Madras 16. 1915; Debika Mitra in B.D.Sharma *et al.*, Fl. India 1: 270. 1993; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 164. 2005.

Trees, up to 6 m tall. Stems woody, minutely puberulous when young, glabrous when old; bark brownish grey, lenticellate. Leaves simple, alternate, distichous; lamina ovate-elliptic, 15–20 × 4–7 cm, acute at apex, cuneate at base, entire, glabrous, coriaceous; petioles 0.3–0.5 cm long, glabrous, grooved above. Flowers bisexual, solitary, extra-axillary; pedicels *c.* 0.25 cm long, slender, glabrous. Sepals 3, free, orbicular, *c.* 2–4 × 5 mm, acute at apex, entire, tomentose out, glabrous within. Petals 3+3, linear-lanceolate, *c.* 35 × 5 mm, acuminate at apex, entire, glabrous, fleshy, greenish-yellow. Stamens more than 12; filaments *c.* 1 mm long, erect, stout. Carpels more than 12, densely pubescent, oblong, stalked; style *c.* 2 mm long, slender; stigma capitate. Fruit an aggregate of berries; fruitlets ovoid-elliptic, smooth.

Distribution: Native range is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: May-August.

Specimen examined: Chenthamara, *s.d.*, *Jomy Augustine* 17090 (CALI).

Monoon fragrans (Dalzell) B.Xue & R.M.K.Saunders, Taxon 61(5): 1031. 2012. *Guatteria fragrans* Dalzell in Hook.'s J. Bot. Kew Gard. Misc. 3: 206 1851. *Polyalthia fragrans* (Dalzell) Bedd. in Icon. Pl. Ind. Or.: 11 1869; Hook.f., Fl. Brit. India 1: 63. 1872; Gamble, Fl. Madras 16. 1915; Debika Mitra in B.D.Sharma *et al.*, Fl. India 1: 271. 1993; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 164. 2005.

Tall trees, up to 10 m tall. Stems woody, young branches tomentose, glabrous when old; bark blakish brown, smooth. Leaves simple, alternate, distichous; lamina elliptic-ovate, 10–25 × 5–10 cm, acute at apex, rounded at base, entire, brown-tomentose to slightly pubescent below; petioles 0.8–1 cm long, stout, grooved above, glabrous. Flowers bisexual, axillary, solitary, fragrant; pedicels 1.5 cm long. Sepals 3, orbicular, *c.* 4–8 × 3 mm, acute at apex, entire, pubescent, fleshy, thick. Petals 3+3, sub-equal, linear-lanceolate, *c.* 70 × 30 mm (outer), 15–40 × 20 mm (inner), acuminate at apex, entire, tomentose, fleshy. Receptacle dilated, convex-shaped. Stamens more than 12, cuneate; filaments reduced or obscure. Carpels more than 12, oblong-ovoid, slightly curved, stipitate, strigose; stigma broad, bifid, blunt. Fruit an aggregate of berries; fruitlets obliquely ellipsoid, velvetish.

Distribution: Native range is SW. India (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests; *Fl. & Ft.*: September-January.

Specimens examined: Kurthode, *s.d.*, *Jomy Augustine* 13517 (CALI); Pooyamkutty, 02.10.1990, *P. Bhargavan* 92051 (MH); *Ibid.,* 14.12.1989, *P. Bhargavan* 89904 (MH).

Orophea Blume

Bijdr. Fl. Ned. Ind. 1: 18. 1825.

Key to the species

1. Leaves pubescent beneath; stamens 12……*O. erythrocarpa*

1. Leaves glabrous beneath; stamens 6…….. *O. uniflora*

Orophea erythrocarpa Bedd. Madras J. Lit. Sci., ser. 2, 22: 71 1861; Hook.f., Fl. Brit. India 1: 91. 1872; Gamble, Fl. Madras 24. 1915; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 158. 2005.

Trees, up to 8 m tall. Branchlets woody, terete, pubescent when young, glabrous when old; bark black, smooth. Leaves simple, alternate, distichous; lamina ovate-elliptic, 5–9 × 3–4 cm, acuminate at apex, rounded at base, entire, glabrous above, pubescent beneath, membranous; petioles 0.3–0.4 cm long, pubescent, stout, slightly grooved above. Stipules absent. Flowers bisexual, axillary, paired, non-fragrant; pedicels *c.* 1 cm long, slender, villous. Sepals 3, broadly ovate, *c.* 2 × 1 mm, acute at apex, entire, tomentose. Petals 3+3; petals orbicular-rhomboid, 4–6 × 3–4 mm (outer), *c.* 5 × 3.5 mm (inner), acute at apex, entire, tomentose out, glabrous within. Stamens 12 in 2 rows, outer 6 imperfect, very small; filaments obscure. Ovary numerous, ellipsoid, glabrous; style compressed; stigma sticky. Fruitlets oblong, sessile, reddish.

Distribution: Native range is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: February-June.

Specimen examined: Arjunankotta, *s.d.*, *Jomy Augustine* 13160 (CALI).

Orophea uniflora Hook.f. & Thoms., Fl. Ind. 1:110. 1855, Hook.f., Fl. Brit. India 1: 90. 1872; Gamble, Fl. Madras 24. 1915; Debika Mitra in B.D.Sharma *et al*., Fl. India 1: 229. 1993; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 160. 2005.

Small trees, up to 5 m tall. Branchlets woody, terete, tomentose on young, glabrous when old; bark brownish grey. Leaves simple, alternate distichous; lamina ovate-lanceolate, 3–16 × 1.5–3 cm, acuminate at apex, acute at base, entire, glabrous, leathery; petioles *c.* 0.2 cm long, tomentose, grooved above, glabrous. Flowers solitary, axillary, non-fragrant; pedicels 0.3–0.5 cm long, narrow, tomentose. Bracts minute, ovate, *c.* 1 mm long, acute at apex and base, entire, glabrous. Sepals 3, widely ovate, *c.* 1 × 1 mm, acute at apex, entire, tomentose out, glabrous within. Petals 3+3; petals widely ovate, *c.* 5 × 6 mm (outer), *c.* 9 × 4 mm (inner), acute at apex, entire, tomentose out, glabrous within, fleshy. Stamens 6; filaments very short, glabrous. Carpels numerous, glabrous; style reduced; stigma sticky. Fruitlets globose, glabrous.

Distribution: Native range is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: February-August.

Specimen examined: Arjunankotta, *s.d.*, *Jomy Augustine* 13373 (CALI).

Sageraea Dalzell

Hooker's J. Bot. Kew Gard. Misc. 3: 207. 1851.

Sageraea thwaitesii Hook.f. & Thomson, Fl. Ind. 1: 93. 1855; Heusden, Nordic J. Bot. 17: 48. 1997. *Bocagea thwaitesii* (Hook.f. & Thomson) Hook.f. & Thomson in J.D.Hooker, Fl. Brit. India 1: 92. 1872. *Sageraea dalzellii* Bedd. Icon. Pl. Ind. Or. 1: 9 1869; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 170. 2005. *Sageraea grandiflora* Dunn, Bull. Misc. Inform. Kew 1914: 182. 1914; Gamble, Fl. Madras 12. 1915; Debika Mitra in B.D.Sharma *et al.*, Fl. India 1: 282. 1993.

Trees, up to 10 m tall. Branchlets woody, terete; bark greyish black, smooth. Leaves simple, alternate, distichous; lamina oblong-elliptic, 20–27 × 7–9 cm, obtuse at apex, rounded at base, entire, glabrous, leathery, shining; petioles *c.* 1 cm long, glabrous, stout, grooved above. Flowers bisexual, axillary, fascicled, non-fragrant; peduncles condensed; pedicels 0.3–0.7 cm long, slender, glabrous. Bracts widely ovate, 3–6 × 2–3 mm, acute at apex, entire, ciliate, golden brown hairy out, glabrous within. Sepals 3, connate at base; lobes orbicular 2–3 × 3–4 mm, acute at apex, entire, ciliate, glabrous. Petals 3+3, orbicular, 10–12 × 6–8 mm, rounded at apex, entire, ciliate, glabrous; inner petals shorter than outer ones. Stamens many; filaments reduced. Ovary ovate, strigose; style condensed; stigma globose. Fruit an aggregate of berries; fruitlets globose, smooth.

Distribution: Native range is SW. India (Kerala) and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-February.

Specimen examined: Kurthode, *s.d.*, *Jomy Augustine* 13391 (CALI).

Uvaria L.

Sp. Pl. 536. 1753.

Key to the species

1. Berries glabrous…….…….... *U. concava*

1. Berries pubescent…….. ……..…… *U. narum*

Uvaria concava Teijsm. & Binn. Natuurk. Tijdschr. Ned.-Indië 3: 331. 1852. *Uvaria hookeri* King, Ann. Roy. Bot. Gard. (Calcutta) 4(1): 28. 1893; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 172. 2005.

Climbing shrubs. Branchlets woody, terete, glabrous; bark greyish-brown, smooth. Leaves simple, alternate; lamina elliptic-oblong, 10–16 × 4–5 cm, acuminate at apex, rounded at base, entire, glabrous, coriaceous; petioles *c.* 0.5 cm long, glabrous, stout, slightly pulvinate. Tendrils glabrous. Flowers solitary, terminal or leaf-opposed, non-fragrant; pedicels *c.* 1.5 cm long, slender, pubescent. Sepals 3, broadly ovate, *c.* 3 × 2 mm, acute at apex, connate at base, entire, pubescent out, glabrous within. Petals 3+3, ovate, 10–14 × 15–20 mm, reflexed at tips, connate at base, tomentose out, glabrous within, leathery. Stamens numerous; filaments *c.* 2 mm long, erect, stout, glabrous. Carpels many, glabrous; styles short, thick; stigma thick. Berries in two series, ovoid, tapering towards tip, glabrous. Seeds many, biseriate, shiny reddish brown.

Distribution: The native range of this species is Tropical Asia to Australia (POWO, 2023), new report to Kerala; *Habitat*: Along coastal areas and deciduous forests at low altitudes; *Fl. & Ft.*: November-February.

Specimen examined: Mangaladevi, 11.12.1996, *Jomy Augustine* 11.12.1996 13754 (KFRI).

Uvaria narum (Dunal) Blume, Fl. Javae 21-22: 5. 1830; Hook.f., Fl. Brit. India 1: 50. 1872; Gamble, Fl. Madras 13. 1915; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 173. 2005. *Unona narum* Dunal, Monogr. Anonac. 99. 1817.



Climbing shrubs, upto 5 m tall. Branchlets woody, terete, sparsely hairy; bark greyish brown. Leaves simple, alternate; lamina elliptic, 10–13 × 4–5 cm, acuminate at apex, rounded at base, entire, glabrous, coriaceous; petioles 4–6 mm long, sparsely pubescent, stout. Tendrils glabrous. Flowers solitary, leaf opposed, non-fragrant; pedicels 0.8–1 cm long, slender, tomentose. Sepals broadly ovate, 6–

8 × 4–5 mm, acute at apex, basally connate, entire at margins, tomentose out, glabrous within. Petals 6, ovate, 20–25 × 10–15 mm, acute at apex, entire, tomentose out, glabrous within. Stamens numerous; filaments *c.* 1 mm long, glabrous. Carpels numerous, oblong, tomentose; style obscure; stigma sticky. Berries in one series, ovate, pubescent.

Distribution: The native range of this species is W. & SW. India and SW. Sri Lanka (POWO, 2023); *Habitat*: Along coastal areas and deciduous forests at low altitudes; *Fl. & Ft.*: December-April.

Specimen examined: Adimali, 03.04.2018, *Vishnu Mohan* 165492 (CALI); Adimali, 28.03.1980, *R. Rajan* 66546 (MH).

MENISPERMACEAE Juss.

Gen. Pl. 284. 1789, *nom. cons.*

Twining or rarely erect shrubs or small trees. Leaves petiolate, sometimes peltate, without stipules, usually simple, entire or lobed. Inflorescences many-flowered, rarely the flowers solitary or geminate, axillary or borne on the leafless wood. Sepals 3–12 or more, rarely 1, free or slightly connate, imbricate or valvate. Petals 1–6 or absent, free or connate, usually imbricate. Stamens 3–6 or indefinite, rarely 2; staminodes absent or present. Carpels 3–6 or more, rarely 1, free; ovules 2. Fruit a drupe.

The family is represented by 75 genera in the world (POWO, 2023); eight genera and 12 species in Idukki district.

Key to the genera

1. Stamens connate……..……..2
1. Stamens free……..……5
2. Flowers solitary or in umbellate heads……*Stephania*
2. Flowers in panicles……3
3. Anthers in a globular head……*Anamirta*
3. Anthers in a ring……4
4. Calyx campanulate……..*Cyclea*
4. Calyx free……..……*Cissampelos*
5. Leaves deeply cordate at base……..……*Tinospora*
5. Leaves acute, obtuse or subcordate at base……6

6. Flowers in drooping panicles…….. ……*Diploclisia*
6. Flowers in erect panicles or axillary fascicles……7
7. Flowers in cymule or panicle up to 20 cm long ……..……..*Cocculus*
7. Flowers in racemes 17 cm long……..*Pachygone*

Anamirta Colebr.,

Trans. Linn. Soc. London 13 52. 1821.

Anamirta cocculus (L.) Wight & Arn., Prod. Fl. Ind. Orient. 1: 446. 1834; Hook.f., Fl. Brit. India 1: 93. 1872; Gamble, Fl. Madras 1: 28. 1915; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 178. 2005. *Menispermum cocculus* L. in Sp. Pl.: 340 1753.

Woody climbers. Branchlets terete, glabrous on mature. Leaves simple, alternate; lamina broadly ovate, 15–25 × 10–15 cm, cuminate at apex, cordate at base, entire, glabrous, coriaceous; petioles 80–130 mm long, glabrous, slender, pulvinate at base. Flowers unisexual, in drooping panicles, non-fragrant. Male flowers: Outer tepals 2, ovate, *c.* 5 × 3 mm, rounded at apex, acute at base, entire, sparsely pubescent out, glabrous within; inner tepals 6, elliptic, *c.* 3 × 2 mm, rounded at apex, obtuse at base, entire, glabrous. Stamens 9, anthers sessile, in a globular head. Female flowers: Outer tepals 2, ovate, 5–6 × 2–3 mm, rounded at apex, acute at base, entire, sparsely pubescent out, glabrous within; inner tepals 6, elliptic, 3–4 × 2–3 mm, rounded at apex, obtuse at base, entire, glabrous, white, delicate. Staminodes 9. Ovary, free; style reduced; stigma sticky. Drupes globose.

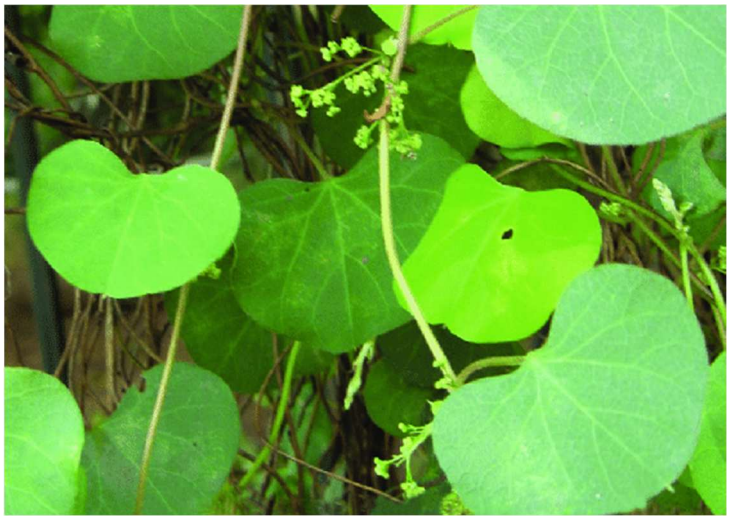
Distribution: The native range of this species is Tropical Asia (POWO, 2023); *Habitat*: Moist deciduous and evergreen forests, also sacred groves in the plains; *Fl. & Ft.*: August-December.

Specimens examined: Chinnar, 18.11.1995, *K.K. Sajeev* 15898 (KFRI); Kattappana, 13.11.1981, *C.N. Mohanan* 72487 (MH); Koruthode, *s.d. Jomy Augustine* 16273 (CALI); Panamkutty, 27.12.1983, *A.G. Pandurangan* 62552; Pooyamkutty, 16.12.1988, *P. Bhargavan* 89954; Thriveny, 10.10.1972, *B.D. Sharma* 42457 (MH).

Cissampelos L.,

Sp. Pl. 2: 1031. 1753.

Cissampelos pareira L., Sp. Pl. 2: 1031. 1753. Hook.f., Fl. Brit. India 1: 103. 1872; Gamble, Fl. Madras 1: 30. 1915; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 180. 2005.



Slender climbing herbs. Branchlets pubescent, slender, twning, striate. Leaves simple, alternate, broadly ovate, 4–5 × 4–6 cm, rounded at apex, slightly cordate at base, entire, hispid out, glabrous inside; petioles *c.* 3 cm long, slender, erect, glabrous. Flowers unisexual. Male flowers; in axillary cymes, sessile. Bracts ovate-orbicular, *c.* 03 × 0.2 cm, rounded at apex and base, entire, puberlous out, glabrous within; bracteoles linear, *c.* 3 × 1 mm, acuminate at apex, entire, pubescent out, glabrous within. Sepals 4, orbicular, *c.* 5 × 4 mm, rounded at apex and base, entire, hairy out, glabrous within. Petals 4, connate at base; lobes orbicular, pubescent out, glabrous within. Stamens 4, connate; filaments reduced. Female flowers; in racemes. Bract ovate, *c.* 6 × 3 mm, acute at apex, rounded at base, entire, pubescent out, glabrous within. Sepals 2, ovate, *c.* 6 × 3 mm, acute at apex, entire, pubescent out, glabrous within. Petals absent. Ovary densely hairy; styles 3, stout, erect; stigma sticky. Drupe globose, glabrous. Seeds 1.

Distribution: The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat*: Deciduous forests, also in the plains; *Fl. & Ft.*: July-September.

Specimens examined: Neriyamangalam, 16.07.2018, *Vishnu Mohan & Santhosh Nampy* 186630; Thekkady, *s.d.*, *Jomy Augustine* 15311 (CALI).

Cocculus DC.

Syst. Nat. 1: 515. 1817.

Cocculus hirsutus (L.) W.Theob. in F.Mason, Burmah, ed. 3, 2: 657. 1860; Gamble, Fl. Madras 29. 1915.

Menispermum hirsutum L., Sp. Pl. 341. 1753.

Cocculus villosus DC., Syst. Nat. 1: 525. 1817; Hook.f., Fl. Brit. India 1: 101. 1872.

Slender climbers. Branchlets terete, wiry, tomentose. Leaves simple, alternate, lamina ovate-elliptic, 2–7 × 1–4 cm, acute-rounded at apex, rounded at base, entire, pubescent; petioles 3–20 cm long, pilose, slender, pulvinate. Flowers unisexual, in clustered cymules; peduncles 0.5–2.5 cm long, slender, tomentose. Male flowers: Sepals, 3+3 broadly ovate to obovate, 1.3–2.5 × *c.* 1 mm, rounded at apex, entire, pilose. Petals ovate-oblong, 0.5–1.2 × 0.3–3 mm, truncate at apex, entire, sparsely pubescent. Stamens adnate; filaments 0.5–1 mm long, glabrous. Female flowers: Sepals, 3+3 broadly ovate to obovate, 1.5–2.5 × *c.* 1 mm, rounded at apex, entire, pilose. Petals ovate-oblong, 0.8–1.5 × 0.5–3 mm, truncate at apex, entire, sparsely pubescent. Staminodes *c.* 0.5 mm long. Carpels ovate; style *c.* 1.5 mm long, erect; stigma sticky. Drupes glabrous.

Distribution: The native range of this species is Eritrea to S. Africa, Arabian Peninsula, SE. Pakistan to S. China (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: October-July

Specimen examined: Chinnar, 17.11.1994, *N. Sasidharan* 11612 (KFRI).

Cyclea Arn. ex Wight

Ill. Ind. Bot. 1: 22. 1840.

Key to the species

1. Calyx in male flowers divided almost to base.....*C. fissicalyx*

1. Calyx in male flowers divided only to ¼ of tube..... *C. peltata*

Cyclea fissicalyx Dunn in Gamble, Fl. Madras 31. 1915; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 185. 2005.

Annual climbing shrubs. Stems branched, brownish. Leaves simple, alternate, peltate; lamina widely ovate, 4–6 × 3–4 cm, acuminate at apex, rounded at

base, wavy, puberulous out, glabrous within; petioles 3–4 cm long, glabrous, slender. Flowers in axillary panicled racemes; peduncles 2–5 cm long, glabrous; pedicels *c.* 0.5 cm long, glabrous. Sepals 5, orbicular, 0.5–1.5 × 1–2 mm, truncate at apex, entire, glabrous. Petals 5, orbicular, 1–2 × 2–2.4 mm, rounded at apex. Synandrium *c.* 1.5 mm long; filaments reduced, glabrous. Female flowers: Sepals 5, fused; lobes orbicular, rounded at apex, entire, hispid out, glabrous in, green. Petals 5, fused; lobes ovate, acute at apex, entire, glabrous. Ovary 1, ovoid, style reduced; stigma sticky. Drupes ovoid, pilose.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: December-April.

Specimen examined: MSNP, Arumadam, 30.12.2014, *S. Syam Radh & Santhosh Nampy* 137931 (CALI).

Cyclea peltata (Burm.f.) Hook.f. & Thomson Fl. Ind. 1: 201 1855; Fl. Brit. India 1: 104. 1872; Gamble, Fl. Madras 1: 31. 1915; M.Mohanan in P.Daniel, Fl. Kerala 1: 186. 2005.



Climbing shrubs. Stems twining, wiry, non woody. Leaves simple, alternate; lamina triangular, 7.5–10 × 5–7 cm, acute at apex, truncate at base, entire, pubescent below, glabrous above; petioles 3–5 cm long, pulvinate. Flowers sessile, in axillary panicles; rachis slender, pubescent. Male flowers: Sepals 5-lobed, connate at base; lobes orbicular, *c.* 3 × 2 mm, rounded at apex, entire, hairy out, glabrous within. Petals 5, orbicular, *c.* 2 × 1 mm, rounded at apex, entire, glabrous. Stamens 4, fused all over. Female flowers: Sepals 5-lobed, connate at base; lobes orbicular, 3–4 × 2.5 mm, rounded at apex, entire, hairy out, glabrous within. Petals 5, orbicular, *c.* 2 × 1 mm, rounded at apex, entire,

glabrous. Carpel one, densely hairy; style bifid; stigma velvetish. Drupes sub-globose, pilose.

Distribution: The native range of this species is Indian Subcontinent to Indo-China (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests, also in the plains; *Fl. & Ft.*: December-May.

Specimens examined: Anakkayam, 24.12.1988, *P. Bhargavan* 90076 (MH); Kottamala, 31.05.1995, *N. Sasidharan* 15372 (KFRI); Munnar, 12.02.2001, *Sonia. K.* 72619; Neriyamangalam, 16.07.2018, *Vishnu Mohan & Santhosh Nampy* 186631 (CALI); Vallakkadavu, 22.03.1994, *Jomy Aujustine* 13484 (KFRI).

Diploclisia Miers

Ann. Mag. Nat. Hist., ser. 2, 7: 37. 1851.

Diploclisia glaucescens (Blume) Diels in H.G.A.Engler (ed.), Pflanzenr., IV, 94: 225. 1910; Gamble, Fl. Madras 28 1915. *Cocculus glaucescens* Blume, Bijdr. Fl. Ned. Ind. 1: 25. 1825.

Climbing shrubs. Branchlets woody, terete, glabrous on young parts, sparsely hairy when mature, warty. Leaves simple, alternate, broadly ovate to orbicular, 4–5 × 6–8 cm, obtuse at apex, cordate-truncate at base, entire, glaucous below, glabrous above, membranous; petioles 10–20 cm long, glabrous, slightly pulvinate. Flowers unisexual, in large drooping panicles. Male flowers: Sepals 3+3, obovate, *c.* 3 × 2 mm, rounded at apex, entire, glabrous. Petals 6, obovate, 1.5–2 × *c.* 1 mm, rounded at apex, incurved at margins. Stamens 6; filaments *c.* 2 mm long, erect, glabrous. Female flowers; Sepals 3+3, obovate, *c.* 3–4 × 2–2.5 mm, rounded at apex, entire, glabrous. Petals 6, obovate, *c.* 2 × 1 mm, rounded at apex, incurved at margins. Ovary ovate; style 0.5–1 mm long, cylindric, glabrous; stigma sticky. Drupes compressed, curved, tubercled.

Distribution: The native range of this species is China (S. & SE. Yunnan to S. & E. Guangdong) to Tropical Asia (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and moist deciduous forests; *Fl. & Ft.*: February-August.

Specimens examined: Chenthamarakotta, 16.03.1994, *Jomy Augustine* 13449 (KFRI); Panamkutty, 22.02.1983, *C.N. Mohanan* 77937 (MH).

Pachygone Miers

Ann. Mag. Nat. Hist., ser. 2, 7: 37, 43. 1851.

Key to the species

1. Lamina elliptic-oblanceolate…… *P. laurifolia*

1. Lamina ovate-lanceolate ……..*P. ovata*

Pachygone laurifolia (DC.) L.Lian & Wei Wang Molec. Phylogen. Evol. 148(106825): 7. 2020. *Cocculus laurifolius* DC., Syst. Nat. 1: 520. 1817; Hook.f., Fl. Brit. India 1: 101. 1872; Gamble, Fl. Madras 29. 1915; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 181. 2005.

Small trees, up to 5 m tall. Branchlets woody, terete, glabrous. Leaves simple, alternate; lamina elliptic-oblanceolate 5–10 × 1.8–5 cm, acuminate at apex, acute at base or cuneate, entire, glabrous, coriaceous; petioles 0.5–1 cm long, glabrous, grooved above. Flowers unisexual, in axillary panicles. Bracts subulate, ovate-orbicular, *c.* 0.3 × 0.2 cm, rounded at apex, entire, puberlous out, glabrous within. Male flower: Sepals 3+3, free, ovate-elliptic, *c.* 1.5 × 1 mm, acute at apex, entire, hispid out, glabrous within. Petals 6, obtuse, *c.* 1.5 × 1 mm, acute-rounded at apex, entire, hispid out, glabrous within. Stamens 6, free; filaments compressed. Female flowers; Sepals 6, free, ovate-elliptic, *c.* 1.5–2 × 1 mm, acute at apex, entire, hispid out, glabrous within. Petals 6, obtuse, *c.* 1.5 × 1–2 mm, acute-rounded at apex, entire, hispid out, glabrous within. Staminodes 12. Ovary free, curved, 1-ovuled; stigma sessile, curved out. Drupe 1-seeded.

Distribution: The native range of this species is Indian Subcontinent to Japan (S. Kyushu) and Philippines (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: October-July

Specimens examined: Chinnakanal, 20.04.1964, *K.M. Sebastine* 18351; Chinnar, 19.04.1964, *K.M. Sebastine* 18313 (MH); Manalar, 15.05.1994, *Jomy Augustine* 13733 (KFRI); MSNP, Sivanpara, 22.11.2017, *S. Syam Radh & Santhosh Nampy* 153456 (CALI); Vellimala, *s.d., Jomy Augustine* 12993 (KFRI).

Pachygone ovata (Poir.) Miers ex Hook.f. & Thomson, Fl. Ind. 1: 203. 1855; Gamble, Fl. Madras 31. 1915. *Cissampelos ovata* Poir. in Lam., Encycl. 5: 10. 1804.

Climbing shrubs. Branchlets woody, terete, pubescent on young parts, glabrous when old. Leaves, simple, alternate; lamina ovate-lanceolate, 3–9 × 1.5–5 cm, obtuse at apex and base, entire, softly pubescent to glabrous; petioles 1–2.5 cm long, glabrous, slender. Flowers in fascicles; peduncles 10–17 cm long; pedicels *c.* 0.3 cm long. Male flowers: Sepals 6, elliptic-rounded, 1–2.5 × 0.5–1 mm, rounded at apex, entire, puberulous out, glabrous within. Petals 6, oblong, *c.* 2 × 1 mm, basal auricles clasping stamen. Stamens 6; filaments *c.* 1.5 mm long, glabrous. Female flowers: Sepals 6, elliptic-rounded, 2.5–3 × 1 mm, rounded at apex, entire, puberulous out, glabrous within. Petals 6, oblong, 2–2.5 × 1–1.5 mm, basal auricles clasping stamen. Staminodes minute. Ovary ovoid, glabrous; style *c.* 1.5 mm long, flattened. Drupes glabrous.

Distribution: The native range of this species is S. India to N. and NE. Australia (POWO, 2023); Habitat: Dry deciduous forests; Fl. & Ft.: January-September.

Specimen examined: Chinnar, 08.01.1995, *K.K. Sajeev* 11683 (KFRI).

Stephania Lour.

Fl. Cochinch. 2: 608. 1790.

Key to the species

1. Heads panicled……..……*S. japonica* var. *discolor*

1. Head solitary……..……*S. wightii*

Stephania japonica var. **discolor** (Blume) Forman, Kew Bull. 11: 56. 1956; Gamble, Fl. Madras 1: 29. 1915.

Stephania hernandifolia (Willd.) Walp., Rep. Bot. Syst. 1: 96. 1842; Wight, Icon. Pl. Ind. Orient. t. 939. 1845. Hook.f., Fl. Brit. India 1: 103. 1872; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 178. 2005.

Herbaceous climbers. Branchlets slender, rigid. Leaves simple, alternate; lamina triangular, 3.5–7 × 2.5–7 cm, caudate at apex, cordate-rounded at base, puberulous beneath, glabrous out; petioles 3–5 cm long, glabrous, erect, pulvinate at base. Male flowers: sessile or sub-sessile, in axillary umbels,

greenish or white. Sepals 8, free, oblanceolate, *c.* 3 × 2 mm, rounded at apex, entire, glabrous or puberulous outside, glabrous inside. Petals 5, sub-orbicular, *c.* 3 × 2 mm, rounded at apex, entire, glabrous-, greenish. Stamens 5, connate. Female flowers: sessile or sub-sessile, in axillary umbels, greenish or white. Sepals 8, free, oblanceolate, 3–3.5 × 2 mm, rounded at apex, entire, glabrous or puberulous out, glabrous within. Petals 5, sub-orbicular, 3–4 × 2–3 mm, rounded at apex, entire at margins, glabrous on both sides, greenish. Staminodes absent. Ovary ovoid; stigmas 3-lobed. Drupes globose.

Distribution: The native range of this species is Tropical & Subtropical Asia to S. Pacific (POWO, 2023); *Habitat*: Evergreen and moist deciduous forests; *Fl. & Ft*.: November-September.

Specimens examined: Kanthallor to Anamudi shola, 25.02.2003, *Thomson Mani* 90833 (CALI); Pachakkanam, 13.11.1975, *K. Vivekananthan* 46668 (MH); Way to Marayoor, 24.02.2003, *Ligimol* 89816; *Ibid.*, 24.02.2003, *Smitha C.K.* 89115; *Ibid.*, 24.02.2003, *Nishitha I.K.* 90415 (CALI).

Stephania wightii (Arn. ex Wight) Dunn in Gamble, Fl. Madras 30. 1915 M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 191. 2005. *Clypea wightii* Arn. ex Wight, Illus. Ind. Bot. 1: 22. 1840.

Climbing herbs. Branchlets terete, glabrous. Leaves simple, alternate; lamina ovate, 3.5–6 × 3–4 cm, acute at apex, rounded at base, dentate, glabrous; petioles 3–5 cm long, glabrous, slender, pulvinate at base. Male flowers: densely packed in cymose axillary fascicle peduncles 1–2 cm long, drooping, slender, narrow; pedicels 2–3 cm long, erect, glabrous. Sepals 6, free, ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous inside, pubescent outside. Petals 4, free, oblong, *c.* 3 × 2 mm, rounded at apex, entire, glabrous. Stamens 6, fused. Female flowers: Sepals 6, free, ovate, 3–4 × 2–2.5 mm, acute at apex, entire, glabrous inside, pubescent outside. Petals 4, free, oblong, 3–4 × 2 mm, rounded at apex, entire, glabrous. Ovary ovoid, glabrous; style reduced; stigma sticky. Drupes oblique.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, especially in rock crevices; *Fl. & Ft.*: February-June.

Specimens examined: Chokkampetti, *s.d., Jomy Augustine* 12570; Munnar, 12.02.2001, *Priya P.D* 73884 (CALI).

Tinospora Miers

Ann. Mag. Nat. Hist. ser. 2, 7(37): 38. 1851.

Key to the species

1. Leaves glabrous…….. *T. cordifolia*

1. Leaves hairy…….. *T. sinensis*

Tinospora cordifolia (Willd.) Miers ex Hook.f. & Thomson, Fl. Ind. 1: 184. 1855; Hook.f., Fl. Brit. India 1: 97. 1872; Gamble, Fl. Madras 1: 26. 1915; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 193. 2005. *Menispermum cordifolium* Willd. in Sp. Pl., ed. 4. 4: 826 1806.

Woody climbers. Stems glabrous, rigid, lenticellate. Leaves simple, alternate; lamina broadly cordate, 4–7 × 4–6 cm, acuminate at apex, cordate at base, entire, glabrous; petioles 3–4 cm long, glabrous, pulvinate at base. Male flowers: in axillary-terminal fascicles; peduncles 5–10 cm long, glabrous, drooping; pedicels 0.5 cm long, glabrous, erect. Sepals 3, ovate, *c.* 3 × 1.5 mm, acuminate at apex, entire, glabrous. Petals 3, clawed, elliptic, *c.* 5 × 3 mm, acute at apex, entire, papillose within, glabrous out. Stamen 6; filaments *c.* 1 mm long, reduced, glabrous. Female flowers; Sepals 3, ovate, *c.* 4–5 × 2–3 mm, acuminate at apex, entire, glabrous. Petals 3, clawed, elliptic, 5–6 × 3 mm, acute at apex, entire, papillose within, glabrous out. Staminodes 3. Carpels 3, ellipsoid, glabrous; style *c.* 2 mm long; stigma sticky. Drupes broadly elliptic.

Distribution: The native range of this species is Indian Subcontinent to Indo-China (POWO, 20213); *Habitat*: Moist deciduous forests and scrub jungles, also in the plains; *Fl. & Ft.*: January-June.

Specimens examined: Chinnar, 08.01.1995, *K.K. Sajeev* 11700 (KFRI); Mankulam, 04.05.2018, *Vishnu Mohan & Santhosh Nampy* 176313 (CALI).

Tinospora sinensis (Lour.) Merr., Sunyatsenia 1: 193. 1934 M.Mohanan in P.Daniel, Fl. Kerala 1: 194. 2005. *Campylus sinensis* Lour. in Fl. Cochinch.: 113 1790.

Tinospora malabarica (Lam.) Hook.f. & Thomson, Fl. Ind. 1: 183. 1855.

Tinospora tomentosa (Colebr.) Hook.f. & Thomson, Fl. Ind. 1: 183. 1855; Hook.f., Fl. Brit. India 1: 96. 1872; M.Mohanan in P.Daniel (ed.), Fl. Kerala 1: 194. 2005.

Climbing shrubs. Stems woody, terete, glabrous on young parts, sparsely pubescent when mature. Leaves simple, alternate; lamina broadly ovate, 10–14 × 8–10 cm, attenuate at apex, cordate at base, entire, densely white tomentose below, glabrous above. Male flowers 3–5 together in axillary fascicles; pedicels 5–10 cm long. Sepals 3 + 3, outer smaller, obovate, 1.5–2 × 1–1.5 mm, rounded at apex, entire, glabrous. Petals 6, obovate, 1.5 × 1 mm, rounded at apex, entire, glabrous. Stamens 6, free; filaments reduced. Female flowers: Sepals 6, obovate, *c.* 4 × 2 mm, acuminate at apex, entire, glabrou. Petals 6, free, elliptic, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Carpels ovate; style reduced; stigma bilobbed. Staminodes 6. Drupes ovoid, glabrous.

Distribution: The native range of this species is Indian Subcontinent to China (S. Yunnan to S. Guangdong) and Indo-China (POWO, 2023); *Habitat*: Evergreen and moist deciduous forests, also in sacred groves in the plains; *Fl. & Ft.*: February-June.

Specimens examined: Kallar, 25.04.2018, *Vishnu Mohan & Santhosh Nampy* 176514; Pamba, *s.d., Jomy Augustine* 17168 (CALI).

BERBERIDACEAE Juss.

Gen. Pl. 286. 1789, nom. cons.

Herbs, shrubs, rarely small trees. Leaves alternate, opposite, or basal, simple, or pinnately or ternately compound. Inflorescences terminal or axillary racemes, spikes, umbels, cymes, or panicles, or flowers fascicled or solitary. Flowers pedicelslate or sessile, bisexual; bracteoles or bracts present or absent. Sepals often petaloid. Petals hooded, pouched, or spurred. Stamens 6. Ovary superior; style present or absent, sometimes persistent in fruit as a beak. Fruit a berry, capsule, follicle, or utricle.

Thirteen accepted genera and 733 species in the world (POWO; 2023); one genus and two species in the study area.

Berberis L.

Sp. Pl. 1: 330. 1753.

Key to the species

1. Leaves simple, entire……..……..*B. tinctoria*

1. Leaves pinnate, serrate..……..……..*B. napaulensis*

Berberis tinctoria Lesch., Mém. Mus. Hist. Nat. 9: 306 1822; Gamble, Fl. Madras 32. 1915; R.R.Rao & B.D.Naithani in B.D.Sharma *et al*., Fl. India 1: 386. 1993; Swarup. *et al*., Shola For. Kerala 43. 1998; Nair in P.Daniel (ed.), Fl. Kerala 1: 197. 2005.

Evergreen glabrous shrubs, up to 2 m tall. Stems woody, terete, glabrous, nodes with 3 sharp slender spines; bark smooth. Leaves simple, whorled; lamina obovate, 1.5–3.5 × 0.7–1.3 cm, mucronate at apex, acuminate at base, entire at margins, glabrous on both sides, coriaceous; petioles 0.2–0.5 cm long, glabrous, grooved above. Stipules absent. Flowers non-fragrant, in axillary racemes; peduncles 2–4 cm long, slender, narrow, glabrous; pedicels 0.5–1 cm long, glabrous. Bracts lanceolate, 2–2.5 × 2 mm, acute at apex, smooth at margins, glabrous on both sides, membranous, caducous. Sepals 6, elliptic, 3–6 × 2–3 mm, rounded at apex, smooth at margins, glabrous on both sides, non-coriaceous. Petals 6, obovate, 6–7 × 4–4.5 mm, rounded at apex, glandular at base, smooth at margins, glabrous on both sides, membranous. Stamens 6; filaments 4–5 mm long, erect, slender, glabrous. Ovary curved shaped, stipitate; style *c*. 3 mm long, slender, glabrous; stigma sticky. Berry red, ellipsoid. Seeds reddish brown.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft*.: February-May.

Specimens examined: Anamudi slop, 22.04.1966, *B.V. Shetty* 27356 (MH); Kanthallor, 25.02.2003, *Shylaja N.* 88321; ibid, 25.02.2003, *Reena M.B.* 89024; *ibid*, 25.02.2003, *Nishitha I.K.* 90422; ibid, 25.02.2003, *Dhanya A.M* 89625; *ibid*, 25.02.2003, *Roshni Balakrishnan* 89924 ibid, 25.02.2003, *Divya N.,* 90527; *ibid*, 25.02.2003, *Reshma Karally* 89422

ibid, 25.02.2003, *Radhika K.V.* 88622; *ibid*, 25.02.2003, *Ligimol* 89827; ibid, 25.02.2003, *Nishitha Kumari P.* 88822 (CALI).

Berberis napaulensis (DC.) Spreng., Syst. Veg. ed. 16. 2: 120 1825; Gamble, Fl. Madras 1: 32. 1915; Nair in P.Daniel (ed.), Fl. Kerala 198. 2005. *Mahonia leschenaultii* (Wight & Arn.) Hort., Cat. Meth. Jard. Bot. Lyon 5. 1860.



Evergreen erect shrubs-small trees, up to 15 m tall. Stems woody, terete, spiny bark corky, grooved. Leaves alternate, imparipinnate; lamina ovate-lanceolate, 6–8.5 × 4.5 cm, acute at apex, auriculate at base, spiny-serrate at margins, glabrous on both sides, coriaceous; rachis 10–20 cm long, glabrous, slender, pulvinate; petioles 0.4–0.6 cm long, glabrous, stout. Stipules absent. Flowers non-fragrant, in terminal racemes; peduncles 5–20 cm long, slender, fleshy, glabrous; pedicels *c.* 1 cm long, slender, narrow, glabrous. Bracts ovate, *c.* 1 × 1 cm, acute at apex, smooth at margins, glabrous on both sides, non-coriaceous. Sepals 6 in 2 whorls, oblong, 6–7 × 1.5–2 mm, notched at apex, smooth at margins, glabrous on both sides, membranous. Petals 6, usually in one series, elliptic, 4–7 × 3–5 mm, rounded at apex, smooth at margins, glabrous on both sides, membranous. Stamens 6, slightly adnate with petal; filaments *c.* 2 mm long, erect, slender, glabrous. Ovary superior, oblong; style sessile; stigma discoid. Berries purple. Seed one.

Distribution: Native to Himalaya to China and N. Indo-China. (POWO, 2021); *Habitat*: Shola forests; *Fl. & Ft.*: June-December.

Specimens examined: Anamudi, 23.09.2019, *Vishnu Mohan & Santhosh Nampy* 151593 (CALI); Eravikulam, 18.10.1989, *P. Bhargavan* 91804; Devikulam, 21.11.1965, *B.V. Shettty* 26604 (MH).

CRUCIFERAE

Herbs, annual, biennial, or perennial. Leaves exstipulate, simple, entire or variously dissected, rarely trifoliolate or pinnately compound; basal leaf rosette present or absent. Inflorescences racemes, corymbs or panicles, ebracteate or less frequently bracteate, sometimes flowers solitary. Flowers hypogynous, actinomorphic, bisexual. Sepals 4. Petals 4, alternate with sepals, arranged in the form of a cross. Stamens 6, in 2 whorls, tetradynamous. Fruits typically 2-valved capsules, arbitrarily termed silique. The family includes 346 genera in the world (POWO, 2023); four genera and five species in Idukki district.

Key to the genera

1. Fruits compressed at right angles to the septum……..…2
1. Fruits compressed parallel to the septum……..…3
2. Petals equal; style short and included within the notch……...*Lepidium*
2. Petals unequal; style long and not included within the notch……...*Capsella*
3. Fruits cylindric; seeds globose……..……..*Rorippa*
3. Fruits linear, tapering on both ends; seeds compressed……*Cardamine*

Capsella Medik.

Pfl.-Gatt. 85. 1792.

Capsella bursa-pastoris (L.) Medik., Pfl.-Gatt. 85. 1792; Hook.f., Fl. Brit. India 1:159. 1872; Gamble, Fl. Madras 1: 38. 1915; Sharma, Fl. India 2: 189. 1993; A.N.Henry & T.Ravish. in P.Daniel (ed.), Fl. Kerala 1: 214. 2005.

Annual herbs, up to 30 cm tall. Stems branched, glabrous. Basal leaves rosulate; lamina oblong-lanceolate, 4–10 × 1.5–3 cm, rounded-acute at apex, attenuate at base, serrate, hispid; petioles 0.3–0.6 cm long, glabrous; cauline leaves ovate-lanceolate, 5–7 × 2 cm, acute at apex, attenuate at base, serrate-dentate, sparsely ciliate, stellate hairy at back, hispid on adaxial side; petioles 0.3–0.7 cm long, glabrous. Flowers in terminal racemes; peduncles up to 25 cm long at maturity; pedicels 0.5–1.4 cm long, slender, glabrous. Sepals 4, ovate, *c.* 2 × 1 mm, rounded at apex, entire, hispid out, glabrous within. Petals 4, obovate, 2–3 × 0.5–1 mm, rounded-crested at apex, entire, glabrous, membranous. Stamens 5; filaments 3–5 mm long, erect, glabrous. Ovary

superior, obcordate, laterally compressed; style very short or absent; stigma globose. Silique obcordate, laterally compressed.

Distribution: Native range is Temp. Eurasia and N. Africa (POWO, 2023); *Habitat:* Wastelands: *Fl. & Ft.*: March-November.

Specimen examined: Anamudishola, 26.11.2017, *Vishnu Mohan & Santhosh Nampy* 154102 (CALI).

Cardamine L.

Sp. Pl. 2: 654. 1753.

Key to species

1. Lower leaves 3-foliate……..……..……..……..*C. africana*

1. Lower leaves 5-or more foliate……..……..……..*C. hirsuta*

Cardamine africana L., Sp. Pl. 2: 655. 1753; Hook.f., Fl. Brit. India 1: 137. 1872; Gamble, Fl. Madras 1: 38. 1915; Sharma, Fl. India 2: 109. 1993; A.N.Henry & T.Ravish. in P.Daniel (ed.), Fl. Kerala 1: 215. 2005.

Weak erect herbs, up to 50 cm tall. Stems soft, sparsely hispid. Leaves alternate, mostly radical, 3-foliate; middle lamina broadly ovate, *c.* 5 × 3 cm, acute at apex, rounded at base, dentate, hispid above; lateral lamina ovate-lanceolate, *c.* 3 × 1.5 cm, attenuate at apex, oblique at base, dentate, hispid above, sparsely hairy below; petioles *c.* 2 cm long, glabrous, grooved, slender. Flowers in few-flowered terminal racemes; pedicels slender *c.* 0.5 cm long, glabrous. Sepals 4, oblong, *c.* 3 × 1 mm, rounded-acute at apex, entire, sparsely pubescent outside, glabrous inside. Petals 4, oblong-obovate, *c.* 5 × 2 mm, rounded at apex, entire, glabrous, membranous. Stamens 6; filaments *c.* 2 mm long, glabrous. Ovary superior; style *c.* 1 mm long, erect, stout, glabrous; stigma globose, sticky. Siliqua elliptic. Seeds narrowly oblong, smooth.

Distribution: Native range is Tropical & S. Africa, N. Yemen, India to W. Malesia, Central and S. Tropical America (POWO, 2023); *Habitat:* Degraded forest areas and plantations at high ranges: *Fl. & Ft.*: Throughout the year.

Specimen examined: Adimaly, 14.07.2018, *Vishnu Mohan & Santhosh Nampy* 154128 (CALI).

Cardamine hirsuta L., Sp. Pl. 2: 655. 1753; Hook.f., Fl. Brit. India 1: 158. 1872; Gamble, Fl. Madras 1: 38. 1915; Sharma, Fl. India 2: 112. 1993; A.N.Henry & T.Ravish. in P.Daniel (ed.), Fl. Kerala 1: 215. 2005.



Herbs, up to 30 cm long. Stems erect, creeping at base, glabrous. Leaves alternate, variable; basal leaves rosette, imparipinnate; leaflets widely ovate, 4–6 × 5–8 mm, rounded at apex, entire-crenate, glabrous; petioles *c.* 1 cm long, glabrous; cauline leaves alternate, imparipinnate; leaflets elliptic-obovate, 3–5 × 2–3 mm, rounded at apex, lobed, glabrous; petioles 2–4 cm long, glabrous. Flowers in terminal or axillary racemes; peduncles 4–8 cm long, erect, narrow, glabrous; pedicels *c.* 0.4–0.6 cm long, narrow, erect, slender, glabrous. Sepals 4, oblong, *c.* 3 × 2 mm, obtuse at apex, ciliate, glabrous. Petals 4, ovate, 3–4 × 2 mm, rounded at apex, entire, glabrous, membranous. Stamens 5; filaments 2–3 mm long, narrow, slender, glabrous. Ovary many-ovuled, elliptic; style1–2 mm long, erect, glabrous; stigma globose, sticky. Siliqua cylindric, fusiform.

Distribution: Native range is Temp. & Subtropical Northern Hemisphere to Old World Tropical Mountains (POWO, 2023); *Habitat:* Moist areas: *Fl. & Ft.*: November-March.

Specimens examined: Mangaladevi, 15.03.1997, *Jomy Augustine* 17904 (KFRI); Pambadum Shola National Park, 20.12.2018, *Vishnu Mohan & Santhosh Nampy* 167844 (CALI).

Lepidium L.

Sp. Pl. 2: 643. 1753.

Lepidium didymum L., Mant. Pl. 92. 1767. *Coronopus didymus* (L.) Sm., Fl. Brit. 2: 691. 1800. *Senebiera didyma* (L.) Pers., Syn. 2: 185. 1806; Gamble, Fl. Madras 1: 39. 1915; Sharma, Fl. India 2: 192. 1993; A.N.Henry & T.Ravish. in P.Daniel (ed.), Fl. Kerala 1: 217. 2005.



Diffuse herbs, up to 30 cm long. Stems angled, grooved, branching from base, hirsute. Leaves alternate, 5 or more foliate, pinnately divided; leaflets elliptic, 0.1–0.3 × 0.1 cm, acute at apex, entire, glabrous; petioles *c.* 0.3 cm long, glabrous, winged. Flowers minute on many-flowered long axillary racemes; peduncles 1–2.8 cm long, erect, hirsute; pedicels *c.* 0.3 cm long, filiform, narrow, slender. Bracts absent. Sepals ovate-orbicular, *c.* 2 × 1 mm, rounded at apex, entire, glabrous. Petals linear, *c.* 4 × 1 mm, rounded at apex, smooth, glabrous, membranous. Stamens 2; filaments 1–2 mm long, slender, glabrous. Ovary superior, widely ovate; style *c.* 1 mm; stigma bilobed, sticky. Siliqua emarginate at base, notched at apex, reticulate.

Distribution: Native range is Peru to Brazil and S. South America (POWO, 2023); *Habitat:* Degraded forests and tea plantations as a weed: *Fl. & Ft.*: Throughout the year.

Specimens examined: Mattupetty, 04.05.2017, *Vishnu Mohan & Santhosh Nampy* 152158 (CALI); Vallakkadavu, 19.08.1995, *Jomy Augustine* 16333 (KFRI).

Rorippa Scop.

Fl. Carniol. 520. 1760.

Rorippa indica (L.) Hiern, Cat. Afr. Pl. 1: 26. 1896; A.N.Henry & T.Ravish. in P.Daniel, Fl. Kerala 1: 220. 2005. *Sisymbrium indicum* L., Mant. Pl. 1: 93. 1767; *Nasturtium indicum* (L.) DC., Syst. Nat. 2: 199. 1821; Hook.f., Fl. Brit. India 1: 134. 1872; Gamble, Fl. Madras 37. 1915.



Slender, glabrous herbs, up to 1 m tall. Stems angled, glabrous. Leaves alternate, variable; lower leaves lyrate with 2 segments on either side, 6–8 × 2.5 cm, dentate at apex, hastate at base, dentate, glabrous; petioles *c.* 2 cm long, glabrous, winged; upper leaves sessile, ovate-lanceolate, 0.5–0.7 × *c.* 0.3 cm, dentate, glabrous; petioles *c.* 0 cm long, glabrous. Flowers in terminal or axillary many flowered racemes; peduncles up to 8 cm long, glabrous; pedicels *c.* 0.5 cm long, slender, erect, glabrous. Sepals 5, ovate, 2–3 × *c.* 1 mm, rounded at apex, entire, glabrous. Petals 5, ellipti c-ovate, 3–4 × *c.* 2 mm, rounded at apex, entire, glabrous. Stamens 6; filaments *c.* 2 mm long, slender, erect. Ovary superior, narrowly elliptic, glabrous; style reduced; stigma rounded, sticky. Siliqua narrowly elliptic, green. Seeds 2-seriate, minute, globose, rugose, reddish-brown.

Distribution: Native range is W. Central Tropical Africa, N. Egypt to Japan and Philippines (POWO, 2023); *Habitat:* Marshy areas: *Fl. & Ft.*: March-April.

Specimens examined: Erattayar, 03.04.2018, *Vishnu Mohan & Santhosh Nampy* 158408 (CALI); Umikkuppam-PTR, 13.03.1995, *N. Sasidharan* 14900 (KFRI).

CAPPARACEAE Juss.

Gen. Pl. 242. 1789, *nom. cons*.

Herbs, shrubs or trees. Leaves alternate or rarely opposite, simple or digitately 2–7-foliolate. Stipules caducous or persistent. Flowers hermaphrodite. Sepals 4–8, free or variously connate. Petals 4–16 or absent. Stamens few-many. Ovary sessile or more usually supported on a gynophore of varying length, 1-locular. Fruit a capsule or berry, few- to many-seeded, rarely 1- seeded.

The family includes 15 genera and 433 species in the world (POWO, 2023); four genera and 13 species in Idukki district.

Key to the genera

1. Plants herbs……..……..……..*Cleome*

1. Plants trees or shrubs…….…..…..2

2. Leaves simple……..……..……*Capparis*

2. Leaves 2–5 foliate……..……..……3

3. Stamens 4–8; berries oblong-cylindric…….....*Cadaba*

3. Stamens 12–50; berries globose or ellipsoid……..*Cretaeva*

Cadaba Forssk.

Fl. Aegypt.-Arab. 67. 1775.

Cadaba fruticosa (L.) Druce, Rep. Bot. Exch. Club Soc. Brit. Isles 3: 415. 1914. *Cleome fruticosa* L., Sp. Pl. 671. 1753.

Cadaba indica Lam., Encycl. 1: 544. 1785; Hook.f., Fl. Brit. India 1: 172. 1872; Gamble, Fl. Madras 43. 1915.

Climbing shrubs. Stems woody, terete, pubescent on young parts. Leaves simple, alternate; lamina oblong, 12–4 × 1–2 cm, rounded-mucronate at apex, rounded at base, entire, slightly pubescent; petioles 0.3–0.5 cm, pubescent. Flowers in terminal racemes; peduncles 2–6 cm long, slender, pubescent; pedicels 0.5–1.5 cm long, slender, pubescent. Sepals 4, lanceolate, *c.* 10 × 5 mm, acuminate at apex, entire, pubescent. Petals 4 + 1 elliptic, *c.* 15 × 5 mm, rounded at apex, clawed at base, entire, glabrous, membranous; lateral petal infundibuliformis, Gynandrophore 5–9 mm long, stout. Stamens 4; filaments 6–9 mm long, slender; Ovary elliptic, 1-celled. stigma sessile, clavate. Berries globose. Seeds globose.

Distribution: The native range of this species is Indian Subcontinent (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: January-October.

Specimen examined: Chinnar, 08.06.1995, *K.K. Sajeev* 15697 (KFRI).

Capparis L.

Sp. Pl. 1: 503. 1753.

Key to the species

1. Flowers axillary 2–4 crowded…… ……..*C. bervispina*

1. Flowers generally not as above……..……2

2. Flowers in supra-axillary vertical series……..*C. zeylanica*

2. Flowers never in supra-axillary vertical series……..……3

3. Flowers in corymbs……4

3. Flowers umbellated or sub-umbellated……7

4. Cataphylls conspicuous at least at base……...5

4. Cataphylls absent……..6

5. Leaves linear to ovate-lanceolate; fruits ellipsoid or ovoid……*C. diversifolia*

5. Leaves elliptic-oblong; fruits ellipsoid……..……..……*C. fuscifera*

6. Plants spiny & uniformly recurved……..……*C. sepiaria*

6. Plants mostly not spiny (if yes, spines few, straight and short)……

……...*C. shevaroyensis*

7. Stamens more than 80……..……*C. moonii*

7. Stamens less than 80……...*C. cleghornii*

Capparis brevispina DC., Prodr. 1: 246. 1824; Gamble, Fl. Madras 45. 1915; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 260. 1993; Sundararagh. & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 225. 2005.

Thorny shrubs, up to 4 m tall. Young stems stellate hairy, glabrous when old. Leaves simple, alternate, ovate-elliptic, 2–9.5 × 1–3.5 cm, acute at apex and base, entire and recurved at margins, coriaceous, shining above, glabrous; petioles 0.2–0.5 cm long, glabrous, grooved at middle. Flowers axillary, 2–4 paired; pedicels 1.5–4 cm long, puberulous. Sepals 4; outer pair boat-shaped, 6–8 × 3–5 mm, acuminate at apex, entire, sparsely puberulous outside, glabrous inside; inner setals ovate, 8–10 × *c.* 4 mm, acute at apex, entire, glabrous. Petals oblong or obovate, *c.* 2 × 1 cm, rounded-acute at apex, entire, sparsely pubescent out, glabrous within. Stamens many; filaments *c.* 2.5 cm long, slender, narrow, erect. Gynophore 2–2.5 cm long; ovary ovate, superior; style reduced; stigma sticky. Berry ovoid, apiculate.

Distribution: The native range of this species is India to Assam, Sri Lanka (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: January-October.

Specimens examined: Chinnar Wild Life Sanctuary, 25.02.2003, *Divya N.* 90526; *Ibid.*, 25.02.2003, *Ligimon* 89826; *Ibid.*, 25.02.2008, *Smitha C.K.*

89124; *Ibid.*, 25.02.2003, *Radhika K.V.* 88624; *Ibid.*, 25.02.2003, *Roshni Balakrishnan* 89925; *Ibid.*, 25.02.2003, *Shylaja N.* 88322; *Ibid.*, 25.02.2003, *Tomson Mani* 90826; *Ibid.*, 25.02.2003, *Nishitha I.K.* 90423 (CALI).

Capparis cleghornii Dunn in Gamble, Fl. Madras: 146 1915; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 263. 1993; Sundararagh.. & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 226. 2005.

Scandent shrubs. Branchlets woody, terete, fulvous-pubescent; thorns sharp, recurved. Leaves simple, alternate; lamina elliptic-obovate, 3–8 × 2–5 cm, acuminate at apex, acute at base, entire, sub-coriaceous; petioles 0.8–1 cm long. Flowers in terminal few flowered sub-umbels; pedicels 2.5–3 cm long, pubescent. Sepals 4, concave, *c.* 12 × 7–8 cm, rounded at apex, entire, pubescent out, glabrous within. Petals 4, obovate, 20–25 × 10–12 mm, rounded at apex, entire, glabrous, membranous. Receptacle *c.* 3 mm across. Stamens less than 80; filaments 25 mm long, slender, glabrous. Gynophore 20–30 mm long, glabrous; ovary ovoid, glabrous; stigma sessile. Berry sub-globose. Seeds obovoid or orbicular, dorsally compressed.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Along margins of semi-evergreen forests; *Fl. & Ft.*: March-December.

Specimen examined: Kanjiar, 17.12.1982, *V.S. Ramachandran* 76176 (MH).

Capparis diversifolia Wight & Arn., Prodr. Fl. Ind. Orient. 27. 1834; Hook.f., Fl. Brit. India 1: 175. 1872; Gamble, Fl. Madras 45. 1915; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 267. 1993; Sundararagh & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 228. 2005.

Thorny climbing shrubs. Stems woody, zig-zag, stellate hairy when young, glabrous when old. Leaves simple, alternate, ovate-lanceolate, 1.5–5 × 1–3 cm, acute with a clefted tip at apex, rounded at base, entire, glabrous above, sparsely pubescent below; petioles *c.* 0.5 cm long, pubescent. Cataphylls ovate, *c.* 3 × 2 mm, acute at apex, entire. Flowers showy, in few-flowered terminal corymbs; peduncles very much reduced; pedicels 1.5–2.5 cm long, narrow,

erect, slender, puberulous. Bracts absent. Sepals sub-equal, ovate, 7–8 × 3–4 cm, rounded at apex, entire, glabrous. Petals ovate or obovate, sub-equal, 1.8–2 × 0.6–0.9 cm, rounded at apex, entire, glabrous, tomentellous basally. Stamens numerous, exceeding pistil; filaments *c.* 2.5 cm long, slender, narrow. Gynophore 2.3–2.5 cm long; ovary fusiform, *c.* 6 cm long, glabrous; style reduced; stigma sticky. Berries ovoid or ellipsoid, smooth.

Distribution: The native range of this species is S. India (POWO, 2023);

Habitat: Semi-evergreen forests; *Fl. & Ft.*: April-January.

Specimens examined: Chinnar, 19.05.1999, *Resmi T.* 78400; *Ibid.*, 19.05.1999, *Resmi T.* 78274; Churulipetty, 19.05.1999, *Sindhu C.* 78400; *Ibid.*, 19.05.1993, *Satheesh George* 79273; *Ibid.*, 19.05.1999, *Thushar K.V.* 79382; Chinnar Wildlife Sanctuary, 20.05.1999, *Shamina M.* 78993 (CALI).

Capparis fusifera Dunn, Bull. Misc. Inform. Kew 1914: 377. 1914; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 271. 1993; Sundararagh & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 2: 229. 2005.

Much branched spreading shrubs, up to 3 m tall. Stems woody, glabrous. Leaves simple, alternate, elliptic-oblong, 10–15 × 5–7 cm, acuminate at apex, obtuse at base, wavy at margins, coriaceous, glabrous; petioles *c.* 0.5 cm long, puberulous, grooved. Cataphylls ovate, 3–4 × *c.* 2 mm, acute at apex, entire. Flowers in corymbs, fragrant; peduncles puberulous. Bracts setaceous, elliptic, *c.* 2 mm long, acuminate at apex. Sepals 4, sub-equal, elliptic, 5–7 × 3.5–4 mm, acuminate at apex, entire, glabrous. Petals 4, obovate, 8–10 × *c.* 4 mm, rounded at apex, attenuate at base, sparsely hairy out, glabrous inside. Stamens ∞; filaments 10 mm long, erect, narrow, exceeding pistil. Gynophore *c.* 10 mm long, slender; ovary spindle-shaped; style narrow, elongate; stigma 1, glabrous. Berries ellipsoid. Seeds 1 or 2.

Distribution: The native range of this species is S. India (POWO, 2023);

Habitat: Semi-evergreen forests; *Fl. & Ft.*: October-March.

Specimens examined: Chinnar, 16.03.1995, *K.P. Rajesh* 15304 (KFRI); Kulamavu, 15.12.1982, *C.N. Mohanan* 76079 (MH); Meenmutty,

18.02.1982, *V.S. Raju* 71253 (MH); Periyar Tiger Reserve, 10.11.2018, *Vishnu Mohan* & *Santhosh Nampy* 175992 (CALI).

Capparis moonii Wight, Ill. Ind. Bot. 1: 35. 1840; Hook.f., Fl. Brit. India 1: 175. 1872; Gamble, Fl. Madras 45. 1915; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 277. 1993; Sundararagh. & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 232. 2005.



Woody climbing shrubs, up to 10 m tall. Stems woody glabrous, thorny. Leaves simple, alternate, ovate-elliptic, 9–12 × 3–5 cm, acute at apex, rounded at base, entire, glabrous; petioles *c.* 1.5 cm long, slender, glabrous; pair of spines at node. Flowers in terminal umbels; pedicels 4–5 cm long, glabrous. Sepals 4, orbicular; outer sepals *c.* 1.5 × 1 cm, rounded at apex, entire, puberulous; inner sepals *c.* 1 × 0.8 cm, rounded at apex, entire, glabrous. Petals oblong-obovate, 2.5–3.3 × *c.* 1.5 cm, rounded at apex, entire, white, hairy inside, glabrous outside. Stamens more than 80; filaments 5–7 cm long, glabrous. Gynophore 4.5–6 mm long, slender, glabrous; ovary ellipsoid, glabrous, green; style reduced; stigma sticky, capitate. Berries 6–8 cm across, fusiform, glabrous.

Distribution The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: Throughout the year.

Specimen examined: Chinnar, 06.02.2021, *Vishnu Mohan* & *Santhosh Nampy* 186455 (CALI).

Capparis sepiaria L., Syst. Nat., ed. 10. 2: 1071. 1759; Hook f., Fl. Brit. India 1: 177. 1872; Gamble, Fl. Madras 46. 1915; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 289. 1993; Sundararagh. & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 233. 2005.

Shrubs at 8 m tall. Branchlets zig-zag, terete, glabrous at maturity; thorns numerous, uniformly recurved. Leaves simple, alternate; lamina ovate-elliptic, 2–4 × 1–2 mm, acute at apex, rounded at base, entires, puberulent below, glabrous above, coriaceous; petioles 3–7 mm long, puberulent, stout. Cataphylls absent. Flowers on terminal corymbs; peduncles 10–20 mm long, erect, stout; pedicels 8–20 mm long, slender, sparsely puberulent. Sepals 4, ovate, 3.5–4 × 2 mm, rounded at apex, ciliate, sparsely pubescent out, glabrous within. Petals 4, obovate-spathulate, 5–6 × 2–3 mm, rounded at apex, entire, glabrous membranous. Stamens many; filaments 10–12 mm long, slender, glabrous. Gynophore 6–12 mm long, slender; ovary ovoid, glabrous; stigma sessile. Berries sub-globose, glabrous. Seeds 1–4.

Distribution: The native range of this species is Tropical & S. Africa, India to China (S. Guangxi, S. Guangdong) and N. Australia (POWO, 2023); *Habitat*: Dry deciduous forest; *Fl. & Ft.*: March-October.

Specimen examined: PTR, 15.03.1997, *Jomy Augustine* 17909 (KFRI).

Capparis shevaroyensis Sundararagh., Kew. Bull. 37: 72. 1982; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 290. 1993; Sundararagh. & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 234. 2005. *Capparis parviflora* Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 176 (1872), nom. illeg.; Gamble, Fl. Madras 46. 1915.

Erect scandent thorny shrubs. Stems glabrous, woody, smooth. Leaves simple, alternate; lamina oblanceolate, 5–12 × 3–7 cm, acute at apex and base, entire, glabrous, coriaceous; petioles *c.* 5 mm long, glabrous, stout. Cataphylls absent. Flowers in terminal corymbs; peduncles *c.* 1 cm long, narrow, glabrous; pedicels *c.* 2 cm, narrow, filiform, glabrous. Bracts subulate, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Sepals 4, orbicular, *c.* 4 × 1.5 mm, rounded at apex, entire, glabrous. Petals, obovate *c.* 4 × 2 mm, rounded at apex, entire, puberulous at base, glabrous, membranous. Stamens numerous; filaments *c.* 10 mm long, slender, glabrous. Gynophore *c.* 10 mm long, slender; ovary ovoid, glabrous; style very short; stigma sicky. Berries globose, smooth.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Degraded moist deciduous forests; *Fl. & Ft.*: August-October.

Specimen examined: Thekkady, *s.d., Jomy Augustine* 17909 (CALI).

Capparis zeylanica L. Sp. Pl., ed. 2.: 720 1762; Gamble, Fl. Madras 46. 1915; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 298. 1993; Sundararagh.. & N.P.Balakr. In P. Daniel (ed.), Fl. Kerala 1: 236. 2005.

Capparis horrida L.f. in Suppl. Pl. 264. 1782; Hook.f., Fl. Brit. India 1: 178. 1872.

Scandent shrubs, up to 5 m tall. Branches terete, densely pubescent. Spines strong, sharp, recurved. Leaves simple, alternate; lamina elliptic-lanceolate 3–6 × 1.5–3 cm, acute at both ends, entire, glabrescent; sub-coriaceous; petioles 5–10 mm long, glabrous. Flowers in supra-axillary vertical series; pedicels 5–15 mm, stout, stellate tomentose. Sepals 4, oblong, 8–11 × 6–8 mm, acute at apex, rounded at base, entire. Petals 4, oblong, 9–13 × 5–7 mm, rounded at apex, entire, glabrous, membranous. Stamens many; filaments 15–20 mm long, slender, glabrous. Gynophore 15–20 mm long, slender, tomentose; ovary ellipsoid; stigma sticky. Berries globose to ellipsoid, verrucose.

Distribution: The native range of this species is SE. China to Tropical Asia (POWO, 2023); *Habitat*: Dry deciduous forests and sacred grooves; *Fl. & Ft.*: March-May.

Specimen examined: Chinnar, 16.03.1995, *K.K. Sajeev* 11965 (KFRI).

Cleome L.

Sp. Pl. 2: 671. 1753.

Key to the species

1. Leaves 1-foliate……..……..*C. monophylla*
1. Leaves multifoliate……..……...2
2. Plants glabrous……..……..3
2. Plants glandular hairy……..*C. viscosa*
3. Leaves monomorphic……*C. rutidosperma* var. *burmanni*
3. Leaves diamorphic……*C. aspera*

Cleome aspera Koenig ex DC., Prodr. 1: 241. 1824; Hook.f., Fl. Brit. India 1: 169. 1872; Gamble, Fl. Madras 41. 1915; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 303. 1993; Sundararagh. & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 239. 2005.

Annual prostrate erect herbs. Stems branching from base, ribbed, glabrous. Leaves dimorphic; alternate; basal leaves 3-foliate; lamina narrowly elliptic, 1–2.5 × 0.5–1 cm, rounded at apex, acute at base, entire, glabrous, subsessile; upper leaves simple, oblong-elliptic, *c.* 1 × 0.3 cm, acute at apex, entire, glandular-pubescent out, glabrous within; petioles *c.* 0.5 cm long, glabrous, slender. Flowers solitary, axillary; pedicels filiform, *c.* 0.4 cm long, elongated in fruit. Sepals linear-lanceolate, *c.* 2 × 1 mm, acute at apex, entire, glandular pubescent out, glabrous within. Petals oblanceolate, 2.5–5 × 1.5 mm, rounded at apex, entire, glabrous. Stamens 6; filaments *c.* 2.5 cm long. Gynophore *c.* 2 mm long, slender; ovary superior, elliptic; style reduced; stigma sticky, capitate. Capsules terete; seeds many.

Distribution: The native range of this species is India, Sri Lanka, Jawa to Lesser Sunda Islands (POWO, 2023); *Habitat*: Wastelands; *Fl & Ft.*: May-August.

Specimens examined: Allampetty, 18.07.1995, *K.K. Sajeev* 15757 (KFRI); Chinnar 19.05.1999, *Shamina M.* 78967 (CALI); *Ibid.*, 19.05.1999, *Lisha K.* 78661; way to Churulipetty, 19.05.1999, *Sindhu C* 78264 (KFRI).

Cleome monophyla L., Sp. Pl. 2: 672. 1753; Hook.f., Fl. Brit. India 1: 168. 1872; Gamble, Fl. Madras 1: 41.1915; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 312. 1993; R.Sundararagh. & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 242. 2005.

Erect annual herbs, up to 30 cm tall. Stems angled, striate, glandular pubescent. Leaves simple, alternate, 1-foliate; lamina linear-lanceolate, 3–5 × 2 cm, acute at apex, truncate-cordate at base, ciliate, sparsely hairy; petioles *c.* 2 cm long, slender, narrow, glandular hairy. Flowers in terminal racemes; peduncles 3–5 cm long, glandular hairy; pedicels 0.5–1 cm long, sparsely hairy, slender. Bracts foliaceous, ovate, 4–5 × 3–4 mm, acuminate at apex, cordate at base, entire, glandular hairy. Sepals 4, linear, 3–5 × *c.* 1 mm, acuminate at

apex, entire, glandular hairy out, glabrous within. Petals oblong-spathulate, 5–7 × 2–3 mm, rounded at apex, tapering at base, glabrous. Stamens 6; filaments unequal, *c.* 8 mm long. Gynophore *c.* 5 mm long, slender, narrow, erect; ovary linear, superior; stigma lobed, sticky. Capsules subsessile, linear, strongly ribbed.



Distribution: The native range of this species is Tropical & S. Africa, N. Yemen, India, Sri Lanka (POWO, 2023); *Habitat*: River banks; *Fl. & Ft.*: April-November. *Specimens examined*: Chinnar, 16.11.1998, *N. Sasidharan* 11552 (KFRI); Chinnar, 18.05.1999, *Sindhu C.* 78226 (CALI); *Ibid.*, 19.05.1999, *Thushar K.V.* 79339 (CALI); Chottupara 07.09.2017, *Vishnu Mohan* & *Santhosh Nampy* 152958; Pius Nagar, 22.06.2018, *Vishnu Mohan* & *Santhosh Nampy* 159344 (CALI).

Cleome rutidosperma var. **burmanni** (Wight & Arn.) Siddiqui & S.N.Dixit, Pl. Sci. 6: 68. 1974. *Cleome burmanni* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 22. 1834; Hook.f., Fl. Brit. India 1: 170. 1872; Gamble, Fl. Madras 1: 41. 1915; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 304. 1993; Sundararagh. & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 239. 2005.



Erect annual herbs, up to 40 cm tall. Stems ribbed, branched from base. Leaves 3-foliolate, alternate; leaflets obovate, 3–4 × 2–2.5 cm, rounded-acute at apex, entire, glabrous; petioles

25–40 mm long, glabrous, slender, narrow, grooved. Flowers axillary, solitary; pedicels 0.5–1 cm long, slender, erect, narrow, glabrous. Sepals 4, lanceolate, 5–7 × 3–3.5 mm, acuminate at apex, entire, hispid out, glabrous within. Petals elliptic-oblong, 2–4 × 1.2 mm, rounded at apex, entire, glabrous, white. Stamens 6; filaments of different lengths, narrow, erect, glabrous, slender. Gynophore *c.* 2 mm long, slender; ovary fusiform, glandular hairy; stigma capitate. Capsules linear.

Distribution: The native range of this variety is W. & S. India, Sri Lanka, Assam to Myanmar (POWO, 2023); *Habitat*: Wastelands; *Fl & Ft.*: August.

Specimen examined: Adimali, 17.08.2019, *Vishhnu Mohan* & *Santhosh Nampy* 186703 (CALI).

Cleome viscosa L., Sp. Pl. 2: 672. 1753; Hook.f., Fl. Brit. India 1: 170. 1872; Gamble, Fl. Madras 1: 41. 1915; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 317. 1993; Sundararagh & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 245. 2005.



Annual erect herbs. Stems glandular hairy, foetid, branched at base. Leaves 3–5-foliolate, alternate; leaflets elliptic-oblong, 1–3 × 0.5–2 cm, acute at apex, cuneate at base, ciliate, glandular pubescent below, glabrous above; petioles 1–2 cm long, glabrous. Flowers axillary or terminal, in few-flowered racemes; peduncles 3–5 cm long, stout, glabrous; pedicels 4–5 cm long, slender, glabrous. Bracts ovate, 3–3.5 × *c.* 1 mm, acumi nate at apex, entire, foliaceous. Sepals 4, oblong-lanceolate, *c.* 6 × 3 mm, rounded at apex, entire, glandular hairy out, glabrous within. Petals 4, obovate -

oblong, 10–12 × 3–4 mm, rounded at apex, entire, glabrous, membranous. Stamens many; filaments 4–6 mm long, slender, glabrous. Gynophore *c.* 4 mm long, erect, slender, stout; ovary sessile, oblong - cylindric, glandular -hairy; stigma capitate, sticky. Capsules linear-oblong. Seeds numerous, reniform.

Distribution: The native range of this species is Tropical and Subtropical Old World (POWO, 2023); *Habitat*: Wastelands; *Fl. & Ft.*: March-August. *Specimens examined*: Chinnar, 25.08.1995, *K.K. Sajeev* 15788 (KFRI); Chinnar, 19.05.1999, *Resmi T.* 78312 (CALI); Kattappana, 28.03.2019, *Vishnu Mohan* & *Santhosh Nampy* 188990 (CALI); Meenmutty, 30.05.1982, *C.N. Mohanan* 74111 (MH); Vellimala, *s.d., Jomy Augustine* 15331 (CALI).

Crataeva L.

Syst. Nat., ed. 10. 2: 1044. 1759.

Crateva magna (Lour.) DC, Prodr. 1: 243. 1824; Sundararagh. in B.D.Sharma & N.P.Balakr., Fl. India 2: 324. 1993; Sundararagh. & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 248. 2005. *Capparis magna* Lour., Fl. Cochinch. 330. 1790.

Crataeva nurvala Buch.-Ham., Trans. Linn. Soc. London 15: 121. 1827. *Crateva religiosa* var. *nurvula* (Buch.-Ham.) Hook.f. & Thomson in J.D.Hooker, Fl. Brit. India 1: 172 1872.

Trees, up to 20 m tall. Branchlets woody, terete, glabrous; bark brownish grey, smooth. Leaves trifoliate, alternate; leaflets lanceolate, terminal leaflet larger than lateral, 4–12 × 2–4.5 cm, attenuate at apex, obliquely rounded at base, entire, glabrous, coriaceous; rachis 5–10 cm long, slender, grooved above, glabrous; petioles *c.* 0.4 cm long, slender, glabrous. Flowers creamy white, in terminal corymbs; pedicels *c.* 5 cm long, erect, slender, glabrous. Sepals 4, free, oblong, 2.5–3 × 1.3–1.5 cm, acute at apex, entire, glabrous, adnate to the lobed disc. Petals 4, obovate, 2–2.5 × 1.5–1.8 cm, acuminate at apex, acute at base, entire, glabrous, membranous. Disc nectariferous. Stamens numerous; filaments 50–80 mm long, slender, glabrous. Gynophore 2–4 cm long, slender, erect, narrow, glabrous; ovary superior, ellipsoid; stigma sessile, sticky,

capitate. Berries globose.

Distribution: The native range of this species is Tropical and Subtropical Asia (POWO, 2023); *Habitat*: River banks in semi-evergreen forests; *Fl. & Ft.*: March-April.

Specimen examined: Vallakkadavu, *s.d., Jomy Augustine* 13426 (CALI).

VIOLACEAE Batsch

Tab. Affin. Regni Veg. 57. 1802.

Herbs, shrubs or trees. Leaves simple, alternate or opposite, entire, stipulate. Flowers usually regular (except in *Viola*), in racemes or solitary in leaf axils. Sepals 5, equal or unequal. Petals 5. Stamen 5, base of filaments fused forming a ring around ovary. Ovary sessile, superior, 1-celled; style simple; stigma terminal, capitate, truncate or cupular. Fruit a 3-valved capsule. Seeds spherical, winged in some climbing species.

The family includes 24 genera (POWO, 2023); two genera and three species in the study area.

Key to the genera

1. Stems very short or absent……..……....*Viola*
1. Stems up to 30 cm long…….. *Pigea*

Pigea Ging.

in A.P.de Candolle, Mém. Viol. 28. 1823.

Pigea enneasperma (L.) P.I.Forst., Austrobaileya 11: 29. 2021. *Viola enneasperma* L., Sp. Pl. 2: 937. 1753. *Hybanthus enneaspermus* (L.) F.Muell., Fragm. 10: 81. 1876; Vivek., in P.Daniel (ed.), Fl. Kerala 1: 251. 2005. *Afrohybanthus enneaspermus* (L.) Flicker, Phytotaxa 230(1): 47. 2015.

Viola suffruticosa L., Sp. Pl. 2: 937. 1753. *Ionidium suffruticosum* (L.) Roth ex Schult. in J.J.Roemer & J.A.Schultes, Syst. Veg., ed. 15. 5: 394. 1819; Hook.f., Fl. Brit. India 1: 185. 1872; Gamble, Fl. Madras 49. 1915.

Annual herbs, up to 30 cm high. Stems woody at base, scabrous, moderately branched. Leaves simple, alternate; lamina linear-lanceolate, 1–3 × 0.1–0.4 cm, acuminate at apex, attenuate at base, minutely crenate, glabrous; petioles 0.4–0.7 cm long, glabrous. Stipules lanceolate, *c.* 1 × 0.5 mm, acute at apex, entire, glabrous. Flowers axillary, solitary, non-fragrant; pedicels *c.* 1 cm long,

slender, narrow, glabrous. Sepals 5, ovate-lanceolate, *c.* 2 × 1 mm, acute at apex, entire and wavy at margins, glabrous. Petals 5, unequal; lower petals sub-cordate, *c.* 0.8 × 0.5, clawed at apex, entire; lateral petals 3, triangular, *c.* 0.5 × 3 mm, truncate at apex, entire. Stamens 5; filaments *c.* 2 mm long, slender. Ovary ovoid, 1-celled; ovules many; styles clavate; stigma oblique. Capsules ovoid. Seeds many, ovoid.

Distribution: Native range is Tropical and S. Africa, Madagascar, Tropical & Subtropical Asia to Australia (POWO, 2023); *Habitat*: Dry deciduous forests and wastelands; *Fl.* & *Ft.***:** June-November.

Specimens examined: Chinnar, 25.08.1995, *K.K. Sajeev* 15812 (KFRI); Vellimala, 10.04.1995, *Jomy Augustine* 15392 (CALI).

Viola L.

Sp. Pl. 2: 933. 1753.

Key to the species

1. Leaves triangular-ovate, not deeply cordate; petioles winged ……

…….. *V. betonicifolia*

1. Leaves ovate, deeply cordate; petioles not winged ……..……..2

2. Sepals linear; stigma lateral ……..……*V. pilosa*

2. Sepals ovate; stigma terminal……..……*V. hamiltoniana*

Viola betonicifolia Sm. A.Rees, Cycl. 37: n.° 7 1818.

Perennial herbs, up to 20 cm tall. Stems reduced or compressed. Leaves simple, radical; lamina triangular–ovate, 1–3 × 1–1.4 cm, acute-rounded at apex, truncate at base, slightly serrate, glabrous; petioles 4–13 cm long, slender, grooved, winged. Stipules lanceolate, scaly, 1–2 cm long, sharply acuminate at apex, entire, glabrous. Flowers axillary, non-fragrant; pedicels 4–20 cm long, narrow, erect, slender, glabrous. Sepals 5, free, 3–5 × 1 mm, sharply acuminate at apex, truncate at base, falcate, entire, glabrous. Petals 5, unequal; lateral petals ovate-oblong, *c.* 10 × 4 mm, rounded at apex, hairy at base, entire; lower petal oblong, *c.* 10 × 6 mm, mucronate at apex, spurred

at base, entire. Stamens 5; filaments *c.* 3 mm long, glabrous. Ovary elliptic; stigma terminal, sticky. Capsules ovoid, many seeded.



Distribution: Native range is Siberia to N. China and Japan (POWO, 2023); *Habitat***:** Open grasslands; *Fl.* & *Ft.*: February-June.

Specimens examined: Chinnar, 08.05.1996, *K.K. Sajeev* 17391 (KFRI); Choondal, Mathikettan Shola National Park, 22.06.2018, *Vishnu Mohan & Santhosh Nampy* 151479 (CALI); Devikulam, 06.02.1970, *B.V. Shetty* 33430 (MH); Meesappulimala, 06.05.2019, *Vishnu Mohan & Santhosh Nampy* 159156(CALI).

Viola hamiltoniana D.Don, Prodr. Fl. Nepal. 206. 1825.

Viola arcuata Blume, Bijdr. Fl. Ned. Ind. 58. 1826.

Viola distans Wall., Trans. Med. Soc. Calcutta 7: 227. 1835; Hook.f., Fl. Brit. India 1: 183. 1872; Gamble, Fl. Madras 48. 1915.

Annual herbs, up to 20 cm tall. Stems very short, stout. Leaves simple, radical; lamina ovate, *c.* 4–5 × 6–7 cm, acute at apex, cordate at base, crenate, glabrous above, sparsely pubescent below; petioles 10–12 cm long, glabrous, slender, grooved above. Flowers axillary, solitary; pedicels 15–18 cm long, slender, glabrous. Sepals 5, ovate, *c.* 6 × 4 mm, acute-rounded at apex, entire, glandular out, glabrous within. Petals 5, lateral petals smaller, obovate, 8–10 × 4 mm, obtuse at apex, entire, glabrous; lower petal *c.* 11 × 5 mm, obtuse at apex, spurred at base. Stamens 5; filaments broad, glabrous. Ovary 1-celled; style *c.* 2 mm long, glabrous; stigma terminal, sticky. Capsules glabrous. Seeds many.

Distribution: The native range of this species is Asia (POWO, 2023); *Habitat*: Grasslands; *Fl.* & *Ft.*: October-March.

Specimens examined: Choondal, Mathikettan Shola National Park, 22.06.2018, *Vishnu Mohan & Santhosh Nampy* 151479; Periyar Tiger Reserve, 13.12.1993, *Jomy Augustine* 12969 (KFRI).

Viola pilosa Blume, Cat. Gew. Buitenzorg 57. 1823; Manilal, Fl. Silent Valley 8. 1988. *Viola serpens* var. *pilosa* (Blume) Hochr., Candollea 2: 438. 1925; Hook.f., Fl. Brit. India 1: 184. 1872; Gamble, Fl. Madras 1: 48. 1915.



Perennial herbs, up to 10 cm tall. Stems compressed. Leaves simple; lamina cordate, 1.5–6 × 1.3–5 cm, acuminate at apex, deeply cordate at base, serrate, hispid; petioles 3–12 cm long, slender, narrow, grooved, hispid. Stipules lanceolate, 0.3–0.6 × 0.2–0.3 mm, sharply acuminate at apex, entire, glabrous, scaly. Flowers solitary, non-fragrant; pedicels 3–10 cm long, erect, narrow, sparsely pubescent. Sepals 5, linear, 3–5 × 1–1.5 mm, acuminate at apex, entire, ciliate, sparsely hispid out, glabrous within. Petals 5, sub-equal; lateral petals oblong, *c.* 1.5 × 0.3 cm, acute at apex, entire, glabrous; lower petal spurred at base, glabrous. Stamens 5, connate; filaments reduced. Ovary ovoid, puberulous; styles *c.* 2 mm long; stigma lateral. Capsules ellipsoid, many seeded.

Distribution: The native range of this species is E. Afghanistan to China (W. Guangdong) and Malesia (POWO, 2023); *Habitat*: Shola forests; *Fl.* & *Ft.*: November-April.

Specimens examined: Choondal, MSNP, 04.01.2017, *Vishnu Mohan & Santhosh Nampy* 151446; way to Marayoor, 24.02.2003, *Shahanas Beegum A.* 90120; *Ibid.*, 24.02.2003, *Lijimol* 89821; *Ibid.*, 24.02.2003, *Reena M.B.* 89019; *Ibid.*, 24.02.2003, *Thomson Mani* 90820; *Ibid.*,

24.02.2003, *Divya N.* 90520; *Ibid*., 24.02.2003, *Nishitha I.K.* 90419; *Ibid*., 24.02.2003, *Dhanya A.M.* 89620; *Ibid*., 24.02.2003, *Smitha C.K.* 89119; *Ibid*., 24.02.2003, *Shylaja N.* 88319; *Ibid*., 13.02.2001, *Priya P.D.* 73860; *Ibid*., 13.02.2001, *Prajeesha P.* 72939; *Ibid*., 13.02.2001, *Priya B.S.* 72434; *Ibid*., 24.02.2003, 8th plot, Silent valley, 20.11.2018, *Vishnu Mohan & Santhosh Nampy* 167723; Nymakkad, 24.01.2017, *Vishnu Mohan & Santhosh Nampy*, 158177; way to Munnar, 24.02.2003, *Roshni Balachandran* 89920 (CALI).

BIXACEAE Kunth

Malvac., Butter. Tiliac. 17. 1822. *nom. cons.*

Shrubs or small trees. Leaves alternate, simple, palminerved, stipulate. Flowers hermaphrodite, paniculate. Sepals 5, deciduous. Petals 5. Stamens numerous; anthers horse-shoe-shaped. Ovary superior, 1-celled; ovules numerous; style slender, recurved; stigma 2-lobed. Fruit a densely echinate-setose or smooth capsule.

The family includes three genera and 25 species (POWO, 2023); one species in the study area.

Bixa L.

Sp. Pl. 1: 512. 1753.

Bixa orellana L., Sp. Pl. 512. 1753; Hook.f., Fl. Brit. India 1: 252. 1827; Gamble, Fl. Madras 1: 51. 1915; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 257. 2005.



Shrubs or small evergreen trees, up to 5 m tall. Branchlets woody, smooth, glabrous; bark brownish grey. Leaves alternate; lamina ovate, 9–24 × 7–16 cm, acuminate at apex, truncate at base, entire at margins, glabrous, shining above, densely red-dotted below, coriaceous; petioles 4–10 cm long, glabrous, slender, slightly

pulvinate. Stipules lanceolate, 5–6 × 2 mm, acuminate at apex, entire at margins, glabrous, scaly. Flowers in terminal corymbs, non-fragrant; peduncles woody, 3–6 cm long, glabrous; pedicels 0.8–1.4 cm long, glabrous, stout. Sepals 5, broadly ovate to sub-orbicular, *c.* 8–10 × 7–9 mm, rounded at apex, entire at margins, glabrous, scaly, purple. Petals 5, unequal, obovate, 20–25 × 10–15 mm, rounded at apex, entire at margins, glabrous, membranous, pale pink. Stamens numerous; filaments 10–17 mm long, erect, slender, thread like. Ovary densely covered with thick red bristles; style *c.* 10 mm long, erect, stout; stigma capitate. Capsules globose or broadly ovoid, clothed with dense long stiff flexible bristles. Seeds obovate, numerous.

Distribution: The native range of this species is Mexico to S. Tropical America (POWO, 2023); *Habitat*: In open bare lands; *Fl.* & *Ft.*: June-November.

Specimen examined: Neriyamangalam, 28.11.2019, *Vishnu Mohan* & *Santhosh Nampy* 186633 (CALI).

PITTOSPORACEAE R.Br.

Voy. Terra Austral. 2: 542. 1814, *nom. cons.*

Evergreen trees, shrubs or climbers with resin-ducts in the bark, rarely spiny. Leaves simple, alternate, entire, dentate or lobed. Flowers few-many in terminal and/or axillary panicles or cymes, or solitary in the axils. Sepals 5, free. Petals 5, generally free. Stamens 5, alternate with petals. Ovary superior, sessile or shortly stipitate; stigma capitate or somewhat lobed. Fruit a berry or a capsule.

This family consist of nine genera and 293 species (POWO, 2023); one genus and three species in the study area.

Pittosporum Banks ex Gaertn.

Fruct. Sem. Pl. 1: 286. 1788, *nom. cons*

Key to the species

1. Peduncles glabrous……*P. neelgherrense*
1. Peduncles puberlous……..2
2. Flowers in umbels or sub-umbels……*P. tetraspermum*
2. Flowers in terminal corymbs……*P. napaulense*

Pittosporum napaulense (DC.) Rehder & E.H.Wilson, Pl. Wilson. 3(2): 326. 1916. *Celastrus napaulensis* (DC.) Steud. in Nomencl. Bot., ed. 2, 1: 315 1840. *Pittosporum floribundum* Royle in Ill. Bot. Himal. Mts.: 77 1834; Hook.f., Fl. Brit. India 1: 199. 1872; Gamble, Fl. Madras 1: 55. 1915.

Small trees, up to 5 m tall. Stems branching, woody, glabrous. Leaves simple, alternate; lamina oblanceolate, 3–9 × 1–2.2 cm, acute at apex, attenuate at base, entire, glabrous; petioles 1–1.5 cm long, glabrous, slender, grooved above. Flowers in terminal corymbs, non-fragrant; peduncles 5–14 cm long, slender, puberlous; pedicels *c.* 0.5 cm long, slender, glabrous. Sepals widely elliptic, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Petals 5, slightly connate at base, lobes recurved, oblong, *c.* 6 × 3 mm, obtuse at apex, entire, glabrous. Stamens 5, free; filaments *c.* 3 mm long, erect, glabrous. Ovary ovate, appressed pubescent; styles *c.* 2 mm long, glabrous; stigma 5-lobed, sticky. Capsules ovate, glabrous, 4-seeded

Distribution: The native range is Himalaya to China (W. Yunnan) and Indo-China (POWO, 2023); *Habitat*: Moist deciduous and shola forests; *Fl. & Ft.*: February-September.

Specimens examined: Periyar Tiger Reserve, 13.09.1994, *N. Sasidharan* 14136 (KFRI); Vallakkadavu, 07.09.1993, *Jomy Augustine* 12361 (CALI).

Pittosporum neelgherrense Wight & Arn., Prodr. Fl. Ind. Orient. 1: 154. 1834; Hook.f., Fl. Brit. India 1: 198. 1872; Gamble, Fl. Madras 1: 55. 1915.

Small trees, up to 3 m tall. Stems woody, branching, glabrous; bark greyish, smooth. Leaves simple, alternate; lamina elliptic-lanceolate, 2.5–6 × 1.5–2.5 cm, acuminate at apex, attenuate at base, entire, glabrous, coriaceous; petioles *c.* 0.5 cm long, erect, grooved, glabrous. Flowers in axillary racemes, fragrant; peduncles woody, glabrous, reduced; pedicels *c.* 0.5 cm long, erect, glabrous. Sepals 5, free, elliptic-lanceolate, 1.5–2 × *c.* 1 mm, acuminate at apex, entire, glabrous. Petals 5, free, lanceolate, *c.* 6 × 2 mm, rounded at apex, entire, glabrous, white. Stamens 5; filaments erect, *c.* 3 mm long, glabrous. Ovary superior, densely tomentose; styles *c.* 3 mm long, erect, glabrous; stigmas 2-lobed. Capsules yellow.

Distribution: The native range is SW. India. (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* December-August.

Specimens examined: Vallakkadavu, 21.08.1995, *Jomy Augustine* 16386 (KFRI); way to Anamudi base camp, 10.12.2019, *Vishnu Mohan & Santhosh Nampy* 170031 (CALI).

Pittosporum tetraspermum Wight & Arn., Prodr. Fl. Ind. Orient. 1: 154. 1834; Hook.f., Fl. Brit. India 1: 198. 1872; Gamble, Fl. Madras 1: 55. 1915.

Small trees, up to 10 m tall. Branchlets woody, young branches puberlous. Leaves simple, crowded at nodes; lamina ovate-elliptic, 2.5–16 × 1.2–5.2 cm, acuminate at apex, attenuate at base, slightly serrate at margins, glabrous; petioles 0.3–1.8 cm long, glabrous-puberlous, stout, grooved. Flowers in terminal sessile umbels, non-fragrant; peduncles reduced, sometimes up to 1 cm long, puberlous; pedicels *c.* 1.5 cm long, erect, slender, glabrous-pubescent. Bracts triangular, *c.* 1.5 × 1 mm, acuminate at apex, entire, glabrous, caducous, scaly. Sepals 5, ovate, 1–1.5 × *c.* 1 mm, acuminate at apex, entire, sometimes ciliate, glabrous. Petals 5, oblong, 6–9 × 1–1.5 mm, rounded at apex, entire, glabrous, membranous. Stamens 5; filaments *c.* 3 mm long, erect, glabrous. Ovary pubescent; styles glabrous, *c.* 2 mm long; stigmas capitate, sticky. Capsules globose.

Distribution: The native range is SE. India, Sri Lanka and Vietnam (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: February-April.

Specimens examined: Way to Eravikulam, 13.02.2001, *Priya P.D.* 51712; *Ibid*., 13.02.2001, *Sheeba M.V.* 73033; *Ibid*.,13.02.2001, *Smitha V.* 45509; *Ibid*., 13.02.2001, *Prajeesha P.* 72944; *Ibid*., 13.02.2001, *Hajarommabi P.* 72838; *Ibid*., 13.02.2001, *Rency R.C.* 73554; *Ibid*., 13.02.2001, *Sujitha T.* 73951; *Ibid*.,13.02.2001, *B. Nazeedha M.K.* 73634; *Ibid*.,13.02.2001, *Reena M.B.* 89097, *Ibid*.,13.02.2001, *Divya N.* 90585; *Ibid*., 13.02.2001, *Shahanas Beegum A.* 90182; *Ibid*., 13.02.2001, *Dhanya A.M.* 89677; *Ibid*.,13.02.2001, *Nishitha I.K.* 90478; *Ibid*., 13.02.2001, *Thomson Mani* 90879; *Ibid*., 13.02.2001, *Ligimol* 89883; *Ibid*., 13.02.2001, *Shylaja N.* 88378; Vallakkadavu, 15.03.1994, *Jomy Augustine* 13436; way side

Pettimudi, 18.03.2019, *Vishnu Mohan & Santhosh Nampy* 159101 (CALI).

POLYGALACEAE Hoffmanns. & Link

Fl. Portug. 1: 62. 1809, *nom. cons.*

Herbs, woody climbers or small trees. Leaves usually alternate, simple, entire. Inflorescences lateral or terminal, racemose, rarely paniculate. Flowers bisexual, regular-zygomorphic. Sepals 5; 2 lateral inner ones often larger than the others and petaloid, 2 lower ones sometimes connate. Petals 3–5. Stamens (3–) 6–8 (–10); filaments united into a sheath. Ovary superior, 1 or 2 (–8)-celled; ovules solitary, pendulous; style terminal, simple. Fruit a capsule, nut, samara or drupe.

The family consists of 29 genera (POWO, 2023); two genera and 11 species in the study area.

Key to the genera

1. Plants herbs or shrubs; flowers irregular……..*Polygala*
1. Plants large trees; flowers regular……..*Xanthophyllum*

Polygala L.

Sp. Pl. 2: 701. 1753.

Key to the species

1. Inflorescence a terminal raceme……..……..*P. paniculata*
1. Inflorescence axillary, extra axillary or leaf opposed raceme……2
2. Caruncle appendage nearly or quite covering the seed, red…….*P. arillata*
2. Caruncle appendage narrow, white……..……...3
3. Caruncle cup-shaped……..……..……4
3. Caruncle 3-fid……..……...8
4. Bracts caducous……..……*P. sibirica*
4. Bracts persistent……..……..5
5. Leaves linear……..……*P. rosmarinifolia*
5. Leaves spreading……..……..……6
6. Stems and racemes with stiff white spreading bulbous-based hairs……..*P. bulbothrix*
6. Stems and racemes without white bulbous-based hairs……..……7

7. Raceme less than 3 cm long……..……....*P. chinensis*

7. Raceme more than 4 cm long……..……..…… *P. elongata*

8. Flowers yellow……...……..*P. jacobii*

8. Flowers other than yellow……..……..9

9. Bracts lanceolate; inner sepal broadly obovate or orbicular, lateral petal hairy inside at base; caruncle shallowly 3-lobed.….*P. persicarifolia*

9. Bracts elliptic; inner sepal elliptic-lanceolate; lateral petal not hairy inside at base; caruncle deeply 3-lobed……..…..….*P. idukkiana*

Polygala arillata Buch.-Ham. ex D.Don, Prodr. Fl. Nepal. 199. 1825; Hook.f., Fl. Brit. India 1: 200. 1872; Gamble, Fl. Madras 58. 1915; R.N.Banerjee & N.P.Balakr. in Daniel, Fl. Kerala 290. 2005.



Small trees, 3–6 m tall. Stems woody, terete, pubescent. Leaves simple, alternate; lamina elliptic or oblong-lanceolate, 6.5–14 × 2–2.5 cm, acuminate at apex, cuneate or obtuse base, entire at margin, glabrescent on both sides; petioles *c.* 1 cm long, pubescent. Flowers in leaf opposed racemes; peduncles 4–8 cm long, densely pubescent; pedicels *c.* 0.3 cm long pubescent. Bracts ovate, 6–8 × 3–4 mm, acuminate at apex, entire. Sepals 5, unequal; lateral 2 sepals petaloid, oblong-obovate, 1.5–1.8 × 0.75 cm, acuminate at apex, entire, sparsely pubescent out, glabrous within; outer sepals 3, small, ovate, 8–9 × 3–4 mm, acute at apex, ciliate. Petals 3, yellow; lateral petals lanceolate, 18–22 × 6–10 mm, acuminate at apex; crest multifid. Stamens 8; filaments 1–1.4 cm long. Ovary compressed, globose, ciliate; style curved toward apex; stigma lobed Capsules baccate, broadly reniform, winged, ciliate, emarginated at apex, mucronate. Seeds brown-red to black, globose; caruncle red, 3-lobed.

Distribution: The native range of this species is Indian Subcontinent to Central & S. China and Philippines (Palawan) (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl & Ft.*: June-January.

Specimens examined: Anamudishola National Park, 25.01.2018, *Vishnu Mohan & Santhosh Nampy* 158253; Kanthallur, 24.06.2017, *Vishnu Mohan & Santhosh Nampy* 184526; Pius Nagar, 22.06.2018, *Vishnu Mohan & Santhosh Nampy* 159371; Mannavan Shola, 23.01.2005, *Jettisha P.I.* 110254; Melmanlar, 11.11.1993, *Jomy* Aujustine 12953; Mlappara, 08.12.1994, *Jomy Augustine* 14342; Nallathannikallar, 11.06.2018, *Vishnu Mohan & Santhosh Nampy* 159316; way to Kanketty, 20.12.2019, *Vishnu Mohan & Santhosh Nampy* 164819; way to Mannavan shola, 08.01.2004, *Sulu Meeran* 94228; *Ibid.*, 08.01.2004, *Reji P.* 96330; 08.01.2004, *Sreenivas V.K.* 96528; Munnar, 13.12.1970, *Premavally O.K.* 1431; *Ibid.*, 13.12.1970, *Raveendranathen P.P.* 396; *Ibid.*, 13.12.1970, *Rugmini P.* 977 (CALI).

Polygala bolbothrix Dunn in Gamble, Fl. Madras 58. 1915; Matthew, Illu. Fl. Palni Hills 41. 1996; R.N.Banerjee & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 292. 2005.



Annual herbs, up to 30 cm tall. Stems terete, hairs stiff white spreading bulbous-based. Leaves simple, alternate; lamina ovate-obovate, 2–3 × 0.5–1 cm, acute-rounded at apex, cuneate at base, entire, pubescent below, glabrous above; petioles 0.4–0.6 cm long, stout, pubescent. Flowers in axillary racemes; peduncles 2–4 cm long, narrow, slender, pubescent; petioles 0.4–0.6 cm long, slender, narrow, pubescent. Bracts ovate, 3–4 × *c.* 2 mm, acuminate at apex, entire, pubescent; bractoles ovate, *c.* 3 × 1 mm, acuminate at apex, entire, pubescent. Sepals 5, unequal; lateral 2 ovate-lanceolate, 4–6 × 2–3 mm,

acuminate at apex, entire, sparsely pubescent out, glabrous within, petaloid; outer 3 ovate, 2–3 × *c.* 1 mm, acuminate at apex, entire, sparsely pubescent out, glabrous within. Petals 3; lateral petals elliptic-oblong, 6–8 × *c.* 4 mm, rounded at apex, entire, adnate to the staminal tube; base of keel petal clawed or sometimes auricled, divided in number of crests. Stamens 8, monadelphous; filaments united basally. Ovary laterally compressed, bilocular; style curved; stigma lobed. Capsules compressed. Seeds 2, ovoid, hairy; caruncle white, 3-lobed.

Distribution: The native range of this species is India (POWO, 2023); *Habitat:* Grasslands and degraded forests; *Fl & Ft:* July-May.

Specimens examined: Kurisumala, 06.08.2017, *Vishnu Mohan & Santhosh Nampy* 154197; Mangaladevi, 08.12.1993, *Jomy Augustine* 12796; Meesappulimala, 12.06.2017, *Vishnu Mohan* & *Santhosh Nampy* 175426; MSNP, Choondal, 14.11.2015, *S. Syam Radh & Santhosh Nampy* 145088; Panchali medu, 13.09.2019, *Vishnu Mohan & Santhosh Nampy* 170307; PTR, 06.12.1993, *Jomy Augustine* 12796 (KFRI); Vellappara-Idukki wildlife sanctuary, 05.08.2017, *Vishnu Mohan & Santhosh Nampy* 154173 (CALI).

Polygala chinensis L., Sp. Pl. 704. 1753; Gamble, Fl. Madras 58. 1915; R.N.Banerjee & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 295. 2005.

Annual erect herbs, up to 40 cm tall. Stems terete, glabrous. Leaves simple, alternate; lamina obovate, 1–2 × 0.5–1 cm, obtuse at apex, cuneate at base, entire and slightly curved at margins, pubescent below, glabrous above; petioles *c.* 0.1 cm long, stout, pubescent. Flowers in few-flowered axillary racemes; peduncles 1–3 cm long, slender; pedicels *c.* 0.15 mm long, glabrous. Bracts 2, lanceolate, 3–5 × *c.* 2 mm, acuminate at apex, entire, sparsely pubescent out, glabrous within. Sepals 5, green, ciliate; lateral sepals ovate-lanceolate, 4–5 × *c.* 3 mm, acuminate at apex, entire, petaloid, falcate; outer sepals 3, lanceolate, *c.* 2 × 1 mm, acuminate at apex, entire. Petals 3; lateral petals elliptic-oblong, 5–6 × *c.* 2 mm, rounded at apex, clawed at base, glabrous; keel petal *c.* 4 × 2 mm; crest 2-fascicled. Stamens 8; staminal sheath adnate to petal. Ovary compressed, ciliate; stigma hooked. Capsules globose,

narrowly winged, ciliate, retuse at apex. Seeds ovoid, densely pubescent; caruncle white, 2-lobed.

Distribution: The native range of this species is Tropical & Subtropical Asia to Caroline Islands (POWO, 2023); *Habitat:* Moist deciduous forests, also in the plains; *Fl & Ft:* January-September.

Specimens examined: Chinnar, 10.01.1995, *N. Sasidharan* 11742 (KFRI); Mankulam,

Polygala elongata J.G.Klein ex Willd., Sp. Pl., ed. 4. 3: 879. 1802; Hook.f., Fl. Brit. India 1: 204. 1872; Gamble, Fl. Madras 1: 58. 1915; R.N.Banerjee & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 296. 2005.



Annual erect herbs, up to 12–20 cm tall. Stems terete, sparsely pubescent. Leaves simple, alternate; lamina linear-lanceolate, 0.5–2.5 × 0.2–0.4 cm, apiculate at apex, acute at base, entire and slightly curved at margins, glabrous; petioles 0.1–0.3 cm long, pubescent. Flowers in axillary racemes; peduncles 4–6 cm long, sparsely pubescent; pedicels 0.6 cm long, slender, glabrous. Bracts lanceolate, *c.* 2 × 1 mm, acute at a pex, entire, ciliate. Sepals 5; lateral petals 2, ovate-lanceolate, 4–5 × *c.* 3 mm, acuminate at apex, entire, petaloid; outer sepals 3, elliptic, *c.* 3 × 2 mm, acute-rounded at apex, entire, ciliate. Petals 3; lateral petals elliptic-obovate, 5–7 × 3–4 mm, truncate at apex, clawed at base, entire, glabrous; crest bilobed. Stamens 8; filaments united basally. Ovary compressed, ciliate; stigma hooked. Capsules slightly winged; caruncle cup-shaped at base; seeds hairy.

Distribution: The native range is Indian Subcontinent to NE. Australia (POWO, 2023); *Habitat:* Moist deciduous forests, also in the plains; *Fl &* Ft: January-December.

Specimens examined: Chinnar, 08.01.1995, *K.K. Sajeev* 11691 (KFRI); Chottupara, 13.10.2018, *Vishnu Mohan & Santhosh Nampy* 164215; Panchalimedu, 13.09.2019, *Vishnu Mohan & Santhosh Nampy* 170308 (CALI).

Polygala jacobii Chandrab., Bull. Bot. Surv. India 9: 288. 1967.

Polygala dunnii Panigrahi, Kew Bull. 29: 655. 1974; R.N.Banerjee & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 298. 2005.

Perennial herbs, up to 30 cm tall. Stems slender, pubescent. Leaves simple, alternate; lamina obovate-oblong, 1–3 × 0.5–1 cm, retuse at apex, acute at base, entire, glabrous above, glaucous beneath; petioles 0.3–0.5 cm long, glabrescent. Flowers in leaf opposed racemes; peduncles 0.3–0.6 cm long, slender; pedicels *c.* 0.3 cm long, glabrous. Bracts lanceolate, *c.* 2 mm long, acute at apex, entire, glabrous. Sepals 5, unequal; lateral sepals 2, obliquely obovate, 4–6 × 2–3 mm, obtuse at apex, petaloid; outer 3, lanceolate, *c.* 4 × 3 mm, acute at apex, ciliate. Petals 3; lateral petals oblong, 4–5 × *c.* 3 mm, truncate-rounded at apex, entire, glabrous; crest many-lobed in 2 bundles. Stamens 8; filaments united at base. Ovary compressed, bilocular, glabrous; style terminal; stigma lateral. Capsules compressed, suborbicular, notched at apex, winged at margins. Seeds obovoid, sparsely hairy, caruncle white, 3-lobed, hooded.

Distribution: The native range of this species is W. and S. India (POWO, 2023); *Habitat:* In the plains; *Fl & Ft:* May-December.

Specimen examined: Kottamala, 06.05.1995, *Jomy Augustine* 15388 (CALI).

Polygala idukkiana M.Vishnu & Nampy, Anales del Jardín Botánico de Madrid 79 (2): e129 2022.



Erect sub-shrub, 20–50 cm tall. Stems densely tomentulose. Leaves simple, alternate; lamina lanceolate, 1.5–5.5 × 0.5–2.2 cm, acute at apex and base, entire, revolute

along margins, sparsely tomentose; petioles 0.15–0.2 cm long, tomentulose. Flowers in axillary racemes; peduncles 1–2 cm long, slender; pedicels 0.3–0.35 cm long, slender. Bracts 3, elliptic, 0.9–1.1 × 0.4–0.5 mm, rounded at apex, ciliate. Sepals 5; lateral sepals 2, elliptic-lanceolate, 5–6 × 2–3 mm, mucronate at apex, ciliate, hispid out, petaloid; outer sepals 3, lanceolate, 2–3 × *c.* 1 mm, narrowly acute at apex, ciliate. Petals 5; lateral petals obliquely obcordate, 7–8 × 4–5 mm, retuse at apex, narrow at base, entire; crest 10–12-lobed in 2 bundles. Stamens 8; staminal sheath adherent to petals. Ovary orbicular, slightly oblique at apex; style *c.* 6 mm long, inclined, terminated by an oblique cymbiform pre-stigmatic cavity. Capsules orbicular, compressed, marginally winged and ciliate. Seeds 2; caruncle white, deeply 3-lobed, 2–2.2 mm long.

Distribution: The native range of this species is India (Kerala); *Habitat:* Semi-evergreen forests; *Fl & Ft:* August-December.

Specimens examined: Kattadikkadavu, 01.10.2021, *Vishnu Mohan & Santhosh Nampy* 176389; Kottppara-Mullaringad, 02.10.2021, *Vishnu Mohan* & *Santhosh Nampy* 176330 (CALI).

Polygala persicariifolia DC., Prodr. 1: 326. 1824; Hook.f., Fl. Brit. India 1: 202. 1872; Gamble, Fl. Madras 1: 58. 1915; R.N.Banerjee & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 300. 2005.



Annual herbs, up to 25 cm tall. Stems terete, pubescent. Leaves simple, alternate; lamina linear-lanceolate, 2.5–4 × 0.5–1 cm, obtuse at apex, cuneate at base, ciliate, pubescent below, glabrous above; petioles 0.3–0.4 cm long, pubescent. Flowers lateral racemes; peduncles 0.8–1.7 cm long, slender, pubescent; pedicels 0.25–0.4 cm long, slender. Bracts 3, unequal, lanceolate, 3–4 × 1–2 mm, acute at apex, ciliate, persistent. Sepals 5; lateral sepals 2,

broadly obovate-orbicular, *c.* 6 × 4 mm, acute at apex, entire, petaloid; outer sepals 3, lanceolate, 2–3 × *c.* 1 mm, acuminate at apex, entire, glabrous. Petals 3; lateral petals obliquely rhombic, 5–7 × 3–4 mm, truncate-rounded at apex, entire, hairy within at base; keel petal cucullate, ciliate; crest 10–12-lobed in 2 bundles. Stamens 8; staminal sheath adnate with petals. Ovary obovoid, ciliate; style curved; stigmas 2, sessile. Capsules oblong, narrowly winged, ciliate. Seeds oblong; caruncle shallowly 3-lobed.

Distribution: The native range of this species is Tropical Africa, Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat:* Grasslands; *Fl & Ft:* August-December.

Specimens examined: Aduvizhunthankudi, 22.11.2014, *S. Syam Radh & Santhosh Nampy* 137829; Mangaladevi, 03.09.1993, *Jomy Augustine* 12460*;* Nakshthrakuthu, 25.10.2018, *Vishnu Mohan & Santhosh Nampy* 158756; MSNP (CALI).

Polygala rosmarinifolia Wight & Arn., Prodr. Fl. Ind. Orient. 37. 1834; Hook.f., Fl. Brit. India 1: 204. 1872; Gamble, Fl. Madras 1: 58. 1915; R.N.Banerjee & N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 301. 2005.

Annual erect herbs, up to 30 cm tall. Stems terete, pubescent. Leaves simple, alternate; lamina ovate-lanceolate, acute at apex, cuneate at base, entire, pubescent. Flowers in axillary racemes; peduncles 1–2 cm long, slender. Bracts elliptic, *c.* 3 × 2 mm, acuminate at apex, ciliate. Sepals 5; lateral sepals obliquely ovate, 3–5 × *c.* 2 mm, acuminate at apex, entire, petaloid; outer 3 ovate, *c.* 3 × 2 mm, acuminate at apex, entire. Petals 3; lateral petals obliquely obovate, 4–6 × 3–4 mm, rounded at apex, entire, glabrous, adnate basally to the staminal tube; keel petal ciliate, crest 10–12-lobed. Stamens 8; filaments united basally. Ovary laterally compressed, bilocular; style curved; stigma lobed. Capsule compressed or flattened, sometimes margined with double wings, dehiscing loculicidal. Seeds globose, hairy; caruncle 3-lobed.

Distribution: The native range of this species is India and Sri Lanka (POWO, 2023); *Habitat:* Grasslands; *Fl & Ft:* May-December.

Specimens examined: Anbari, 12.05.1995, *Jomy Augustine* 15397; Mangaladevi, 09.09.1993, *Jomy Augustine* 12459 (CALI); Meenmutty,

04.10.1983, *C.N. Mohanan* 79980; Painavu, 18.02.1984, *A.G. Pandurangan* 78038 (MH); Vagamon, 30.12.2017, *VishnuMohan* & *Santhosh Nampy* 165268 (CALI).

Polygala sibirica L., Sp. Pl. 702. 1753; Hook.f., Fl. Brit. India 1: 205. 1872; Gamble, Fl. Madras 1: 58. 1915; Matthew, Illu. Fl. Palni Hills 41. 1996; R.N.Banerjee & N.P. Balakr. in P.Daniel (ed.), Fl. Kerala 302. 2005.



Perennial herbs, up to 25 cm tall. Stems terete, pubescent. Leaves simple, alternate; lamina ovate-elliptic, 6–15 × 4–6 mm, obtuse at apex, rounded at base, entire, curved at margins, pubescent; petioles *c.* 0.2 cm long, stout. Flowers in extra-axillary racemes; peduncles *c.* 1 cm long, slender. Bracteoles 3, lanceolate, *c.* 3 × 2 mm, acuminate at apex, entire, pubescent. Sepals 5; wing sepals 2, sub-falcate, 6–7 × *c.* 3 mm, cuspidate at apex, ciliate, petaloid; outer sepals 3, lanceolate, *c.* 3 × 1 mm, acute at apex, entire. Petals 3; lateral petals 2, obliquely obovate, rounded at apex, entire, glabrous; crest many lobed. Stamens 8; staminal sheath *c.* 5 mm long. Ovary obovoid, ciliate; style stout; stigmas capitate. Capsules sub-cordate, narrowly winged, shortly ciliate. Seeds compressed-oblong, densely white pubescent, caruncle white, 3-lobed.

Distribution: The native range of this species is Central & E. Romania to Temp. Asia and N. Indo-China (POWO, 2023); *Habitat*: Shola forests and grasslands; *Fl & Ft*.: Throughout the year.

Specimens examined: Eravikulam, 02.05.2017, *Vishnu Mohan & Santhosh Nampy* 152129 (CALI); *Ibid*., 03.12.1987, *P. Bhargavan* 87321 (MH); Meesappulimala, 16.08.2018, *Vishnu Mohan* & *Santhosh Nampy* 178562 (CALI); Pettimudi, 18.03.2019, *Vishnu Mohan & Santhosh*

Nampy 168990 (CALI); Vellimala, 15.09.1993, *Jomy Augustine* 12355 (CALI).

Polygala paniculata L., Syst. Nat., ed. 10. 2: 1154 1759.



Annual erect herbs, up to 30 cm tall. Stems terete, glabrous. Leaves simple, alternate; lamina lanceolate, 2.5–4 × 0.5–0.75 mm, mucronate at apex, acute at base, entire, curved at margins, glabrous. Flowers in terminal racemes; peduncles 2.5–5 cm long, slender, glabrous. Bracts lanceolate, *c.* 2 × 1 mm, acute at apex, entire. Sepals 5, persistent; lateral sepals obliquely ovate, *c.* 3 × 1.5 mm, apiculate at apex, glabrous, petaloid; outer sepals unequal, ovate-lanceolate, 2–2.5 × *c.* 0.5 mm, acute at apex, glabrous. Petals 3; lateral petals obovate, 3–4 × *c.* 2 mm, rounded at apex, entire, glabrous; crest linear, many lobed, hairy at base. Stamens 8; staminal sheath 1.5–2 mm long. Ovary ovoid, glabrous, ciliate; style curved, hooked at apex. Capsules oblong, emarginate at apex, glabrous. Seeds oblong, truncate at apex, silky-hairy, black; caruncle hood-shaped, 3-lobed.

Distribution: The native range of this species is Mexico to Tropical America (POWO, 2023); *Habitat:* Grasslands; *Fl & Ft:* August-March.

Specimens examined: Dam side-Idukki wildlife sanctuary, 05.08.2017, *Vishnu Mohan & Santhosh Nampy* 154176; Kanchiyar, 18.03.2018, *Vishnu Mohan & Santhosh Nampy* 158407; Kulamavu, 22.01.2019, *Vishnu Mohan* & *Santhosh Nampy* 168910 (CALI).

Xanthophyllum Roxb.

Pl. Coromandel 3(4): 81 1820.

Xanthophyllum flavescens Roxb., Pl. Coromandel 3: 82 1820.

Xanthophyllum arnottianum Wight Ill. Ind. Bot. 1: 50. 1838; Gamble, Fl. Madras 1: 59. 1915; R.N.Banerjee & N.P.Balakr. in PDaniel (ed.), Fl. Kerala 307. 2005.



Small trees. Branchlets woody, terete, glabrous; bark brownish, smooth. Leaves simple, alternate; lamina elliptic, 5–15 × 2.5–7.5 cm, acute at apex, rounded at base, entire, glabrous; petioles *c.* 0.2 cm long, glabrous. Flowers in axillary or terminal racemes; peduncles 2.5–5 cm long, stout, pubescent; pedicels 0.3–0.6 cm long, slender, pubescent. Bracts elliptic-ovate, 2–3 × 1.5 mm, acuminate at apex, entire. Sepals 5; lateral sepals 2, elliptic, 4–6 × *c.* 2 mm, rounded at apex, entire; outer sepals lanceolate-elliptic, 2–5 × 2.5–3 mm, acute at apex, entire, glabrous. Petals 5; lateral petals oblong, 4–6 × 2–3 mm, rounded at apex, entire; keel petals larger than others. Stamens 8; filaments adherent at base of petals. Ovary glabrous; style 1, hairy; stigma capitate. Drupes globose. Seed usually 1; seed coat membranous; caruncle absent.

Distribution: The native range of this species is India to China (S. Yunnan) and W. & Central Malesia (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests, also sacred groves in the plains; *Fl & Ft.*: Throughout the year.

Specimens examined: Ammachikkottaram, 11.05.2017, *Vishnu Mohan* & *Santhosh Nampy* 184562; Kumarikulam, 10.12.1994, *Jomy Augustine* 14385; Meenuliyan para, 12.12.2016, *Vishnu Mohan & Santhosh Nampy* 151355 (CALI); Pooyamkutty, 13.12.1988, *P. Bhargavan* 87491 (MH); Thommankutthu, 10.12.2016, *Vishnu Mohan & Santhosh Nampy* 151317; Uppumala-way to Cheruthoni, 13.11.2014, *Dilna P.K.* 136605 (CALI).

CARYOPHYLLACEAE Juss.

Gen. Pl. 299. 1789., *nom. cons.*

Annual or perennial herbs. Leaves opposite; stems nodes swollen; base of each leaf pair often joins around to form a perfoliate base. Stipules absent.

Inflorescence a cyme. Flowers regular, bisexual. Sepals 4 or 5, with bracts at the base of calyx in some genera. Petals 4 or 5, more or less bilobed or even fringed, notched or deeply cut at apex. Stamens twice as many as petals. Ovary superior; carpels 2–5, united; styles free, as many as carpels. Fruit a capsule. The family includes 101 genera in the world (POWO, 2023); seven genera and eight species in Idukki district.

Key to the genera

1. Stipules present……..……..…2
1. Stipules absent……...……...……3
2. Styles free…….…. *Spergula*
2. Styles connate……...……...……4
3. Sepals connate……*Dianthus*
3. Sepals free…….……..…...5
4. Sepals green……..……...…… *Drymaria*
4. Sepals white……..……6
5. Petals shorter than or equal to sepals……..…… *Stellaria*
5. Petals longer than sepals……...…….. *Cerastium*
6. Sepals ridged……...…… *Polycarpon*
6. Sepals not ridged……..……...…... *Polycarpaea*

Cerastium L.

Sp. Pl. 1: 437. 1753

Cerastium glomeratum Thuill., Fl. Env. Paris 2: 226. 1799; P.Daniel in P.Daniel (ed.), Fl. Kerala 1: 309. 2005. *Cerastium vulgatum* L., Fl. Suec., 2 158. 1755, *nom. rej. Cerastium vulgatum* var. *glomeratum* (Thuill.) Edgew. & Hook.f., Fl. Brit. India 1: 228. 1874.

Annual erect herbs, up to 10 cm tall. Stems terete unbranched, strongly hispid. Leaves simple, decussate; lamina obovate, 0.5–1.5 × 0.2–0.5 cm, mucronate at apex, attenuate at base, entire at margins, hispid on both sides, non-coriaceous; petioles *c.* 0.3 cm long, glabrous, winged. Stipules absent. Flowers in terminal cymes, non-fragrant; peduncles 1–2.5 cm long, slender, hispid; pedicels 0.2–0.3 cm long, slender, hispid. Bracts lanceolate, *c.* 5 × 3 mm, acute at apex, attenuate at base, entire at margins, hispid on both sides,

membranous. Sepals 5, lanceolate, *c.* 4 × 1 mm, attenuate at apex, entire at margins, hispid out, glabrous within. Petals 5, fused, *c.* 6 mm long, bifid at apex, white, glabrous on both sides, membranous. Stamens 5, adnate to petals; filaments 2–3 mm long, erect, stout, glabrous. Ovary superior, ovate, *c.* 3 × 2 mm; style *c.* 2 mm long, erect, glabrous; stigma sticky. Capsules cylindric. Seeds ovoid, rugose-tubercled.

Distribution: The native range of this species is Europe, Macaronesia to Assam (POWO, 2023); *Habitat*: Open lands and roadsides; *Fl.* & *Ft.*: Throughout the year.

Specimen examined: Meesappulimala, 15.09.2019, *Vishnu Mohan* & *Santhosh Nampy* 170385 (CALI).

Drymaria Willd. ex Schult.

Syst. Veg., ed. 15 5: 406. 1819

Drymaria cordata (L.) Willd. ex Schult. J.J.Roemer & J.A.Schultes, Syst. Veg., ed. 15. 5: 406 1819; N.C.Majumdar in B.D.Sharma & N.P.Balakr., Fl. India 2: 533. 1993; P.Daniel in P.Daniel (ed.), Fl. Kerala 1: 311. 2005.

Drymaria cordata Edgew. & Hook.f. in Hook.f., Fl. Brit. India 1: 244. 1874 *p.p.*; Gamble, Fl. Madras 63. 1915.

Cerastium cordifolium Roxb., Fl. Ind. 2: 458. 1832.



Annual prostrate herbs. Stems terete, brancled, smooth, glabrous. Leaves simple, decussate; lamina orbicular-reniform, 0.5–1.5 × 0.5–2 cm, rounded at apex, cordate at base, entire at margins, glabrous on both sides, membranous; petioles 0.2–0.4 cm long, glabrous, grooved. Stipules absent. Flowers in axillary to terminal cymes, non-fragrant; peduncles 0.6–1.2 cm long, narrow, glabrous; pedicels 0.2–0.4 cm long, slender, glabrous. Bracts lanceolate, *c.* 2.5

× 1.5 mm, acuminate at apex, rounded at base, entire at margins, glabrous on both sides, membranous. Sepals 5, free, lanceolate, *c.* 3 × 1 mm, acuminate at apex, entire at margins, glabrous on both sides, membranous. Petals 5, lanceolate, 4 × 3 mm, bifid at apex, entire at margins, glabrous on both sides, membranous, white. Stamens 5; filaments *c.* 1.5 mm long, erect, slender, glabrous. Ovary superior, globose; style 3-fid, 3 mm long, glabrous; stigma crested. Capsules oblong, glabrous. Seeds many.

Distribution: The native range of this species is Mexico to S. Tropical America, Tropical & S. Africa (POWO, 2023); *Habitat*: Moist areas like paddy fields*; Fl.* & *Ft.*: Throughout the year.

Specimens examined: Irumbu Palam, 28.12.2017, *Vishnu Mohan & Santhosh Nampy* 156569; Kanjiar, 18.10.1982, *C.N. Mohanan* 76452 (KFRI); Kanthallor, 25.02.2003, *Reena M.B.* 89048; *ibid*, 25.02.2003, *Smitha* 89147; *ibid*, 25.02.2003, *Gigimol* 121115; *ibid*, 25.02.2003, *K.V. Radhika* 88646; *ibid*, 25.02.2003, *Roshni Balakrishnan* 89954; MSNP, 11.12.2016, *Vishnu Mohan* & *Santhosh Nampy* 151363; Munnar, on the way to Eravikulam, 23.01.2018, *Vishnu Mohan & Santhosh Nampy* 158137; Munnar, 12.02.2001, *Rani K. Meena* 72510; *ibid*, 17.05.1999, *Shamina M.* 78907; *ibid*, 17.05.1999, *Sindhu C.* 78208; *ibid*, 17.05.1999, *Lisha K.* 78602; *ibid*, 12.02.2001, *Priya P.D.* 73814; Periyar, 18.02.1982, *V.S. Raju* 71262 (KFRI); Pethotti, 06.01.2017, *Vishnu Mohan & Santhosh Nampy* 151596; Vellappara-Idukki Wildlife sanctuary, 05.08.2017; *Vishnu Mohan & Santhosh Nampy* 154129; way to Mannavan Shola, 08.01.2004, *Jayatha Jayapalan* 96652; *ibid*, 08.01.2004 *Rakendhu C.K.* 97152; way to Marayoor, 11.12.2003, *Mini V.* 97254 (CALI); Upputhara, 30.09.1981, *C.N. Mohanan* 72082 (KFRI).

Polycarpaea Lam.

Hist. Nat. 2: 3, 5. 1792.

Polycarpaea corymbosa (L.) Lam., Tabl. Encyl. 2: 129. 1797; Hook.f., Fl. Brit. India 1: 245. 1874; Gamble, Fl. Madras 1: 65. 1915; P.Daniel in P.Daniel (ed.), Fl. Kerala 1: 313. 2005.



Annual herbs, up to 15 cm tall. Stems terete, woody at base, branching, pubescent towards tip. Leaves simple, pseudo-verticillate; lamina linear-lanceolate, 0.5–1 × 0.1–0.2 cm, acuminate at apex, attenuate at base, entire at margins, glabrous on both sides, coriaceous, sessile. Stipules lanceolate, *c.* 0.2 × 0.1 cm, acuminate at apex, entire at margins, glabrous on both sides. Flowers in terminal cymes; non-fragrant; peduncles 1–2 cm long, stout, glabrous; pedicels *c.* 0.5 cm long, erect. Bracts lanceolate, *c.* 2 × 1 mm, acuminate at apex, rounded at base, entire at margins, glabrous on both sides, scaly. Sepals 5, free, lanceolate, *c.* 3 × 1 mm, acuminate at apex, entire at margins, silvery tomentose out, glabrous within. Petals 5, free, orbicular, *c.* 3 × 2 mm, rounded at apex, entire at margins, glabrous on both sides, membranous. Stamens 5; filaments *c.* 1 mm long, erect, slender, glabrous. Ovary superior, ovoid, glabrous; style reduced; stigma crested. Capsules sub-globose, glabrous. Seeds many.

Distribution: The native range of this species is Tropics and Subtropics (POWO, 2023; *Habitat*: On dry bare rocks; *Fl.* & *Ft.*: February-August. *Specimens examined*: Chinnar W.L.S, way to Kuttar, 14.02.2007, *Sheeba M.V.* 73044; *ibid*, 14.02.2007, *Sujitha T.* 73993; *ibid*, 14.02.2007, *Sonia K.* 72680; *ibid*, 14.02.2007, *Priya P.D.* 73882; Pius Nagar, 22.06.2018, *Vishnu Mohan & Santhosh Nampy* 159333 (CALI).

Polycarpon Loefl.

C.Linnaeus, Syst. Nat., ed. 10. 2: 881, 1360 1759.

Key to the species

1. Leaves puberulous…… *P. prostratum*

1. Leaves glabrous……..……..*P. tetraphyllum*

Polycarpon prostratum (Forssk.) Asch. & Schweinf., Oesterr. Bot. Z. 39: 128. 1889; Hook.f., Fl. Brit. India 1: 245. 1874; Gamble, Fl. Madras 64. 1915.

Annual prostrate herbs, up to 16 cm tall. Stems terete, branched, smooth, glabrous. Leaves simple, opposite; lamina obovate, 6–15 × 2–4 mm, rounded at apex, acute at base, entire at margins, puberulous on both sides, sub-sessile. Stipules lanceolate, *c.* 0.3 × 0.1 mm, acuminate at apex, entire at margins, glabrous on both sides, scaly. Flowers in terminal dichasial paniculate cymes, non-fragrant; peduncles 0.7–0.9 cm long, narrow, sparsely pubescent; pedicels *c.* 0.4 cm long, narrow, sparsely pubescent. Bracts ovate, *c.* 4 × 2 mm, rounded at apex and base, entire at margins, puberulous on both sides. Sepals 5, free, sub-equal, linear-oblong, *c.* 3 × 1 mm, acuminate at apex, entire at margins, puberulous out, glabrous within. Petals 5, free, linear, *c.* 3 × 2 mm, dentate at apex, entire at margins, glabrous on both sides. Stamens 5; filaments *c.* 2 mm long, erect, stout, glabrous. Ovary superior, ovate, glabrous; style 3 mm long, erect, 3-fid, stigma capitate. Capsules ovoid, glabrous. Seeds many.

Distribution: The native range of this species is Africa to Syria, NE. Pakistan to S. China and Indo-China (POWO, 2023; *Habitat*: Paddy fields and exposed areas; *Fl.* & *Ft.*: January-April.

Specimens examined: Aanayirangal dam, 05.01.2017, *Vishnu Mohan* & *Santhosh Nampy* 151555 (CALI); Vazhathoppe, 21.04.1982, *Diraviadoss* 71284 (MH).

Polycarpon tetraphyllum (L.) L., Syst. Nat. 10. 2: 881. 1759; Gamble, Fl. Madras 1: 65. 1915.

Annual prostrate herbs, up to 10 cm tall. Stems terete, branching, glabrous. Leaves simple, opposite; lamina obovate-spathulate, 0.5–1.3 × 0.4–0.6 cm, acute at apex, rounded at base, entire at margins, glabrous on both sides; petioles 0.4–0.6 cm long, glabrous, grooved, slightly winged. Stipules triangular, *c.* 0.3 × 0.2 mm, acuminate at apex, entire at margins, glabrous on both sides. Flowers in axillary cymes, non-fragrant; peduncles erect, 0.5–0.8 cm long, glabrous; pedicels *c.* 0.2 cm long, slender, glabrous. Bracts absent. Sepals 5, free, widely elliptic-lanceolate, *c.* 3 × 1 mm, acuminate at apex, winged at margins, glabrous on both sides. Petals 5, free, narrowly oblong, *c.* 3 × 1.5 mm, rounded at apex, entire at margins, glabrous on both sides, membranous. Stamens 5; filaments *c.* 2 mm long, erect, delicate, glabrous.

Ovary superior, elliptic; style *c.* 3 mm long, glabrous; stigma sticky. Capsules ovoid, glabrous. Seeds minute, brownish.

Distribution: The native range of this species is Europe to Sri Lanka, Macaronesia to N. & NE. Tropical Africa, Arabian Peninsula (POWO, 2023); *Habitat*: Roadsides; *Fl.* & *Ft.*: Throughout the year.

Specimen examined: Munnar, 05.08.2017, *Vishnu Mohan* & *Santhosh Nampy* 154163 (CALI).

Spergula L.

Sp. Pl. 1: 440. 1753

Spergula arvensis L., Sp. Pl. 1: 440. 1753; Hook.f., Fl. Brit. India 1: 243. 1874; Gamble, Fl. Madras 1: 63. 1915.

Erect annual herbs, up to 10 cm tall. Stems quadrangular, branched, glabrous. Leaves simple, decussate; lamina linear, *c.* 6 × 1 mm, attenuate at apex, truncate at base, entire at margins, glabrous on both sides; petioles absent. Stipules whorled, ovate, *c.* 0.1 × 0.1 cm, acute at apex, entire at margins, glabrous on both sides, membranous. Flowers in terminal many-flowered cymes, non-fragrant; peduncles reduced; pedicels *c.* 0.7 cm long, narrow, glabrous. Bracts ovate, *c.* 2 × 1 mm, acute at apex, rounded at base, entire at margins, glabrous on both sides, membranous. Sepals 5, free, lanceolate, *c.* 3 × 1 mm, acute at apex, entire at margins, glandular out, glabrous within. Petals 5, free, elliptic, *c.* 3 × 2 mm, acute-rounded at apex, entire at margins, glabrous on both sides, membranous. Stamens 5; filaments *c.* 4 mm long, erect, stout. Ovary superior, globose; styles 5 mm long, free, recurved; stigma sticky. Capsules globose, glabrous. Seeds numerous, ovoid.

Distribution: The native range of this species is Europe to Siberia and NW. India, Macaronesia, NW. Africa, Ethiopia to E. Central & E. Tropical Africa (POWO, 2023); *Habitat*: Open grasslands; *Fl.* & *Ft.*: Throughout the year.

Specimen examined: Meesappulimala, 15.10.2019, *Vishnu Mohan* & *Santhosh Nampy* 170395 (CALI).

Stellaria L.

Sp. Pl. 1: 421. 1753

Key to the species

1. Plants glabrous; flowers solitary in axillary corymbs…….. *S. media*

1. Plants stellate tomentose; flowers in axillary cymes…….. *S. vestita*

Stellaria media (L.) Vill., Hist. Pl. Dauphiné 3: 615. 1789; Hook.f., Fl. Brit. India 1: 230. 1874; Gamble, Fl. Madras 1: 62. 1915.



Creeping annual herbs. Stems terete, smooth, glabrous. Leaves simple, decussate; lamina ovate-lanceolate, 0.5–2 × 0.3–1.5 cm, acute at apex and base, entire at margins, glabrous on bo th sides, membranous; petioles *c.* 0.2 cm long, glabrous, winged. Stipules absent. Flowers non-fragrant, solitary or in axillary few flowered corymbs; pedicels *c.* 1 cm long, slender, glabrous. Bracts ovate, *c.* 3 × 1 mm, acuminate at apex, rounded at base, entire at margins, glabrous on both sides, membranous. Sepals 5, free, elliptic-lanceolate, *c.* 3 × 1 mm, acute at apex, entire at margins, sparsely hairy out, glabrous within, membranous. Petals 5, free, ovate, *c.* 3 × 2 mm, incised at apex, entire at margins, glabrous on both sides, membranous. Stamens 10; filaments *c.* 2 mm long, erect, narrow, glabrous. Ovary superior, ovoid, glabrous; style 3 mm long, curved, glabrous; stigma capitate. Capsules ovoid, glabrous. Seeds numerous, brown, reniform.

Distribution: The native range of this species is Eurasia, N. & NE. Tropical Africa (POWO, 2023); *Habitat*: Open grasslands; *Fl.* & *Ft.*: October-November.

Specimens examined: Rhodomansion, Silent valley, 21.11.2018, *Vishnu Mohan & Santhosh Nampy* 167778 (CALI); Vellimala, 28.08.1994, *Jomy Augustine* 14058 (KFRI).

Stellaria vestita Kurz, J. Bot. 11: 194. 1873; *Stellaria saxatilis* Buch. Ham. ex D.Don, Prodr. Fl. Nepal. 215. 1825; Gamble, Fl. Madras 1: 62. 1915.



Prostrate, creeping, annual herbs. Stems terete, branched, stellate hairy in young parts, glabrous when old. Leaves simple, decu ssate; lamina ovate, 1–2.5 × 0.5–10 mm, acuminate at apex, cordate at base, entire at margins, young leaves stellate hairy on both sides, glabrous when old; petioles *c.* 0.3 cm long, glabrous, grooved. Stipules absent. Flowers in axillary dichotomous cymes, non-fragrant; peduncles erect, *c.* 4 cm long, narrow, stellate hairy; pedicels 1–2 cm long, slender, stellate hairy. Bracts ovate, *c.* 3 × 2 cm, acuminate at apex, rounded at base, entire at margins, stellate hairy out, glabrous within, membranous. Sepals 5, free, ovate-lanceolate, *c.* 4 × 2 mm, acuminate at apex, entire at margins, stellate hairy out, glabrous within. Petals 5, free, ovate 3–4 × 2 mm, deeply bifid at apex, entire at margins, glabrous on both sides, delicate. Stamens 10; filaments *c.* 2 mm long, glabrous. Ova ry superior, ovate, 3-celled; styles 3 mm long, slender, glabrous. Capsules ovate, glabrous. Seeds numerous, compressed.

Distribution: The native range of this species is Nepal to Japan and Indo-China, S. India, Jawa, Philippines (Luzon), New Guinea (POWO, 2023); *Habitat*: Margins of tea plantations; *Fl.* & *Ft.*: May.

Specimen examined: Way to Meesappulimala, 06.05.2019, *Vishnu Mohan & Santhosh Nampy* 159139 (CALI).

PORTULACACEAE Juss.

Gen. Pl. 312. 1789, *nom. cons.*

Annual or perennial herbs, occasionally soft-wooded shrubs or small trees. Leaves opposite or alternate, simple, entire. Inflorescence cymose, sometimes

reduced to a solitary axillary flower. Flowers regular. Sepals 2, slightly unequal. Petals (3–)4–5(–12), free or basally connate, sometimes adnate to the ovary base. Stamens 3–∞, often adherent to the petals. Ovary superior or partly inferior, with 2–5 carpels, unilocular; styles simple; stigmas capitate or branched. Fruits capsule, rarely indehiscent.

The family includes one genus and 152 species (POWO, 2023); two species in the study area.

Portulaca L.

Sp. Pl. 1: 445. 1753.

Key to the species

1. Nodes glabrous; leaves obovate……*P. oleracea*

1. Nodes with a whorl of dense silvery white hairs; leaves ovate-lanceolate…….. *P. quadrifida*

Portulaca oleracea L., Sp. Pl. 445. 1753; Hook.f., Fl. Brit. India 1: 246. 1874; Gamble, Fl. Madras 1: 66. 1915; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 317. 2005.



Glabrous annual fleshy herbs. Stems branched; nodes glabrous. Leaves simple, sub-opposite, sub-sessile; lamina obovate, 0.8–2 × 0.2–0.6 cm, rounded at apex, attenuate at base, entire; petioles *c.* 0.2 cm long, very much reduced, winged. Stipular hairs *c.* 1 mm long, inconspicuous, caducous. Flowers sessile, terminal, non-fragrant. Bracts ovate-acuminate, *c.* 2 × 1 mm, acuminate at apex, entire, membranous. Sepals 5, connate at base; lobes keeled, *c.* 3 × 2 mm, glabrous. Petals 5, connate at base; lobes broadly obovate, 4–8 × 2–6 mm, rounded at apex, entire, membranous, yellow. Stamens 7–12; filaments *c.* 4 mm long, thread-like, glabrous. Ovary ovoid; styles *c.* 4 mm long, narrow, slender. Capsules obovoid. Seeds many, reniform.

Distribution: The native range of the species is Macaronesia, Tropical Africa, Medit. to Pakistan and Arabian Peninsula (POWO, 2023); *Habitat:* Wet areas in degraded forests; *Fl.* & *Ft.*: June-October.

Specimens examined: Chinnar, 19.08.2017, *Vishnu Mohan* & *Santhosh Nampy* 176516 (CALI); Thriveny, 10.10.1972, *B.D. Sharma* 42445 (MH).

Portulaca quadrifida L., Mant. Pl. 73: 1767; Hook.f., Fl. Brit. India 1: 247. 1874; Gamble, Fl. Madras 1: 66. 1915; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 318. 2005.

Annual prostrate herbs. Stems glabrous, fleshy; nodes with a whorl of dense silvery white hairs. Leaves simple, opposite; lamina ovate-lanceolate, 0.5–1.5 × 0.2–0.5 cm, obtuse at apex, entire, glabrous; petioles *c.* 0.1 cm long, winged. Stipular hairs *c.* 3 mm long, numerous. Flowers solitary, terminal, subtended by four leaves. Sepals 5, connate at base; lobes obtuse, 2–4 × 1.5–3 mm, acute at apex, entire, glabrous. Petals 5, oblong, *c.* 6 × 3 mm, truncate-rounded at apex, delicate. Stamens 8; filaments *c.* 4 mm long, hairy at base. Ovary ovoid; styles *c.* 4 mm long, hairy at base. Capsules obovate-conical. Seeds many.

Distribution: The native range of the species is Tropical & Subtropical Old World to SW. Pacific (POWO, 2023); *Habitat:* Wastelands and roadsides; *Fl.* & *Ft.*: June-September.

Specimen examined: Chinnar, 19.08.2017, *Vishnu Mohan* & *Santhosh Nampy* 176518 (CALI).

HYPERICACEAE Juss.

Gen. Pl. 254. 1789. *nom. cons.*

Herbs. Leaves opposite, verticillate or alternate, simple; stipules absent; indumentum often stellate. Inflorescence terminal, cymose-paniculate, or a single flower. Sepals imbricate, often glandular. Petals imbricate or contorted, white, yellow. Stamens numerous, hypogynous, often united into bundles. Ovary 1–5-locular; styles usually free. Fruit a capsule, berry or drupe.

The family includes six genera and 618 species in the world (POWO, 2023); one genus and three species in the study area.

Hypericum Tourn. ex L.

Sp. Pl.: 785 1753.

Key to the species

1. Stamens numerous in 5 bundles; styles 5……*H. mysorense*

1. Stamens numerous in 3 bundles; styles 3……2

2. Leaves sagittate at base; seeds transversely ribbed……*H. japonicum*

2. Leaves rounded at base; seeds not ribbed……*H. wightianum*

Hypericum japonicum Thunb. in J.A.Murray (ed.), Syst. Veg., ed. 14: 702. 1784; Hook.f., Fl. Brit. India 1: 256. 1874; Gamble, Fl. Madras 1: 70. 1915; K.Vivek. in P.Daniel (ed.), Fl. Kerala 1: 326. 2005.



Annual erect herbs, up to 30 cm tall. Stems branching from base, glabrous. Leaves, simple, decussate; lamina ovate, 0.5–1 × 0.2–0.5 cm, rounded to acute at apex, sagittate at base, entire, glabrous; glands present at the middle of lamina base. Flowers solitary, axillary or in terminal cymes; pedicels erect, glabrous, *c.* 1 cm long, stout, woody. Sepals 5, free, oblong-obtuse, 3–6 × 2–4 mm, mucronate at apex, entire, glandular out, glabrous within. Petals 5, free, oblong, 2–5 × 1–3 mm, rounded at apex, entire, glabrous, yellow, thin. Stamens numerous, free, in 3 bundles; filaments *c.* 5 mm long, slender, narrow, erect, glabrous. Ovary 1-celled, ellipsoid; styles 3, short; stigma capitate, sticky. Capsules smooth, ellipsoid. Seeds transversely ribbed.

Distribution: Native range of this species is Indian Subcontinent to Kuril Islands and Australasia (POWO, 2023); *Habitat*: Water logged areas in grasslands and semi-evergreen forests; *Fl.* & *Ft.*: April-January.

Specimens examined: Anakkara, 03.04.2018, *Vishnu Mohan & Santhosh Nampy* (CALI); Devikulam, 15.04.1960, *K. Subramaniyam* 10236 (MH); Eravikulam, 02.05.2017, *Vishnu Mohan* 152124; Kavalappara, 22.12.1994, *Jomy Augustine* 14545 (CALI); Kulamavu, 14.12.1982, *C.N. Mohanan* 76059 (MH); Near Neymakkad, 24.01.2018, *Vishnu Mohan & Santhosh Nampy* 158199 (CALI).

Hypericum mysurense Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 99. 1934; Hook.f., Fl. Brit. India 1: 253. 1874; Gamble, Fl. Madras 1: 70. 1915; K.Vivek. in P.Daniel (ed.), Fl. Kerala 1: 326. 2005.



Erect bushy shrubs, up to 3 m tall. Stems woody, branching, glabrous. Leaves simple, decussate; lamina elliptic-lanceolate, 1.5–3 × 0.3–0.6 cm, acuminate at apex, slightly auriculate at base, entire, glabrous above, slightly glaucous beneath, sessile. Flowers in terminal cymes, non-fragrant. Sepals 5, unequal, free, elliptic-lanceolate, 6–10 × 3–4 mm, acuminate at apex, entire, glabrous. Petals 5, free, obovate-orbicular, 15–25 × 10–15 mm, truncate at apex, entire, glabrous, yellow. Stamens numerous, in 5 bundles; filaments 20–25 mm long, slender, glabrous, connate at base. Ovary 5-celled, broadl y ovoid, *c.* 5 mm long; styles 5, basally connate, *c.* 15 mm long, erect; stigma capitate. Capsules glabrous, ellipsoid. Seeds cylindric.

Distribution: Native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Grasslands and margins of shola forests; *Fl.* & *Ft.*: Throughout the year.

Specimens examined: Devikulam, 07.02.2017, *Vishnu Mohan & Santhosh Nampy* 151649; *Ibid.*, 02.05.2017, *Vishnu Mohan & Santhosh Nampy* 152114; *Ibid.*, 26.02.2003, *Smitha* 89161; *Ibid.*, 26.02.2003, *Divya N.* 90572; *Ibid.*, 26.02.2003, *Shylaja N* 88365; *Ibid.*, 26.02.2003, *Ligimol,* 89870; *Ibid.*, 26.02.2003, *Dhanya A.M.* 89663; *Ibid.*, 26.02.2003, *Roshni Balakrishnann* 89971; *Ibid.*, 26.02.2003, *Thomson Mani* 90866; *Ibid.*, 26.02.2003, *Reesha Karally* 89471; Kumarikulam, 09.12.1993, *Jomy* Augustine 13003; Mathikettan Shola National Park, 04.01.2017, *Vishnu Mohan & Santhosh Nampy* 151499; Munnar, 12.02.2001, *Smitha V.* 72722; *Ibid.*, 12.02.200, *Sheeba M.V.* 73012; *Ibid.*, 12.02.2001, *Priya B.S.*

72415; *Ibid.*, 12.02.2001, *Prajeesha P.* 72925; *Ibid.*, 12.02.2001, *Rency R.C.* 73543; *Ibid.*, 12.02.2001, *Smitha C.* 74525; *Ibid.*, 12.02.2001, *Hajarommabi P.* 72824; *Ibid.*, 12.02.2001, *Priya D.* 73843 (CALI).

Hypericum wightianum Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 99. 1834; Gamble, Fl. Madras 1: 70. 1915.

Hypericum napaulense sensu Dyer in Hook.f., Fl. Brit. India 1: 256. 1874, *p.p.* non Choisy 1824.

Hypericum humifusum sensu Dyer in Hook.f., Fl. Brit. India 1: 255. 1874, *p.p.* non L. 1753; Gamble, Fl. Madras 70. 1915.

Annual diffuse herbs, up to 40 cm tall. Stems branching, reddish, glabrous. Leaves simple, decussate; lamina oblong, 0.5–1 × 0.3–0.5 cm, rounded at apex and base, entire at margins, glabrous above, glaucous and gland dotted beneath. Flowers in terminal cymes, non-fragrant; peduncles *c.* 1 cm long, slender, glabrous; pedicels *c.* 1 cm long, slender, glabrous. Sepals 5, free, oblong-elliptic, 5 × 3 mm, acute at apex, entire, glabrous. Petals 5, free, obovate-orbicular, 6–8 × *c.* 4 mm, obtuse at apex, entire, gland dotted below. Stamens numerous, 3-adelphous at base; filaments 6–8 mm long, erect, narrow, slender. Ovary glabrous; styles 3, *c.* 5 mm long, slender, glabrous; stigma exserted, capitate, sticky. Capsules ellipsoid. Seeds not ribbed.

Distribution: Native range of this species is S. India, Sri Lanka, E. Himalaya to S. China and Indo-China (POWO, 2023); *Habitat*: Grasslands; *Fl.* & *Ft.*: Throughout the year.

Specimens examined: Meesapulimala, 14.08.2019, *Vishnu Mohan & Santhosh Nampy* 176076; Vellimala, 09.02.1995, *Jomy Augustine* 15345 (CALI).

GUTTIFERAE

Trees, shrubs, woody climbers or perennial or annual herbs, juice resinous. Leaves simple, opposite or rarely subopposite to alternate or whorled, exstipulate. Flowers actinomorphic, bisexual, dioecious or polygamous. Sepals (2) 4–5 (6 or more), quincuncial or decussate. Petals 4–5 (6 or more), free, alternating with sepals. Androecium in two whorls; filaments variously united or free. Ovary superior, 1–5-locular (rarely to 12-locular); placentation usually

axile, sometimes ± parietal; stigmas equal in number to the loculi. Fruit a capsule or a berry or drupe. Seeds sometimes winged, carinate or arillate, without endosperm.

The family includes 20 genera (POWO, 2023); three genera and 10 species in the study area.

Key to the genera

1. Style distinct; stigma broadly peltate, fruit a drupe or capsule……2
1. Style indistinct; stigma broadly peltate; fruit a berry……*Garcinia*
2. Fruits enclosed by sepals……...*Mesua*
2. Fruits not enclosed by sepals……3
3. Fruit a drupe…….. *Calophyllum*
3. Fruit a capsule……..…..…*Poeciloneuron*

Calophyllum L.

Sp. Pl. 1: 513. 1753.

Key to the species

1a. Petals absent……..*C. calaba*
1b. Petals present……..……2
2a. Flowers bisexual; fruit a drupe……..……*C. austroindicum*
2b. Flowers polygamous; fruit a drupe…… *C. polyanthum*

Calophyllum austroindicum Kosterm. ex P.F.Stevens, J. Arnold Arbor. 61: 250. 1980; W.Arisdason & P.Daniel in P.Daniel (ed.), Fl. Kerala 1: 330. 2005.

Tree up to 15 m tall. Branchlets woody, quadrangular; bark pale brown. Leaves simple, opposite; lamina elliptic-ovate, 3.5–8.5 × 2–4.2 cm, acute-rounded at apex, attenuate at base, entire and recurved at margins, glabrous, leathery, shining above; petioles 1–1.5 cm long, glabrous, grooved above. Stipules linear-lanceolate, 5–7 × 1–2 mm, acuminate at apex, entire, glabrous, caducous. Flowers in axillary racemes, fragrant; peduncles 3–6 cm long, glabrous, erect; pedicels 1.5–2 cm long, erect, glabrous. Sepals 4, free, subequal; outer sepals 2, suborbicular, 3–5 × 3–6 mm, rounded at apex, entire, glabrous; inner sepals 2, elliptic *c.* 6 × 4 mm, rounded at apex, entire, glabrous. Petals 4, free, obovate-oblong, 4–9 × 3–6 mm, rounded at apex, entire, glabrous. Stamens numerous; filaments 8–10 mm long, narrow, erect, thread

like, glabrous. Ovary globose, glabrous; style erect, *c.* 3 mm long, glabrous; stigmas peltate, sticky. Drupes ovoid, beaked at apex.

Distribution: The native range of this species is SW. India and N. Andaman Islands (POWO, 2023); *Habitat:* Evergreen forests; *Fl.* & *Ft.*: November-June.

Specimen examined: Anamudishola National Park, 22.06.2018, *Vishnu Mohan & Santhosh Nampy* 159369 (CALI).

Calophyllum calaba L., Sp. Pl. 514. 1753; W.Arisdason & P.Daniel in P.Daniel (ed.), Fl. Kerala 1: 330. 2005.

Trees, up to 20 m tall. Branchlets woody, quadrangular, glabrous; bark brownish, deeply fissured. Leaves simple, decussate; lamina ovate-obovate, 4–9 × 1.5–4 cm, acute-rounded at apex, attenuate at base, entire and slightly recurved at margins, glabrous, leathery; petioles *c.* 0.5 cm long, pulvinate, grooved. Stipules linear-lanceolate, 5–6 × 1–2 mm, acuminate at apex, entire, glabrous, scaly. Flowers in axillary few flowered racemes; peduncles *c.* 1 cm long, erect, stout, glabrous; pedicels 1.2 cm long, erect, glabrous. Sepals 4, subequal, deflexed, membranous; outer sepals 2, ovate, 3–5 × 3–5 mm, rounded at apex, entire, glabrous; inner sepals 2, elliptic, 6–9 × 3–5 mm, rounded at apex, entire, glabrous, petaloid. Petals 0. Stamens numerous; filaments *c.* 6 mm long, thread like, slender, erect, glabrous. Ovary ovoid; style *c.* 4 mm long, erect; stigma peltate, sticky. Drupes ovoid, glabrous.

Distribution: The native range of this species is Sri Lanka to W. & S. Malesia (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests and sacred groves; *Fl.* & *Ft.*: September-May.

Specimen examined: Vallakkadavu, 12.09.1994, *Jomy Augustine* 14087 (CALI).

Calophyllum polyanthum Wall. ex Choisy, Mém. Soc. Phys. Genève 12: 423. 1849; W.Arisdason & P.Daniel in P.Daniel (ed.), Fl. Kerala 1: 333. 2005. *Calophyllum elatum* Bedd., Rep. Conservator Forests 1863-1864: 31. 1864; Gamble, Fl. Madras 76. 1915. *Calophyllum tomentosum* sensu Hook.f., Fl. Brit. India 1: 274. 1874, non Wight 1839.

Trees, up to 40 m tall. Branchlets woody, quadrangular; bark deeply fissured.

Leaves simple, decussate; lamina lanceolate-elliptic, 4–9 × 2.5 cm, acuminate at apex and base, entire and not recurved at margins, leathery; petioles 1.5–2 cm long, glabrous, grooved above. Flowers in axillary to terminal racemes, fragrant; peduncles 3–7 cm long, pubescent; pedicels *c.* 1 cm long, narrow, pubescent. Sepals 4, unequal; outer sepals 2, ovate, 2–5 × 2–6 mm, rounded at apex, entire, glabrous; inner sepals 2, free, ovate-oblong, larger than outer sepals, 4–8 × 3–6 mm, acute-rounded at apex, entire, glabrous. Petals 4, free, obovate, 7–9 × 4–5 mm, rounded at apex, entire, glabrous. Stamens numerous; filaments erect, *c.* 5 mm long, narrow, slender, glabrous. Ovary ovoid; style slender, erect; stigma peltate, sticky. Drupes subglobose.

Distribution: The native range of this species is Indian Subcontinent to China (S. Yunnan) and Indo-China (POWO, 2023); *Habitat:* Evergreen forests; *Fl.* & *Ft.*: February-September.

Specimen examined: Sabarimala, 15.02.1996, *Jomy Augustine* 17708 (CALI).

Garcinia L.

Sp. Pl. 1: 443. 1753.

Key to the species

1. Sepals and petals 5……..……*G. spicata*
1. Sepals and petals 4……..…..2
2. Flowers sessile……3
2. Flowers stalked……..4
3. Stamens in male flower 12–15……*G. wightii*
3. Stamens in male flowers more than 20…*G. cambogioides* var *cambogioides*
4. Leaves length more than 10 cm; flowers pinkish,…..*G. pushpangadaniana*
4. Leaves length less than 10 cm length; flowers yellow……*G. cowa*

Garcinia cowa Roxb. ex Choisy Mém. Nouv. Gen. Guttif.: 17 1823; Hook.f., Fl. Brit. India 1: 202. 1874; Gamble, Fl. Madras 1: 74. 1915.

Evergreen trees, up to 10 m tall. Branchlets woody, quadrangular; bark brownish black; exudation yellow, sticky. Leaves simple, opposite, decussate; lamina elliptic-oblong, 2–8 × 1.3–3.6 cm, acute-rounded at apex, acute at base,

entire at margin, glabrous on both sides, coriaceous; petioles 5–8 mm long, glabrous, stout, grooved above. Flowers dioecious: Male flowers; pedicels *c.* 4 mm long, glabrous. Sepals 4, free, unequal; outer sepals 2, broadly ovate, *c.* 6 × 5 mm, rounded at apex, entire at margins, fleshy, yellow, glabrous on both sides; inner sepals 2, widely ovate, *c.* 7 × 5 mm, rounded at apex, entire at margins, fleshy, glabrous on both sides. Petals 4, orbicular, *c.* 8 × 5 mm, rounded at apex, entire at margins, glabrous on both sides. Stamens numerous on a convex fleshy receptacle; filaments short: Female flowers in terminal fascicles, longer than male flowers; pedicels *c.* 2 mm long, stout. Sepals 4, free, unequal; outer sepals 2, broadly ovate, *c.* 6 × 5 mm, rounded at apex, entire at margins, fleshy, glabrous on both sides; inner sepals 2, widely ovate, *c.* 7 × 5 mm, rounded at apex, entire at margins, fleshy, glabrous on both sides. Petals 4, free, orbicular, *c.* 8 × 5 mm, rounded at apex, entire at margins, glabrous on both sides. Staminodes in 4 groups. Ovary superior, sub globose; stigma sessile, peltate, deeply divided. Berry globose.

Distribution: The native range of this species is India, Central Himalaya to China (W. & S. Yunnan) and Malaya (POWO, 2023);

Habitat: Evergreen forest; *Fl.* & *Ft.*: March-August.

Specimens examined: Edamalakkudi, 19.03.2019, *Vishnu Mohan & Santhosh Nampy* 159109; way to Umayamala, 30.08.2019, *Vishnu Mohan & Santhosh Nampy* 170268 (CALI).

Garcinia cambogioides var **cambogioides** (Murray) Headland Mat. Med. Ind., ed. 3: 839 1837.*Garcinia morella* (Gaertn.) Desr. J.B.A.M.de Lamarck, Encycl. 3: 701 1792; Hook.f., Fl. Brit. India 1: 204. 1874; Gamble, Fl. Madras 1: 74. 1915.

Evergreen trees, up to 10 m tall. Branchlets woody, angular, glabrous; exudation dark yellow or orange yellow, sticky; branchlets quadrangular, glabrous. Leaves simple, opposite, decussate, elliptic-ovate, 6–11 × 3–4 cm, acute-attenuate at apex, cuneate at base, entire at margin, glabrous on both sides, coriaceous; petioles 8–12 mm, stout, glabrous, grooved above. Flowers unisexuals, reddish, sessile: Male flowers in axillary fascicles. Sepals 4 free, orbicular; outer sepals 2, orbicular, 1.5–2 × 1.5–2 mm, rounded at apex, entire

at margins, glabrous on both sides; inner sepals 2, orbicular, 3–3.5 × 3–3.5 mm, rounded at apex, entire at margins, glabrous on both sides. Petals 4, free, orbicular, 5–8 × 3–6 mm, rounded at apex, entire at margins, glabrous on both sides. Stamens 10; filaments adnate, stout. Female flowers axillary, solitary. Sepals 4 free, orbicular; outer sepals 2, orbicular, 3.5–4 × 3–3.5 mm, rounded at apex, entire at margins, glabrous on both sides; inner sepals 2, orbicular, 4–4.5 × 4 mm, rounded at apex, entire at margins, glabrous on both sides. Petals 4, free, orbicular, 8–10 × 5–8 mm, rounded at apex, entire at margins, glabrous on both sides. Staminodes 10. Ovary superior, globose; stigma peltate, sessile, lobed. Fruit a berry globose.

Distribution: The native range of this variety is SW. India, Sri Lanka, Assam to Bangladesh (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl.* & *Ft.*: February-August.

Specimens examined: Eravikulam, 26.02.2003, *Roshni* Balakrishnan 89972; *ibid*, 26.02.2003, *Dhanya M,* 89664; *ibid*, 26.02.2003, *Nisha Kumari* 88869; *ibid*, 26.02.2003, *Nishitha I.K* 88665; *ibid*, 26.02.2003; *ibid*, 26.02.2003, *Shahanaz Beegum A.* 90170; *ibid*, 26.02.2003, *Smitha* 89162; *ibid*, 26.02.2003, *Divya N.* 90573; *ibid*, 26.02.2003, *Thomson Mani* 90867; *ibid*, 26.02.2003, *Ligimol* 89871; *ibid*, 26.02.2003, *Reesha Karally* 89472; Vallakkadavu, 02.02.1994, *Vishnu Mohan & Santhosh Nampy* 13193 (CALI).

Garcinia pushpangadaniana T.Sabu, N. Mohanan, Krishnaraj & Shareef Phytotaxa 116: 52. 2013.



Trees up to 20 m tall. Branchlets woody, angular, glabrous; latex yellow, milky. Leaves simple, opposite decussate; lamina oblong, 10–25 × 3.5–10 cm, acute or obtuse at apex, rounded at base, entire and recurved at margins, coriaceous, glabrous on both sides; petioles 1–2 cm long, woody, stout. Stipule lanceolate, 6–8 × 3–3.5

mm, acuminate at apex, entire at margins, glabrous on both sides. Flowers on axillary fascicle. Male flower: pedicels 7–9 mm long, stout, glabrous. Sepals 5, unequal, orbicular 5–8 × 4–6 mm, rounded at apex, ciliate, membranous at margin, glabrous on both sides. Petals 5, free, orbicular, 10–15 × 8–15 mm, rounded at apex, shortly clawed at base, entire at margins, glabrous on both sides, fleshy at middle. Stamens 12, alternating with fleshy intra staminal disc; filaments *c.* 1 mm long; rudimentary pistil present. Female flower; pedicels 1–1.5 cm long. Sepal 4, orbicular, 6–6.6 × 5–6.5 mm, rounded at apex, entire at margins, glabrous on both sides. Petals 5, free, orbicular, 1–1.2 × 1–1.2 cm, rounded at apex, membranous and ciliate at margin, fleshy at middle. Staminodes 5, slender, peltate. Ovary globose; style very short. Fruit fleshy, irregularly ridged on the surface.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: June-September.

Specimens examined: Kannadippara, 08.06.2018, *Vishnu Mohan & Santhosh Nampy* 159267; Nallathanni Kallar, 16.09.2018, *Vishnu Mohan & Santhosh Nampy* 161933 (CALI).

Garcinia spicata (Wight & Arn.) Hook.f., J. Linn. Soc. Bot. 14: 486.1875; Gamble, Fl. Madras 74. 1915; W. Arisdason & P.Daniel in P. Daniel, (ed.) Fl. Kerala 1: 342. 2005. *Xanthochymus spicatus* Wight & Arn. in Prodr. Fl. Ind. Orient. 1: 102 1834.

Garcinia spicata var. *glomerata* Vesque in A.L.P.P.de Candolle & A.C.P.de Candolle, Monogr. Phan. 8: 311 1893.

Evergreen trees up to 25 m tall. Branchlets woody, angular; bark yellowish-brown; exudation sticky, yellowish-green. Leaves simple, opposite, decussate; lamina ovate-elliptic, 7–16 × 3.5–7 cm, obtuse at apex, acute at base, entire and recurved at margins, glabrous on both sides, coriaceous; petioles *c.* 20 mm long, stout, glabrous, grooved above. Flowers unisexuals: Male flowers: in axillary fascicles. Bract lanceolate, *c.* 3 × 3 mm, rounded at apex, entire at margins, glabrous on both sides; pedicels *c.* 10 mm long, glabrous. Sepals 5, free, ovate-orbicular, *c.* 3 × 4 mm, rounded at apex, ciliate at margin. Petals 5,

obovate, 5–6 × 5–6 mm, rounded at apex, entire at margins, concave, membranous. Stamens 5; filaments 6–7 mm long; pistillode clavate, smooth. Female flowers: solitary, axillary or paired. Sepals 5, free, ovate-orbicular, 3–4 × 4–4.5 mm, rounded at apex, ciliate at margin. Petals 5, obovate, 5–6.5 × 5–6 mm, rounded at apex, entire at margins, concave, membranous. Staminoides 5. Ovary superior, globose; style *c.* 1 mm long; stigma peltate, lobed. Berry, broadly oblong.

Distribution: The native range of this species is S. India, Sri Lanka, Assam (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: March-November.

Specimen examined: Kurthode, 12.11.1995, *Jomy Augustine* 16906 (CALI).

Garcinia wightii Anders. in Hook.f., Fl. Brit. India 1: 205. 1874; Gamble, Fl. Madras 74. 1915; W.Arisdason & P.Daniel in P. Daniel, Fl. Kerala 1: 344. 2005..

Trees, up to 10 m tall. Stems, woody, angular; bark brown; exudation orange yellow, sticky. Leaves simple, opposite, decussate; lamina lanceolate 7.5–14 × 1.5–2 cm, acuminate at apex, acute at base, entire and recurved at margins, glabrous on both sides, shining above, coriaceous; petioles *c.* 8 mm long, slender, glabrous, grooved above. Flowers unisexuals; male flowers axillary, solitary, sessile. Sepals 4, equal, orbicular, 3–3.3 × 3 mm, rounded at apex, entire at margins, glabrous on both sides, concave. Petals 4, free, yellow, obovate, 5–6 × 3–3.5 mm, rounded at apex, entire at margins, distinctly concave. Stamens many; filaments free above. Pistillode tetragonal. Female flowers axillary, solitary, sessile. Sepals 4, equal, orbicular, *c.* 3 × 3 mm, rounded at apex, entire at margins, concave. Petals 4, obovate, 5–5.6 × 3.3–3.5 mm, rounded at apex, entire at margins, distinctly concave. Ovary superior; stigmas sessile, *c.* 3 mm long, glabrous. Berry sub globose, glabrous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*; Along stream banks in evergreen and semi-evergreen forests; *Fl. & Ft.*: November-March.

Specimens examined: Thommankutthu, 30.11.2019, *Vishnu Mohan & Santhosh Nampy* 164659; Thommankutthu, 10.12.2018, *Vishnu Mohan & Santhosh Nampy* 151318 (CALI).

Mesua L.

Sp. Pl. 1: 515. 1753.

Mesua thwaitesii Planch. & triana, Ann. Sci. Nat., Bot. ser. 4, 15: 305. 1816. Hook.f., Fl. Brit. India 1: 278. 1874; W.Arisdason & P.Daniel in P. Daniel, Fl. Kerala 1: 350. 2005.

Trees up to 20 m tall. Branchlets woody, terete-angular; bark dark brown, smooth; exudation yellow, sticky. Leaves simple, opposite, decussate; lamina elliptic-lanceolate, 8–15 × 1.5–3.5 cm, acuminate at apex, acute at base, entire at margin, glabrous on both sides, shining above, glaucous beneath, coriaceous; petioles 8–10 mm, slender, glabrous, grooved above, glaucous. Flowers bisexual, fragrant, sessile in terminal cymes; peduncle 8–9 mm long, stout, glaucous; pedicels reduced, stout. Sepals 4, free, orbicular, 1.5–2 × 1–2 cm, rounded at apex, entire at margins, rigid, glabrous on both sides. Petals 4, free, orbicular, 20–30 × 15–30 mm, rounded at apex, entire at margins, glabrous on both sides, delicate. Stamens numerous; filaments 2–4 cm long, glabrous, erect, yellow. Ovary superior, glabrous; style erect, 1–2 mm long, glabrous; stigma peltate, sticky, fleshy. Capsule, depressed, glabrous.

Distribution: The native range of this species is SW. India, Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests, also in sacred groves of the plains; *Fl.* & *Ft.*: February-December.

Specimen examined: Aaram mile, 26.12.1988, *P. Bhargavan* 90096 (MH); Calvary mount, 06.10.1983, *A.G. Pandurangan* 79271 (MH); Mankulam, 16.09.2017, *Vishnu Mohan & Santhosh Nampy* 186773 (CALI).

Poeciloneuron Bedd.

First published in J. Linn. Soc., Bot. 8: 267 1865.

Poeciloneuron indicum Bedd. J. Linn. Soc., Bot. 8: 267 1865; Hook.f., Fl. Brit. India 1: 278. 1874; Gamble, Fl. Madras 77. 1915; W. Arisdason & P.Daniel in P. Daniel, (ed.) Fl. Kerala 1: 352. 2005.

Large evergreen trees up to 30 m tall. Branchlets woody, terete; bark grey to brown, rough; exudation milky yellow. Leaves simple, opposite; lamina elliptic-oblong, 10–22 × 2.5–5 cm, caudate at apex, obtuse at base, entire at margins, glabrous on both sides, coriaceous; petioles 10–30 mm, stout, grooved above. Flowers bisexual, in axillary and terminal panicles; peduncles 5–20 cm long, puberulous; pedicels 10–20 mm long, puberulous. Bracts triangular 5–8 × 4 mm, acuminate at apex, entire at margins, glabrous on both sides. Sepals 5; ovate, *c.* 3 × 2 mm, acute at apex, entire at margins, puberulous out, glabrous within. Petals 5, obovate, 5–6 × 4–4.5 mm, rounded at apex, entire at margins, glabrous on both sides. Stamens numerous; filaments *c.* 0.5 mm long. Ovary bilocular; styles 2, subulate; stigma peltate. Capsule globose, beaked. Seed one, fleshy.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests, also in sacred groves; *Fl.* & *Ft.*: September-June.

Specimen examined: Kulamavu, 14.12.1982, *C.N. Mohanan* 76061; Valara, 24.09.1972, *R. Rajan* 74990 (MH).

THEACEAE Mirb.

Bot. Reg. 2: ad t. 112. 1816 *nom. cons.*

Trees or shrubs. Leaves alternate or spiral, simple, usually coriaceous, exstipulate. Flowers axillary, solitary or sometimes paired or in fascicles, rarely cymose or in elongated racemes. Sepals usually 5, imbricate, free or shortly connate. Petals usually 5, imbricate, free or shortly connate. Stamens free or fasciculate or connate at base to form a tube, sometimes adnate to the base of petal. Ovary superior (rarely apparently semi-inferior), syncarpous, sessile. Fruit a loculicidal capsule (often leaving a persistent central column) or a dry or rarely fleshy berry or drupe, indehiscent or rarely irregularly dehiscent at apex. Seeds scanty or absent, sometimes folded or spirally twisted.

The family includes 366 species under eight genera (POWO, 2023); three genera and four species in the study area.

Key to the genera

1. Anthers versatile; fruit a capsule..... *Polyspora*

1. Anthers basifixed; fruit a berry……..……2

2. Leaves crenate-serrate; flowers unisexual……... *Eurya*

2. Leaves entire; flowers bisexual…….…… *Ternstroemia*

Eurya Thunb.

Nov. Gen. Pl. 3: 67. 1783.

Key to the species

1. Bracts lanceolate; petals free……..…*E. japonica*

1. Bracts orbicular; petals connate at base…….. *E. nitida*

Eurya japonica Thunb. Nov. Gen. Pl.: 67 1783; Hook.f., Fl. Brit. India 1: 284. 1874; Gamble, Fl. Madras 79. 1915.

Shrubs, up to 3 m tall. Stems woody, terete, with persistent leaf base; bark brown, smooth. Leaves simple, alternate-opposite; lamina ovate-elliptic, 2–6 × 0.5–2.5 cm, acute-shortly acuminate at apex, broadly attenuate at base, finely crenate-serrate, glabrous, shining above, leathery; petioles *c.* 5 mm, glabrous, stout, grooved above. Flowers dioecious, solitary or in few flowered axillary fascicles, non-fragrant; peduncles *c.* 2 mm long, slender, glabrous; pedicels reduced. Bracts lanceolate, *c.* 3 × 1 mm, acuminate at apex, entire, hispid out, glabrous within; bractoles ovate, *c.* 1 × 0.7 mm, acute at apex, entire at margins, sparsely hispid out, glabrous within. Male flowers: Sepals 5, free, orbicular, *c.* 1 × 1 mm, rounded-mucronate at apex, entire, glabrous. Petals 5, free, orbicular, 1.5–2 × 1 mm, rounded at apex, entire, glabrous, membranous. Stamens 12–15; filaments *c.* 2 mm long, stout, glabrous. Female flowers: Sepals 5, free, orbicular, *c.* 1 × 1 mm, rounded-mucronate at apex, entire, glabrous. Petals 5, free, white, orbicular, 1.5–2 × 1 mm, rounded at apex, entire, glabrous, membranous. Ovary minute, glabrous; styles *c.* 2 mm long, erect. Berry sub-globose.

Distribution: The native range of this species is China (Anhui, E. Zhejiang) to Korea and Vietnam, Central & S. Japan to Central Nansei-shoto (POWO, 2023); *Habitat:* Margins of grasslands and shola forests; *Fl.* & *Ft.*: March-August.

Specimen examined: Meesappulimala, 26.08.2018, *Vishnu Mohan & Santhosh Nampy* 173347 (CALI).

Eurya nitida Korth., Verh. Nat. Gesch. Ned. Bezitt. Bot. 4: 115. 1841; K.Vivek. in P.Daniel, Fl. Kerala 1: 355. 2005. *E. japonica* subsp. *nitida* (Korth.) T.Yamaz., J. Jap. Bot. 70: 271. 1995. *E. japonica* var. *nitida* (Korth.) Dyer in J.D.Hooker, Fl. Brit. India 1: 284. 1874.

Shrubs, up to 5 m tall. Stems woody, terete; bark brown, glabrous, smooth. Leaves simple, alternate; lamina elliptic, 1.5–4 × 1–2 cm, acute-acuminate at apex, acute at base, serrate, coriaceous, glabrous; petioles *c.* 0.5 cm long, glabrous, slender, grooved above. Flowers unisexual, in axillary fascicles, non-fragrant, white; pedicels 0.1–0.25 cm long, glabrous. Bracts orbicular, *c.* 2 × 2 mm, acute at apex, entire, glabrous; bracteoles 2, orbicular, *c.* 1.5 × 1.5 mm, acute at apex, entire, glabrous. Male flowers: Calyx lobes 5, broadly ovate to orbicular, *c.* 1.5 × 1.5 mm, acute-rounded at apex, ciliate, glabrous. Petals 5, connate at base; lobes broadly oblong-orbicular, *c.* 2 × 2 mm, rounded at apex, entire, glabrous. Stamens 12–15, connate at base, adnate to base of petals; filaments *c.* 2 mm long. Female flowers: Calyx lobes 5, broadly ovate to orbicular, *c.* 1.5 × 1.5 mm, acute-rounded at apex, ciliate, glabrous. Petals 5, connate at base; lobes broadly oblong-orbicular, rounded at apex, entire, glabrous. Ovary superior, globose, glabrous; styles *c.* 2 mm long, united at base; stigmas 3-lobed. Berries globose, black.

Distribution: Native range is Tropical & Subtropical Asia and W. Pacific, Tubuai Islands (POWO, 2023); *Habitat:* Margins of grasslands and shola forests; *Fl.* & *Ft.*: January-March.

Specimen examined: Anamudishola, 25.01.2018, *Vishnu Mohan & Santhosh Nampy* 158265 (CALI).

Polyspora Sweet

News Lit. Fashion 2: 205 1825.

Polyspora obtusa (Wall. ex Wight & Arn.) Niissalo & L.M.Choo, Phytotaxa 458: 164. 2020. *Gordonia obtusa* Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 87. 1834; Hook.f., Fl. Brit. India 1: 291. 1874; Gamble, Fl. Madras 79. 1915;

KVivek. in P.Daniel, Fl. Kerala 1: 356. 2005.

Gordonia parvifolia Wight, Ill. Ind. Bot. 1: 99. 1840.



Small trees, 10 m tall. Branchlets woody, terete; bark greyish-white, hispid on apex, glabrous when old. Leaves simple, alternate; lamina elliptic-lanceolate, 3.5–12 × 2.5–4.5 cm, acute or attenuate at apex, cuneate at base, crenate, glabrous, coriaceous; petioles *c.* 10 mm long, glabrous except the upper middle, slender. Flowers bisexual, solitary, terminal or axillary, non-fragrant; pedicels *c.* 0.5 cm long, stout, pubescent. Sepals 5, free, unequal, orbicular, 6–8 × 6–8 mm, rounded at apex, entire, pubescent out, glabrous in. Petals 5, free, obovate, *c.* 15 × 10 mm, truncate at apex, entire, glabrous, membranous. Stamens numerous; filaments *c.* 8 mm long, adnate to the base of petals, slender, glabrous. Ovary superior, ovoid, tomentose; styles *c.* 4 mm long, stout, ribbed; stigmas 6-lobed. Capsules oblong.

Distribution: Native range is W. and S. India (POWO, 2023); *Habitat:* Evergreen forests; *Fl.* & *Ft.*: September-May.

Specimens examined: Kozhikkanam, 24.09.1972, *B.D. Sharma* 41643; Pachakkanam, 03.10.1976, *K. Vivekananthan* 48398 (MH); Nakshathrakutthu, Mankulam, 04.12.2018, *Vishnu Mohan & Santhosh Nampy* 168851 (CALI).

Ternstroemia Mutis ex L.f.

Suppl. Pl. 39, 264 1782, *nom. cons.*

Ternstroemia gymnanthera (Wight & Arn.) Bedd., Fl. Sylv. S. India t. 91. 1871; K.Vivek. in P.Daniel (ed.), Fl. Kerala 1: 357. 2005.

Cleyera gymnanthera Wight & Arn., Prodr. Fl. Ind. Orient. 1: 87. 1834. *Ternstroemia japonica sensu* Hook.f., Fl. Brit. India 1: 280. 1874, *non* Thunb.,

1794; Gamble, Fl. Madras: 78. 1915.

Small trees, up to 15 m tall. Branchlets woody, terete; bark brownish black, smooth. Leaves simple, alternate, often clustered at apex of stems; lamina obovate, 3.5–5.5 × 1.5–2.5 cm, acute at apex, cuneate at base, entire, slightly revolute, glabrous, coriaceous; petioles *c.* 2 cm long, glabrous, stout, reddish. Flowers unisexual, solitary, axillary or extra axillary, non-fragrant; pedicels *c.* 1 cm long, stout, glabrous. Male flowers: Sepals 5, unequal, orbicular, 3–5 × 3–4 mm, rounded at apex, entire, glabrous, persistent. Petals 5, obovate-cuneate, 6–8 × 5–6 mm, rounded at apex, entire, glabrous. Stamens yellow, numerous, free; filaments adnate to base of petals; pistillodes clavate. Female flowers as same as male flowers. Ovary ovoid, glabrous; styles simple; stigmas *c.* 3 mm long, erect; stigma sticky. Berries ovoid.

Distribution: Native range is Indian Subcontinent to S. China and Indo-China (POWO, 2023); *Habitat:* Shola forests and evergreen forests; *Fl.* & *Ft.*: June-April.

Specimens examined: Chokkampettimala, 14.10.1994, *Jomy Augustine* 13611; Pachampallam, 06.04.1994, *Jomy Augustine* 13568 (CALI).

DIPTEROCARPACEAE Blume

Bijdr. Fl. Ned. Ind. 4: 222. 1825, *nom. cons.*

Trees or shrubs. Leaves simple, alternate. Stipules caducous. Flowers bisexual. Sepals 5, accrescent. Petals 5, contorted to right, free or slightly connate at base. Stamens 5, 10, 15 or numerous. Ovary superior, (1) 3-locular with axile or parietal placentation. Fruit 1-seeded, indehiscent, surrounded by the wings of the accrescent calyx.

The family includes 22 accepted genera (POWO, 2023); three genera and five species in the study area.

Key to the genera

1. Calyx tubular, shortly lobed……*Dipterocarpus*

1. Calyx lobe nearly free……2

2. Sepals in fruit longer than fruit……*Hopea*

2. Sepals in fruit shorter than fruit……*Vateria*

Dipterocarpus C.F.Gaertn.

Suppl. Carp. 50. 1805.

Key to the species

1. Young shoots densely tomentose; stamens less than 30….. ..*D. bourdillonii*

1. Young shoots appressed-tomentose; stamens more than 30…….. *D. indicus*

Dipterocarpus bourdillonii Brandis, Hooker's Icon. Pl. 25: t. 2403. 1895; Gamble, Fl. Madras 81. 1915; K.P.Janardh. & W.Arisdason in P.Daniel, Fl. Kerala 1: 360. 2005.

Evergreen trees, up to 20 m tall. Branchlets woody, terete; young parts covered with dense brown tomentum, angled; bark brownish black, lenticellate. Leaves simple, alternate; lamina elliptic-ovate, 20–28 × 12–15 cm, acute at apex, rounded at base, entire, coriaceous, glabrous above, stellate hairy beneath; petioles 5–6 cm long, stellate hairy, pulvinate. Stipules lanceolate, 15–20 × *c.* 7 mm, acuminate at apex, entire, hispid out, glabrous within. Flowers bisexual, in short axillary racemes; peduncles 4–5 cm long, narrow, slender, glabrous; pedicels slender, *c.* 0.5 cm long, glabrous. Sepal fused, winged, lobes ovate-lanceolate, 5–7 × 3–3.4 mm, acute at apex, entire, glabrous out, pubescent within. Petals 5, free, narrow oblong-elliptic, 1.5–2 × 0.5 cm, acute at apex, entire, glabrous, membranous. Stamens 25; filaments broad, connate at base. Ovary superior, 3-celled; style 3–5 mm long, pubescent; stigma globose, velvitish, sticky. Fruit a nut, winged.

Distribution: Native range is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* January-June.

Specimen examined: Kurthode, 15.03.1994, *Jomy Augustine* 188900 (CALI).

Dipterocarpus indicus Bedd., Conserv. For. Rep. 17. 1864; Gamble, Fl. Madras 81. 1915.

Dipterocarpus turbinatus sensu Dyer in Hook.f., Fl. Brit. India 1: 295. 1874 *p.p.* non Gaertn.f.

Evergreen trees, up to 20 m tall. Branchlets woody, terete; bark pale grey, lenticellate. Leaves simple, alternate; lamina ovate-elliptic, 10–12 × 7–8 cm,

apex acute, rounded at base, crenate, glabrous, coriaceous; petioles 2.5–3 cm long, glabrous, slender. Stipules large, lanceolate, 8–10 × 3–4 mm, acute at apex, entire, glabrous. Flowers bisexual, in axillary racemes, fragrant; peduncles 4–5 cm along, glabrous; pedicels 1–2 cm long, glabrous. Sepals fused; lobes 5, unequal, oblong-ovate, 4–5 × 2–2.5 mm, rounded at apex, entire, glabrous. Petals 5, free, elliptic-ovate, 15–20 × 5 mm, rounded at apex, entire, glabrous, membranous. Stamens numerous; filaments 5–6 mm long, erect, glabrous. Ovary superior, 3-celled; style 3–4 mm long, glabrous, slender; stigma capitate, sticky. Nut oblong, 2-winged, reddish-brown.

Distribution: Native range is SW. India (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.:* February-July.

Specimen examined: Chenthamarakotta, 16.03.1994, *Jomy Augustine* 13444 (CALI).

Hopea Roxb.

Pl. Coromandel 3: 7. 1811, *nom. cons.*

Key to the species

1. Panicles minutely puberulous……*H. parviflora*
1. Panicles glabrous……..*H. ponga*

Hopea parviflora Bedd., Rep. Conservator Forests 1863-1864: 31. 1864; Hook.f., Fl. Brit. India 1: 308. 1874; Gamble, Fl. Madras 82. 1915; K.P.Janardh. & W.Arisdason in P. Daniel, Fl. Kerala 1: 365. 2005.

Evergreen trees, up to 35 m tall. Branchlets woody, terete, sparsely pubescent; bark rough, vertically fissured. Leaves simple, alternate, ovate, 8–12 × 3–5 cm, acute at apex, obtuse at base, entire, glabrous, coriaceous; petioles 1–1.2 cm, slender, pubescent when young, glabrous when mature, grooved above. Stipules ovate, 4–5 × 2–3 mm, acuminate at apex, entire, glabrous, scaly. Flowers bisexual, in terminal or axillary racemose panicles; peduncles 5–25 cm long, slender, puberulous; pedicels 0.2–0.3 cm long, stout. Sepals 5, ovate, *c.* 3 × 2 mm, acute at apex, entire, tomentose out, glabrous within. Petals 5, oblong, *c.* 6 × 4 mm, fimbriate at apex, entire, glabrous. Stamens 5, slightly connate; filaments 3–4 mm long, glabrous. Ovary glabrous; style subulate. Nut terete, glabrous; wings 2, glabrous.

Distribution: The native range of this species is SW. and S. India (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, along in the plains in sacred groves; *Fl. & Ft.:* January-June.

Specimen examined: Keezhalipuzha, 21.12.1988, *P. Bhargavan* 90037 (MH).

Hopea ponga (Dennst.) Mabb., Taxon 28: 587. 1979.

Hopea wightiana sensu Hook.f., Fl. Brit. India 1: 309.1874; Gamble, Fl. Madras 82. 1915.

Evergreen trees, up to 20 m tall. Branchlets woody, terete; bark brown, glabrous, lenticellate. Leaves simple, alternate; lamina ovate-lanceolate, 10–15 × 2.5–4 cm, acute at apex, rounded at base, entire, glabrous, coriaceous; petioles 0.4–0.8 mm long, glabrous, slightly grooved above. Flowers bisexual, in drooping racemose panicles, non-fragrant; peduncles 3–4 cm long, glabrous, stout; pedicels 0.5–1 cm long, glabrous, slender. Sepals campanulate; lobes ovate-orbicular, 5–7 × 3 mm, acute at apex, entire, glabrous out, pubescent within. Petals 5, free, orbicular-ovate, 6–8 × 3 mm, acute-acuminate at apex, entire, pubescent at base, glabrous towards tip. Stamens 10 alternate with petals; filaments 6–8 mm long, erect, slender, glabrous. Ovary superior, puberulous; style short, subulate; stigma capitate. Nut ovoid, glabrous.

Distribution: The native range of this species is SW. and S. India (POWO, 2023); *Habitat*: Semi evergreen forests; *Fl. & Ft.:* May-December.

Specimens examined: Panamkutty, 27.12.1983; *A.G. Pandurangan* 62554 (MH); Periyar, 13.06.1983, *A.G. Pandurangan* 79220 (MH); Thannikudy, 07.09.1993, *Jomy Augustine* 12336; *ibid*, 10.07.1993, *Jomy Augustine* 12070; *ibid*, 09.05.1994, *Jomy Augustine* 13787 (CALI).

Vateria L.

Sp. Pl. 1: 515. 1753.

Vateria indica L., Sp. Pl. 1: 515. 1753; Hook.f., Fl. Brit. India 1: 313. 1874; Gamble, Fl. Madras 1: 85. 1915.

Evergreen trees, up to 30 m tall. Branchlets woody, terete; bark greyish, puberulous. Leaves simple, alternate; lamina oblong-ovate, 10–17 ×3.5–10 cm,

acuminate at apex, round at base, entire, glabrous, coriaceous; petioles 2–4 cm long, glabrous, swollen at base. Stipules narrow, linear-lanceolate, 1–1.3 × 0.6–0.8 cm, acuminate at apex, entire, deciduous. Flowers bisexual, in terminal panicles, fragrant; peduncles 4–8 cm long, slender, glabrous; pedicels 0.5–1 cm long, erect, glabrous. Sepals 5, free, lanceolate-ovate, 8–10 × 3–4 mm, acute at apex, entire, pubescent out, glabrous within. Petals 5, obovate-orbicular, 7–13 × 6–8 mm, rounded at apex, entire, glabrous, membranous. Stamens many, free; filaments hairy, erect. Ovary superior, ovoid-oblong, tomentose; style filiform, glabrous; stigma globose, sticky. Capsules ovoid, glabrous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* March-August.

Specimens examined: Arjunankotta, 15.04.1995, *Jomy Augustine* 15089 (CALI); Kulamavu, 02.06.1982, *C.N. Mohanan* 74146 (MH); Vallakkadavu, 14.03.1994, *Jomy Augustine* 13476 (CALI).

MALVACEAE Juss.

Gen. Pl. 271. 1789, *nom. cons.*

Annual or perennial herbs or shrubs. Leaves simple, alternate, sessile to petiolate, usually stipulate, unlobed to deeply lobed. Flowers regular, bisexual or rarely unisexual, solitary or in cymose inflorescences. Calyx lobes (3–)5, sometimes united at base, valvate. Petals 5, free. Stamens 5–numerous; anthers dehiscing by slits. Ovary superior with (1–)5–many locules, with as many or twice as many styles-branches as carpels.

The family includes 242 genera (POWO, 2023); 11 genera and 24 species in the study area.

Key to the genera

1. Leaves simple, entire, lobed or palmatifid……2

1. Leaves digitate……..…10

2. Carpels separating from the axis at maturity……4

2. Carpels not separating……3

3. Calyx spathaceous, splitting down by one side and falling off after flowering ……..…..*Abelmoschus*

3. Calyx with 5 distinct teeth, and persistent in flower……..*Hibiscus*

4. Styles as many as carpels……5

4. Stylar branches twice as many as carpels……..……8

5. Carpels bursting irregularly……*Sida*

5. Carpels dehiscing by regular central line……..……6

6. Plants with trailing stems……..…..*Herissantia*

6. Pants erect……*Abutilon*

7. Leaves with large glands at base of leaf……..…*Urena*

7. Leaves eglandular……*Pavonia*

8. Plats shrubs……*Azanza*

8. Plants trees……..9

9. Flowers with epicalyx; capsule covered with spines……*Cullenia*

9. Flowers without epicalyx; capsule not coverd with spines……10

10. Flowers over up to 7 cm long. long; capsules thick, woody……*Bombax*

10. Flowers 2.5–_4 cm. long; capsules thin, leathery……*Ceiba*

Abelmoschus Medik.

Malvenfam. 45. 1787.

Key to the species

1. Involucral bracts linear……*A. moschatus*

1. Involucral bracts ovate……*A. angulosus*

Abelmoschus angulosus Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 53. 1834. *Abelmoschus angulosus* Wall. ex Wight & Arn., var. *angulosus* Sivar. & Pradeep, Malvac. Southern Peninsular India 52. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 400. 2005. *Hibiscus angulosus* (Wall. ex Wight & Arn.) Steud. ex Mast. in Hook.f., Fl. Brit. India 1: 341. 1874; Gamble, Fl. Madras 1. 97. 1915.

Abelmoschus angulosus Wall. ex Wight & Arn. var. *grandiflorus* Thw., Enum. Pl. Zeyl. 26. 1858; Sivar. & Pradeep, Malvac. Southern Peninsular India 55. 1996.



Woody shrubs, up to 2 m tall. Stems erect, densely pubescent. Leaves simple alternate; lamina 3–5-lobed, 5–10 × 8–10 cm, acute-acuminate at apex, cordate at base, serrate, hispid above, glabrous below except the veins; petioles 3–10 cm long, slender, narrow, strongly hispid. Stipules lanceolate, 4–5 × 1–1.5 mm, acute at apex, entire, glabrous. Flowers axillary, solitary, non-fragrant; pedicels 3–5 cm long, erect, slender, densely pubescent with rigid hairs. Involucral bracts connate at base; lobes ovate, 15–20 × 6–8 mm, acute at apex, entire, coriaceous, hairy. Calyx fused splitting one side, membranous, densely pubescent with rigid hairs out, hispid inside. Petals five, free, obovate, 40–50 × 30–35 mm, truncate-rounded at apex, entire, glabrous. Staminal column *c.* 30 mm long, adnate to the petals; filaments 1.5 mm long, erect, slender, glabrous. Ovary ovoid, densely appressed hairy; stigmas discoid. Capsules fusciform-ovoid. Seeds many.

Distribution: Native range is Pakistan to W. Malesia (POWO, 2023); *Habitat*: Moist deciduous, semi-evergreen and shola forests; *Fl. & Ft.*: October-February.

Specimens examined: Banglavuthara, 21.12.2019, *Vishnu Mohan & Santhosh* Nampy 164857; Koymanchola, 10.02.2021, *Vishnu Mohan & Santhosh* Nampy 188722; Pettimudi, 28.12.2019, *Vishnu Mohan & Santhosh Nampy* 164859 (CALI).

Abelmoschus moschatus Medik., Malvenfam. 46. 1787; Sivar. & Pradeep, Malvac. Southern Peninsular India 70. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 404. 2005. *Hibiscus abelmoschus* L., Sp. Pl. 696. 1753; Hook.f., Fl. Brit. India 1: 342. 1874; Gamble, Fl. Madras 87. 1915.

Erect herbs, up to 1 m tall. Stems terete, clothed with long deflexed hairs. Leaves simple, alternate; lamina plamately 3–7-lobed, 7–15 × 6–20 cm, lobes often narrowly linear, acuminate at apex, sagittate at base, dentate, stellate and simple hairy below; petioles 8–10 cm long, pubescent. Stipules linear, 5–8 × *c.* 2 mm, acuminate at apex, entire, pubescent. Flowers axillary, solitary; pedicels 2–5 c m long, stout, sparsely pubescent. Involucral bracts linear, 7–9 × *c.* 2 mm, acuminate at apex, entire, hispid, caducous. Calyx spathaceous, splitting at one side. Petals 5, obovate, *c.* 60 × 50 mm, rounded at apex, entire. Staminal column *c.* 15 mm long; filaments *c.* 5 mm long. Ovary ovoid; stylar branches 5; stigmas purple, hairy. Capsules oblong-lanceolate, strongly 5-angular, appressed hairy. Seeds reniform, concentrically ribbed.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Rocky areas in moist deciduous forests, also in the plains; *Fl. & Ft.*: July-December.

Specimen examined: Pooyamkutty, 08.07.1988, *P. Bhargavan* 87412 (MH).

Abutilon Mill.

Gard. Dict. Abr. ed. 4: 23. 1754.

Key to the species

1. Mericarps 2 or 3-seeded……*A. indicum*

1. Mericarps 4–6-seeded ……*A. persicum*

Abutilon indicum (L.) Sweet, Hort. Brit. 54. 1826; Hook.f., Fl. Brit. India 1: 326. 1874; Gamble, Fl. Madras 1: 91. 1915; Sivar. & Pradeep, Malvac. Southern Peninsular India 192. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 378. 2005.

Shrubs, up to 3 m tall. Stems terete, green, densely clothed with minutely short stellate simple hairs. Leaves simple, alte rnate; lamina ovate-orbicular, 4–7 × 3–4.5 cm, acuminate at apex, cordate at base, crenate-dentate, velvety, glaucous beneath with dense stellate indumentum; petioles 30–50 mm long, velvety, slender. Stipules linear, 2–4 × *c.* 3 mm long, acuminate at apex, entire. Flowers axillary, solitary; pedicels 30–40 mm long, velvetish, erect, slender. Calyx campanulate, lobes five, ovate, 5–7 × *c.* 4 mm, acute at apex, entire,

pubescent with minute stellate hairs out, glabrous within. Petals 5, broadly obovate, 10–13 × 12–15 mm, rounded or emarginate at apex, entire, glabrous except at base. Staminal column *c.* 6 mm long. Ovary globose, densely pubescent with silvery white hairs; styles many; stigmas capitate, sticky. Schizocarp globular with a flattened apex.



Distribution: The native range of this species is Mascarenes, Tropical & Subtropical Asia to W. Pacific (POWO, 2023); *Habitat*: Scrub jungles and wastelands; *Fl. & Ft.*: September-April.

Specimen examined: Chinnar, 16.01.2018, *Vishnu Mohan & Santhosh Nampy* 176543; Chinnar, way to Kuuttar, 14.02.2001, *Sheeba M.V.* 73067 (CALI).

Abutilon persicum (Burm.f.) Merr., Philipp. J. Sci. 19: 364. 1921; Sivar. & Pradeep, Malvac. Southern Peninsular India 201. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 381. 2005

Shrubs, up to 3 m tall. Stems erect, branching, pubescent on young parts, glabrous when old. Leaves simple, alternate; lamina broadly ovate, 6–18 × 5–13, acuminate at apex, serrate, cordate at base, velvetish; petioles 2–12 cm long, sparsely hairy when young, glabrous when old. Stipules linear, 1.5–2 × *c.* 1 mm, acute at apex, entire, pubescent. Flowers in axillary, solitary or racemose; peduncles up to 30 cm long, pubescent all over; pedicels erect, slender, 5–8 cm long, pubescent all over. Calyx campanulate, lobes ovate, 6–7 × 3–4 mm, acute at apex, entire, sparsely pubescent within, densely pubescent out. Petals 5, obovate, 30–40 × 15–20 mm, rounded at apex, entire, glabrous. Staminal column *c.* 3 mm long, conical; filaments 20–25 mm long, numerous,

slender, glabrous. Ovary, cylindric, densely pubescent at apex; styles glabrous; stigmas globose. Schizocarp cylindric with pointed apex.

Distribution: Native range is Indian Subcontinent to Indo-China and S. Malesia (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests; *Fl. & Ft*.: November-April.

Specimens examined: Kanthallor, Anamudishola, 25.02.2003, *Shanaz Beegum* 90132; *Ibid.*, 25.02.2003, *Thomson Mani* 90832; *Ibid.*, 25.02.2003, *Shylaja N.* 88330; *Ibid.*, 25.02.2003, *K.V. Radhika* 88631; *Ibid.*, 25.02.2003, *Dhanya A.M.* 89633; *Ibid.*, 25.02.2003, *Reena M.B.* 89032; *Ibid.*, 25.02.2003, *Smitha* 89131 (CALI); Thekkady, 27.011965, *K. Vivekananthan* 23013 (MH).

Azanza Alef.

Bot. Zeitung (Berlin) 19: 297 1861.

Azanza lampas Alef., Bot. Zeitung (Berlin) 19: 297. 1861. *Thespesia lampas* (Cav.) Dalzell & A.Gibson, Bombay Fl. 19. 1861; Hook.f., Fl. Brit. India 1: 345. 1874; Sivar. & Pradeep, Malvac. Southern Peninsular India 40. 1996; Sasidh. *et al*., Bot. Stud. Med. Pl. Kerala 18. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 430. 2005. *Hibiscus lampas* Cav., Diss. 3: 154. t.56. 1787; Gamble, Fl. Madras 98. 1915.



Erect shrubs, up to 2 m tall. Stems rigid, erect, terete, glabrous. Leaves simple, alternate, cordate at base, shallowly 3–5 lobed; lobes ovate-elliptic, acute at apex, glabrous above, pubescent beneath; petiole s slender, erect, 3–4 cm long, glabrous. Stipules very much reduced or obscure. Flowers axillary, solitary; pedicels erect, slender, 2–2.5 cm long, glabrous. Bracts subulate, 2–2.3 × *c*. 1 mm, acute-acuminate at apex,

entire, sparsely pubescent. Calyx campanulate, cupular, glabrous. Petals 5, free, obovate, 40–50 × 20–27 mm, rounded-truncate at apex, entire, hispid out, glabrous within, membranous. Staminal column *c.* 20 mm long, erect; filaments 3–4 mm long, slender, glabrous. Ovary conical, slightly angular, glabrous; styles *c.* 60 mm long, slender; stigmas 5, globose, velvitish. Capsule ellipsoid, angular.

Distribution: Native range is Tropical and Subtropical Asia (POWO, 2023); *Habitat*: Moist deciduous forests; *Fl. & Ft.*: August-December.

Specimens examined: Erattayar, 15.10.1982, *V.S. Ramachandran* 74632 (MH); Munnar, 18.11.2020, *Vishnu Mohan* 173336 (CALI).

Bombax L.

Sp. Pl.: 511 1753.

Key to the species

1. Stamens below 100……*B. ceiba*

1. Stamens above 400……*B. insigne*

Bombax ceiba L., Sp. Pl. 511. 1753, *nom. cons.*

Bombax malabaricum DC. in Prodr. 1: 479. 1824; Hook.f., Fl. Brit. India 1: 349. 1874; Gamble, Fl. Madras 99. 1915; S.K.Srivastava & K.Vivek. in P.Daniel (ed.), Fl. Kerala 1: 443. 2005.

Deciduous trees, up to 45 m tall. Branchlets woody, terete, prickly; bark grey. Leaves digitately-compound, alternate; leaflets 5–7, elliptic, 8–17 × 2–6 cm, caudate-acuminate at apex, attenuate at base, entire, glabrous; rachis 12–20 cm long, stout, pulvinate at base, glabrous; petiolule 1.4–2 cm long, stout, glabrous. Stipules lanceolate, 0.5–0.8 × 0.3–0.4 cm, acuminate at apex, entire, glabrous. Flowers solitary or 2–5 together; pedicels 1–2 cm long, stout, glabrous. Calyx campanulate, irregularly lobed, lobes ovate, 30–35 × 25–30 mm, acute at apex, entire, glabrous to sparsely puberulous outside, silky inside, falling off with petals and stamens, coriaceous. Petals 5, obovate-elliptic, 85–150 × 35–50 mm, rounded-acute at apex, recurved at margins, fleshy, tomentellous out, glabrous within. Stamens nearly 100; staminal tube

short. Ovary tomentose, 5-celled; styles exceeding the stamens; stigmas 5-fid. Capsules cylindrical. Seeds numerous, pyriform, smooth, dark brown, embedded in white cotton.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests, also in the plains; *Fl. & Ft.*: January-April.

Specimen examined: Moolamattam, 18.02.1982, *C.N. Mohanan* 73354 (MH).

Bombax insigne Wall., Pl. Asiat. Rar. 1: 74. 1830; Hook.f., Fl. Brit. India 1: 349. 1784; Gamble, Fl. Madras 100. 1915; S.K.Srivastava & K.Vivek. in P.Daniel (ed.), Fl. Kerala 1: 444. 2005.

Bombax scopulorum Dunn in Gamble, Fl. Madras 100. 1915.

Deciduous trees, up to 25 m tall. Branches whorled, branchlets prickly; bark greyish-brown, smooth. Leaves digitately compound, alternate, crowded at the tip of branchlets; leaflets 6–8; lamina obovate-oblong, 7–16 × 3–7 cm, acuminate at apex, attenuate at base, entire, glabrous; rachis 15–25 cm long, stout, pubescent, swollen at base, grooved above; petiolules 3–6 cm long, stout, pubescent. Flowers solitary, axillary; pedicels 0.8–1.6 cm long, stout, glabrous. Calyx tube irregularly lobed, campanulate; lobes 5, ovate, acute at apex, entire, glabrous out, densely silky within. Petals 5, linear-oblong, 100–120 × *c.* 25 mm, acute-rounded at apex, narrowed at base, tomentose out, glabrous within. Stamens more than 400 in 5 bundles; filaments 100–150 mm long, slender, glabrous. Ovary ovoid, tomentose; styles 120 mm long; stigmas 5-fid. Capsules 5-angled, 5-valved, glabrous. Seeds many, embedded in dense creamy silky fibres.

Distribution: The native range of this species is India to China (S. Yunnan) and Indo-China (POWO, 2023); *Habitat*: Rocky areas in evergreen, semi-evergreen and moist deciduous forests; *Fl. & Ft.*: November-April.

Specimen examined: Cheruthoni, 19.02.1982, *C.N. Mohanan* 76209 (MH).

Ceiba Mill.

Gard. Dict. Abr., ed. 4.: 287. 1754.

Ceiba pentandra (L.) Gaertn., Fruct. Sem. Pl. 2: 244. 1791; S.K.Srivastava & K.Vivek. in P.Daniel (ed.), Fl. Kerala 1: 446. 2005. *Bombax pentandrum* L., Sp. Pl. 511. 1753. *Eriodendron pentandrum* (L.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43: 113. 1874; Gamble, Fl. Madras 100. 1915.

Eriodendron anfractuosum DC., Prodr. 1: 479. 1824, *nom. superfl.*; Hook.f., Fl. Brit. India 1: 350. 1874.

Trees, up to 20 m tall. Branches woody, terete, glabrous; bark greenish-grey, peeling off; exudation red, watery, sticky. Leaves digitately compound, alternate; leaflets 5–9; lamina obovate-oblong, 4.5–14 × 2–4 cm, acute at apex and base, entire, glabrous; rachis 5–20 cm long, slender, glabrous, pulvinate; petiolules 0.3–0.8 cm long, stout, glabrous. Flowers in clusters of 3–10, axillary; pedicels 2–4 cm long, stout, glabrous. Calyx campanulate, irregularly 5-lobed; lobes ovate, glabrous out, silky pubescent within, coriaceous, persistent. Petals 5, ovate-spathulate, 25–50 × 10–15 mm, rounded at apex, entire, adnate to the base of staminal tube, tomentose out. Staminal tube divided into 5 groups. Ovary globular, tomentose at apex; styles filiform at base; stigmas capitate. Capsules ellipsoid, indehiscent. Seeds numerous, pyriform, white silky fibres.

Distribution: The native range of this species is Mexico to Tropical America (POWO, 2023); *Habitat*: Rocky areas in evergreen, semi-evergreen and moist deciduous forests; *Fl. & Ft.*: February-June.

Specimen examined: Cheruthoni, 16.02.1982, *C.N. Mohanan* 73310 (MH).

Cullenia Wight

Icon. Pl. Ind. Orient. 4: t. 1761. 1851.

Cullenia exarillata A.Robyns, Bull. Jard. Bot. Natl. Belg. 40: 249. 1970; S.K.Srivastava & K.Vivek. in P.Daniel (ed.), Fl. Kerala 1: 448. 2005. *Cullenia excelsa* Wight Icon. Pl. Ind. Orient. 5: t. 1761 1852; Hook.f., Fl. Brit. India 1: 350. 1874; Gamble, Fl. Madras 101.1915.

Evergreen trees, up to 40 m tall. Branchlets woody, terete, glabrous; bark grey, smooth. Leaves simple, alternate, distichous; lamina elliptic-oblong, 5–16 ×

2.5–6 cm, acute at apex, rounded at base, entire, shiny above, peltate scales beneath, coriaceous; petioles 1–2.5 cm long, stout, grooved above. Flowers densely clustered on tubercles; pedicels 2–3 cm long, stout, glabrous. Epicalyx tubular, 10–18 mm long, 5-lobed at apex, lepidote out, puberulus within. Calyx tube *c.* 35 mm long, 5-lobed at apex, densely lepidote out, glabrous within. Petals absent. Staminal tube 40–50 mm long, 5-lobed at apex. Ovary pentangular, densely lepidote; styles woody, with prominent scales at base; stigmas capitate. Capsules globose with acute tip, 5-valved. Seeds 2 in each locule, shining.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-November.

Specimens examined: Mankulam, 14.08.2019, *Vishnu Mohan & Santhosh Nampy* 876543 (CALI); Pachakkanam, 20.11.1974, *K. Vivekananthan* 45368 (MH).

Herissantia Medik.

Philos. Bot. 1: 90 1789.

Herissantia crispa (L.) Brizicky, J. Arnold Arbor. 49: 279 1968; T.K.Paul in B.D.Sharma & Sanjappa, Fl. India 3: 276. 1993; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 383. 2005. *Sida crispa* L., Sp. Pl. 685. 1753. *Abutilon crispum* (L.) Medik., Malv. 29. 1787; Hook.f., Fl. Brit. India 1: 327. 1874; Gamble, Fl. Madras 91. 1915.

Prostrate perennial herbs, up to 50 cm tall. Stems slender, terete, pubescent, stiff. Leaves simple, alternate; lamina cordate-orbicular, 3.5–5.5 × 3.5–4 cm, acuminate at apex, deeply cordate at base, crenate, densely stellate hairy; petioles 2–3 cm long, narrow, slender, hispid. Stipules linear-lanceolate, 0.1–0.27 × 0.4–0.5 cm, acuminate at apex, entire at margins, pubescent. Flowers axillary, solitary, non-fragrant; pedicels jointed above half, 2–3 cm long, hispid. Calyx companulate, 5 lobed; lobes acuminate-triangular, 3–3.4 × *c.* 2 mm, acute at apex, entire, pubescent with small simple hairs out, glabrous within. Petals 5, free, obovate-orbicular, 8–9 × 8–10 mm, rounded at apex, clawded at base, entire, glabrous. Stamens numerous; filaments *c.* 0.5 mm

long, narrow, erect, slender. Ovary obovate, sparsely pubescent; styles *c.* 3 mm long, glabrous; stigmas discoid, sticky. Schizocarp globose, winged, drooping.

Distribution: Native range is Tropical & Subtropical America (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: May-February.

Specimens examined: Chinnar, 19.05.1999, *P. Prashy* 79484; *Ibid.*, 18.02.1998, *Vishnu Mohan* 60917; *Ibid.*, 18.02.1998, *Lincy Antony T.* 59794; *Ibid.*, 17.02.1998, *Sumitha M.R.* 59888; *Ibid.*, 19.05.1999, *Sindhu C.* 78265 (CALI).

Hibiscus L.

Sp. Pl. 2: 693. 1753, *nom. cons.*

Key to the species

1. Calyx lobes with nectaries……..……2
1. Calyx lobes without nectaries……..……3
2. Plant rambling undershrubs……..……*H. hispidissimus*
2. Plant erect herbs……*H. sabdariffa*
3. Seeds silky hairy……..……..……..……*H. micranthus*
3. Seeds glabrous……..……..4
4. Plant herbs ……*H. lobatus*
4. Plant shrubs-sub-shrubs……..……*H. lunariifolius*

Hibiscus hispidissimus Griff., Not. Pl. Asiat. 4: 521 1854; Sivar. & Pradeep, Malvac. Southern Peninsular India 106. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 413. 2005.

Rambling or climbing shrubs. Stems, petioles and pedicels armed with recurved prickles, often intermingled with dense stellate indumentum. Leaves, simple, alternate; lamina 3–5-angled, *c.* 8 × 3–6 cm, acuminate at apex, truncate at base, serrate; petioles 4–7 cm long, hispid; stipules lanceolate, *c.* 7 × 3 mm, acuminate at apex, ciliate. Flowers axillary, solitary; pedicels 2–5 cm long, prickly. Involucral bracts bifurcate, 15 × *c.* 3 mm, spathulate, entire, hispid above. Calyx tube *c.* 10 mm long; lobes 5, lanceolate, *c.* 10 × 4 mm, acuminate at apex, entire. Petals 5, obovate, 45–50 × 30–40 mm, rounded at apex, entire, glabrous. Staminal column 15–20 mm long; filaments *c.* 3 mm long. Ovary ovoid, densely appressed hairy; stigmas 5, capitate.

Capsules ovoid, bristly hairy. Seeds 3-gonous, dark brown.

Distribution: The native range of this species is Indian Subcontinent to China (Yunnan) and Indo-China (POWO, 2023); *Habitat*: Dry and moist deciduous forests, also in the plains; *Fl. & Ft.*: September-March.

Specimens examined: Chinnar, 14.02.2001, *Priya P.D.* 51703; Meenmutty, 13.12.1982, *C.N. Mohanan* 76045; Thekkady, 17.03.1973, *B.D. Sharma* 43908 (MH).

Hibiscus lobatus (Murray) Kuntze, Revis. Gen. Pl. 3(2): 19. 1898. *Hibiscus solandra* L'Hér., Stirp. Nov. 103. 1789, *nom. superfl.*; Hook.f., Fl. Brit. India 1: 336. 1874; Gamble, Fl. Madras 1: 98. 1915; Sivar. & Pradeep, Malvac. Southern Peninsular India 125. 1996; M.Mohanan & A.V.N.Rao in P. Daniel (ed.), Fl. Kerala 1: 414. 2005.



Annual erect herbs, up to 1.5 m tall. Stems erect, branching, densely pubescent. Leaves simple, alternate; lamina lobed or unlobed; lobes ovate-lanceolate 2.5–5.5 × 0.6–1.5 cm, densely softly tomentose below, sparsely pubescent above. Stipules filiform, 3–4 × 0.7–1 mm, acuminate at apex, entire, sparsely pubescent. Flowers in subterminal and terminal panicles, non-fragrant; pedicels 5–6 cm long, glabrous. Bracts ovate, 3–3.4 × *c.* 2 mm, acute at apex, entire, pubescent. Sepals ovate, connate at base into a short campanulate tube; lobes 5, ovate-lanceolate, 8–9 × 2–3 mm, acuminate at apex, entire, pubescent out, glabrescent within. Petals 5, free, obovate-orbicular, 20–25 × *c.* 9 mm, rounded at apex, entire, glabrous, white. Stamens many; staminal column *c.* 15 mm long; filaments *c.* 4 mm long, erect, slender. Ovary 7-celled, glandular hairy; styles as many as the carpels; stigmas terminal. Capsules ovoid, truncate at apex.

Distribution: Native range is Tropical Africa to Botswana, Madagascar, Indian Subcontinent to Hainan and Peninsula Malaysia (POWO, 2023); *Habitat*: Moist and dry deciduous forests; *Fl. & Ft.*: July-January.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175936; *Ibid.*, 14.02.2001, *Priya P.D.* 51703; *Ibid.*, 14.02.2001, *Sheeba M.V.* 73073 (CALI).

Hibiscus lunariifolius Willd., Sp. Pl., ed. 4. 3: 811. 1800; Hook.f., Fl. Brit. India 1: 338. 1874; Gamble, Fl. Madras 1: 98. 1915; Sivar. & Pradeep, Malvac. Southern Peninsular India 138. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 415. 2005.



Erect undershrubs, up to 5 m tall. Stems green, terete, densely clothed with soft stiff hairs. Leaves simple, alternate; lamina orbicular, shallowly 5-lobed, 3.5–7 × 3.5–7 cm, acuminate at apex, cordate at base, dentate, pubescent with soft simple and stellate hairs; petioles 3–10 cm long, erect, narrow, slender, densely clothed with soft stiff hairs. Stipules subulate, 5–7 × *c.* 1 mm, acute at apex, entire, pubescent. Flowers axillary, solitary; pedicels 0.5–1 cm, stout, densely clothed with soft stiff hairs. Bracts linear-lanceolate, *c.* 10 × *c.* 3 mm, acuminate at apex, entire, densely clothed with soft stiff hairs. Calyx companulate, 5-lobed; lobes lanceolate, acute at apex, entire, densely clothed with soft stiff hairs out, glabrous inside. Petals 5, obovate, 5–6 × 2.5–3 mm, rounded at apex, attenuate at base, entire, glabrous. Staminal column *c.* 15 mm long; filaments 4 mm long, erect, slender. O vary sub-globose, 5-celled; styles *c.* 2 mm long; stigmas 5, densely pubescent. Capsules sub-globose, apically beaked.

Distribution: Native range is S. India and Sri Lanka (POWO, 2023); *Habitat*: Dry and moist deciduous forests; *Fl. & Ft.*: October-February.

Specimens examined: way to Kanthallor, 25.02.2003, *Thomson Mani* 90851; Karimutty, 09.02.2021, *Vishnu Mohan* & *Santhosh Nampy* 188786; Kanthallor, 25.02.2003, *Nishakumari P.* 88863; *Ibid.*, 25.02.2003, *Reena M.B.* 89051; *Ibid.*, 25.02.2003, *Radhika K.V.* 88649; *Ibid.*, 25.02.2003, *Shylaja N.* 88362; *Ibid.*, 25.02.2003, *Shahanavaz Beegum A.* 90158; *Ibid.*, 25.02.2003, *Ligimol* 89863; *Ibid.*, 25.02.2003, *Nishitha I.K.* 90461 (CALI); *ibid.*, 25.02.2003, *Divya* 90557 (CALI); Kumily, 24.12.1974, *K. Vivekananthan* 45683 (MH);.

Hibiscus micranthus L.f., Suppl. Pl. 308. 1782; Hook.f., Fl. Brit. India 1: 335. 1874; Gamble, Fl. Madras 1: 97. 1915; Sivar. & Pradeep, Malvac. Southern Peninsular India 97. 1996.



Erect shrubs, up to 2 m tall. Stems slender, terete, green, clothed with stellate hairs. Leaves simple, alternate; lamina ovate, 2–2 .5 × 1.5–2 cm, acute at apex, rounded at base, serrate at margins, sparsely stellate hairy; petioles 5–8 mm long, densely clothed with stellate hairs. Stipules linear, 6–7 × 1–1.5 mm long, acuminate at apex, entire, sparsely stellate hairy. Flowers solitary, axillary; pedicels *c.* 0.5 cm long, narrow, erect, slender, sparsely stellate. Bracts linear, 2–3 × 0.5–1 mm, acuminate at apex, entire, sparsely pubescent. Calyx campanulate; lobes 5, 3–5 × 2–2.3 mm, acute at apex, entire, sparsely stellate hairy out, glabrous inside. Petals 5, obovate, 8–10 × 3–4 mm, rounded at apex, entire, glabrous, white. Staminal column curved, *c.* 4 mm long. Ovary sub-globose, minutely hairy; stigmas capitate, 5. Capsules oblong, minutely strigose.

Distribution: Native range is Africa to Arabian Peninsula, S. Iran to Myanmar (POWO, 2023); *Habitat*: Scrub jungles; *Fl. & Ft.*: December-May.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan* & *Santhosh Nampy* 175946; *Ibid.*, 14.02.2001, *Sheeba M.V.* 73070; *Ibid.*, 14.02.2001,

Sonia K. 72673; *Ibid.*, 14.02.2001, *Priya P.D.* 73885; *Ibid.*, 14.02.2001, *Prajeesha P.* 72959; *Ibid.*, 14.02.2001, *Priya B.S.* 72447 *Ibid.*, 19.05.1999, *Prashy P.* 79472; *Ibid.*, 19.05.1999, *Sindhu C.* 78249; *Ibid.*, 19.05.1999, *Satheesh George* 79247; *Ibid.*, 18.05.1999, *Thushar K.V.* 79321; *Ibid.*, 18.02.1998; *Sujana K.S.* 60140; *Ibid.*, 18.02.1998, *Lincy Antony T.* 59791 (CALI).

Hibiscus sabdariffa L. Sp. Pl. 2: 695. 1753, *nom. cons.*; Gamble, Fl. Madras 99. 1915; Sivar. & Pradeep, Malvac. Southern Peninsular India 114. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 421. 2005.



Erect shrubs, up to 2 m tall. Stems glabrous or sparsely pubescent, green or reddish purple. Leaves simple, 3–4-lobed; lobes lanceolate, 6–8 × 1.5–2 cm, acuminate at apex, serrate, glabrous; petioles 2–8 cm long, reddish purple, glabrous. Stipules linear-subulate, 15–20 × 2–3 mm long, acuminate at apex, entire, sparsely hairy. Flowers axillary, solitary or in racemose panicles by reduction of upper leaves; pedicels *c.* 1.5 cm long, stout, glabrous. Bracts subulate, 15–20 × 5–8 mm long, acuminate at a pex, entire, sparsely hairy. Epicalyx lobes 12, adnate to the base of calyx, lanceolate, 8–10 × 1.6–2 mm, sparsely hairy out, glabrous within, persistent. Calyx campanulate; lobes 5, ovate-lanceolate, 9–10 × 3–4 mm, acute at apex, entire. Petals orbicular, 5–6 × *c.* 3 cm, rounded at apex, entire, glabrous, membranous. Staminal column *c.* 15 mm long. Ovary ovoid, appressed-hairy; stigmas glabrous. Capsules ovoid, densely strigose.

Distribution: Native range is W. Tropical Africa to Sudan (POWO, 2023); *Habitat*: Grown as vegetable, but now naturalised; *Fl. & Ft.*: December-February.

Specimen examined: Meenuliyanpara, 29.11.2019, *Vishnu Mohan* & *Santhosh Nampy* 164615 (CALI).

Pavonia Cav.

Diss. 2, Secunda Diss. Bot. App. 2. 1786.

Key to the species

1. Epicalyx lobes 5, shortly connate at base……*P. burchellii*

1. Epicalyx lobes 8−14, free…….. *P. zeylanica*

Pavonia burchellii (DC.) R.A.Dyer, Bull. Misc. Inform. Kew 1932: 152. 1932; Sivar. & Pradeep, Malvac. Southern Peninsular India 176. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 436. 2005. *Althaea burchellii* DC., Prodr. 1: 438. 1824.

Perennial erect herbs, up to 50 cm tall. Stems branched, erect, terete, sparsely hirsute. Leaves simple, alternate; lamina ovate-orbicular, shallowly 5-lobed, 2–3.5 × 2–3.5 cm, acute at apex, cordate at base, crenate, sparsely hairy; petioles 2–4 cm long, erect, slender, narrow, pubescent. Stipules linear, 2–4 × *c.* 1 mm, acute at apex, entire, pubescent. Flowers axillary, solitary, non-fragrant; pedicels 4–5 cm long, erect, pubescent. Bracts ovate, connate at base, 5–5.8 × 4–5 mm, acute at apex, entire, pubescent. Calyx campanulate, 5-lobed; lobes ovate, 6–6.7 × 3–4 mm, acute at apex, pubescent; Epicalyx lobes 5, shortly connate at base. Petals 5, free, orbicular-obovate, 1.5–2 × 0.5–0.7 cm, rounded at apex, entire, glabrous, membranous. Staminal column *c.* 3 mm long, glabrous; filaments *c.* 3 mm long, glabrous, slender, thin. Ovary pentamerous; styles *c.* 2 mm long, slender; stigmas capitate. Schizocarp compressed.

Distribution: Native range is Egypt to S. Africa (POWO, 2023); *Habitat*: Scrub jungles and dry deciduous forests; *Fl. & Ft.*: August-May.

Specimens examined: Chinnar, 19.05.1999, *Satheesh George* 79271; *Ibid.*, 19.05.1999, *Lisha K.* 78681; *Ibid.*, 19.05.1999, *Prashy P.* 79492 (CALI).

Pavonia zeylanica (L.) Cav., Diss. 3: 134. 1787; Hook.f., Fl. Brit. India 1: 331. 1874; Gamble, Fl. Madras 93. 1915; Sivar. & Pradeep, Malvac. Southern Peninsular India 173. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 438. 2005.

Viscid sub-shrubs, up to 1 m tall. Stems erect, terete, stellate hairy. Leaves simple, alternate; lamina orbicular, shallowly 3-lobed, cordate at base; lobes obovate, acute at apex, crenate, simple hairy above, stellate hairy beneath; petioles 2–5 cm long, pubescent, erect, slender, narrow. Stipules filiform, 4–5 × 1–1.5 mm, acute at apex, entire, sparsely pubescent. Flowers solitary, non-fragrant, axillary; pedicels 2–4 cm long, slender, pubescent. Bracts linear, 5–6 × 1.7–2 mm, acute at apex, entire, pubescent. Calyx campanulate; lobes ovate-orbicular, 2–2.5 × *c.* 1 mm, acute at apex, entire, pubescent out, glabrous within; Epicalyx lobes 8−14, free. Petals 5, free, obovate, 5–7 × 6–8 mm, rounded at apex, entire, glabrous, membranous. Staminal column 6–7 mm long, erect, white, stout; filaments 2–3 mm long, slender, glabrous. Ovary depressed globose, glabrous; styles *c.* 10 mm long, glabrous; stigmas capitate, sticky. Schizocarps sub-globose.



Distribution: Native range is Indian Subcontinent to W. Indo-China (POWO, 2023); *Habitat*: Sandy rock region of scrub jungles; *Fl. & Ft.*: June-February.

Specimens examined: Chinnar, 19.05.1999, *Prashy P.* 79455; *Ibid.*, 19.02.1998, *Lincy Antoney* 59792; *Ibid.*, 14.02.2001, *Sheeba M.V.* 73059; *Ibid.*, 19.05.1999, *Satheesh George* 79270; *Ibid.*, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175954; *Ibid.*, 14.02.2001, *Prajeesha P.* 72958; *Ibid.*, 14.02.2001, *Nazeedha M.K.* 73662 (CALI).

Sida L.

Sp. Pl. 2: 683. 1753.

Key to the species

1. Leaves broadly ovate, basally cordate, margins dentate throughout……2

1. Leaves elliptic, rhomboid, basally truncate, margins basally entire……4

2. Styles and mericarps 5 ……..……..3

2. Styles and mericarps 7 ……..……...*S. cordifolia*

3. Plants erect……..……*S. mysorensis*

3. Plants prostrate……..……..*S. cordata*

4. Leaves and branching pattern distichous……..……*S. acuta*

4. Leaves and branching pattern alternate……..……5

5. Staminal column glabrous……..……..*S. rhombifolia*

5. Staminal column glandular hairy……..……*S. scabrida*

Sida acuta Burm.f., Fl. Ind. 147. 1768; Gamble, Fl. Madras 90. 1915; Sivar. & Pradeep, Malvac. Southern Peninsular India 238. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 387. 2005.

Sida carpinifolia sensu Mast. in Hook.f., Fl. Brit. India 1: 323. 1874 p.p. non L.f. 1781.

Erect sub-shrubs, up to 1 m tall. Stems terete, green, stellate hairy, smooth.



Leaves simple, alternate, leaves and branching pattern distichous; lamina ovate_elliptic, 1.5–5 × 0.5–1.5 cm, acute at apex, attenuate at base, serrate, glabrous, coriaceous; petioles 0.3–0.5 cm long, erect, sparsely hairy. Flowers solitary, axillary, or paired in the leaf axils; pedicels 0.3–0.4 cm, erect, terete, slender, sparsely hairy. Calyx campanulate; lobes ovate, 5–6 × 2.5–3 mm, acute at apex, entire, sparsely hairy out, glabrous inside. Petals 5, free, obovate, 8–10 × 5–6 mm, rounded-truncate at apex, entire, gl abrous. Staminal column *c.* 2.5 mm, long, glabrous; filaments *c.* 1 mm long, slender, erect. Ovary ovoid, sparsely hairy towards apex; stigmas globose, sticky. Schizocarps trigonous, glabrous.

Distribution: Native range is Tropics and Subtropics (POWO, 2023); *Habitat*: Dry and moist deciduous forests, also in the plains; *Fl. & Ft.*: August-January.

Specimens examined: way to Mannavan shola, 08.01.2004, *Rakendhu K.S.* 97148; *Ibid.*, 08.01.2004, *Sairabhanu N.K.* 97046; way to Marayoor, 08.01.2004, *Reji P.* 96349; Neriyamangalam, 17.11.2020, *Vishnu Mohan & Santhosh Nampy* 173304 (CALI).

Sida cordata (Burm.f.) Borss.Waalk., Blumea 14: 182. 1966; Sivar. & Pradeep, Malvac. Southern Peninsular India 266. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 389. 2005. *Melochia cordata* Burm.f. in Fl. Indica: 143 1768;

Sida veronicifolia Lam., Encycl. 1: 5. 1783; Gamble, Fl. Madras 89. 1915.

Sida humilis var. *veronicifolia* (Lam.) Mast., Hook.f., Fl. Brit. India 1: 322. 1874, *nom. illeg.*

Prostrate herbs, up to 50 cm tall. Branches slender, stellate hairy. Leaves simple, alternate; lamina broadly ovate-orbicular, 2–5 × 1.5–4.5 cm, acute at apex, cordate at base, serrate-crenate; petioles 3–3.5 cm long, slender, glabrous. Stipules linear, 1–2 × *c.* 1 mm, acuminate at apex, entire, glabrous. Flowers axillary, solitary; pedicels 1–2 cm long, filiform, slender, glabrous. Calyx campanulate, 10–20 mm long; lobes 5, triangular 3–4 × *c.* 2 mm, acute at apex, entire, stellate-tomentose out, glabrous within. Petals 5, obovate, 5–6 × 4.5–5 mm, rounded at apex, entire, glabrous, yellow. Staminal column *c.* 2 mm long. Ovary sub-globose; styles 5; stigmas 5, globose. Schizocarp trigonous. Seeds reniform, brownish-black.

Distribution: The native range of this species is Socotra, Tropical and Subtropical Asia (POWO, 2023); *Habitat*: All types of habitats from sandy sea coasts to deciduous forests; *Fl. & Ft.*: September-April.

Specimen examined: PTR, 18.09.1993, *Jomy Augustine* 12421 (KFRI).

Sida cordifolia L., Sp. Pl. 684. 1753; Hook.f., Fl. Brit. India 1: 324. 1874; Gamble, Fl. Madras 1: 89. 1915; Sivar. & Pradeep, Malvac. Southern Peninsular India 256. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 390. 2005.

Erect branched sub-shrubs, up to 1.5 m tall. Stems green, tomentose with minute stellate and spreading simple hairs. Leaves simple, alternate; lamina ovate-elliptic, 2.5–5 × 2–3.5 cm, acute-acuminate at apex, cordate at base, serrate, densely stellate-tomentose beneath with simple hairs on nerves and soft tomentose above; petioles 2–3.5 cm long, pubescent. Stipules linear, 1.5–2 × *c*. 0.5 cm, acute at apex, entire, stellate hairy. Flowers solitary, axillary, non-fragrant; pedicels erect, terete, 0.3–2 cm long, densely pubescent, smooth. Calyx campanulate; lobes 5, ovate, 6–7 × 3–4 mm, acute at apex, entire, pubescent. Petals 5, free, obovate-orbicular, 8–9 × 6–6.5 mm, truncate at apex, entire, glabrous. Staminal column *c.* 3 mm long, glabrous; filaments *c.* 4 mm long, slender, glabrous. Ovary sub-globose, pubescent; styles 7, *c.* 10 mm long, glabrous, slender; stigmas capitate, sticky, yellow. Schizocarp pubescent towards apex.

Distribution: The native range of this species is Paleotropics (POWO, 2023); *Habitat*: Common along roadsides, sandy sea coasts and wastelands; *Fl. & Ft.*: Throughout the year.

Specimens examined: Chinnar, 14.02.2001, *Prajeesha P.* 72975; *Ibid.*, 14,02.2001, *Sheeba M.V.* 73055; Churulipetty, 19.05.1999, *Satheesh George,* 79275; *Ibid.*, 19.05.1999, *Thushar K.V.* 79380 (CALI); PTR, 12.07.1993, *Jomy Augustine* 12006 (KFRI).

Sida mysorensis Wight & Arn., Prodr. Fl. Ind. Orient. 1: 59. 1834; Hook.f., Fl. Brit. India 1: 322. 1874; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 392. 2005.

Sida glutinosa Roxb. in Fl. Ind., ed. 1832. 3: 172. 1832, *nom. illeg.*; Gamble, Fl. Madras 89. 1915.

Erect sub-shrubs, up to 80 cm tall. Stems terete, viscid, gland-tipped and simple patent hairy. Leaves simple, alternate, broadly ovate, 3–5 × 2–3.5 cm,

acute at apex, cordate at base, serrate-crenate, stellate and simple hairs intermingled with glandular hairs on both surfaces; petioles 2–3 cm long, slender. Stipules linear, *c.* 5 × 3 mm, acuminate at apex, entire, pubescent. Flowers axillary, solitary; pedicels 0.5–0.7 cm long, filiform, jointed above middle. Calyx campanulate, divided to the middle; lobes 5, triangular, stellate and simple hairy on both sides. Petals obovate, 5–6 × *c.* 3 mm, retuse at apex, entire, glabrous. Staminal column 3–5 mm long. Ovary sub-globose; styles *c.* 5 mm long, slender, glabrous; stigmas 5-lobed. Schizocarp trigonous. Seeds reniform, brownish-black.

Distribution: The native range of this species is Tropical and Subtropical Asia (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests; *Fl. & Ft.*: October-February.

Specimen examined: Chinnar, 12.01.1995, *K.K. Sajeev* 11800 (KFRI).

Sida rhombifolia L., Sp. Pl. 684. 1753; Hook.f., Fl. Brit. India 1: 323. 1874; Gamble, Fl. Madras 90. 1915; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 394. 2005.

Shrubs, up to 50 cm tall. Branchlets terete, stellate pubescent. Leaves simple, alternate; lamina rhomboid, 2.5–6 × 1.5–3.5 cm, acute at apex, obtuse at base, serrate, tomentose below, glabrous above; petioles 0.5–1 cm, pubescent. Stipules linear, 8–10 × *c.* 4 mm, acuminate at apex, entire. Flowers axillary, solitary or in clusters; pedicels *c.* 0.6 cm long, tomentose. Calyx campanulate; lobes triangular, *c.* 3 × 2 mm, acute at apex, entire, tomentose out, glabrous within. Petals 5, obovate, 8–9 × *c.* 5 mm, rounded at apex, entire, glabrous. Staminal column *c.* 3 mm long, glabrous; filaments *c.* 4 mm long, slender, glabrous. Ovary sub-globose, pubescent; styles *c.* 10–12 mm long, glabrous; stigmas capitate, sticky.



Distribution: The native range of this species is Tropical and Subtropical Old World (POWO, 2023); *Habitat*: Wastelands; *Fl. & Ft.*: Throughout the year.

Specimens examined: Chinnar, 29.02.1992, *Sasidharan* 17222 (KFRI); Pooyamkutty, 14.12.1988, *P. Bhargavan* 89902 (MH).

Sida scabrida Wight & Arn., Prodr. 57. 1834; Sivar. & Pradeep, Malvac. Southern Peninsular India 250. 1996; M.Mohanan & A.V.N. Rao in P.Daniel, (ed.), Fl. Kerala 1: 395. 2005.

Erect branched sub-shrubs, up to 2 m tall. Stems terete, green clothed with stellate hairs. Leaves simple, alternate; lamina ovate-elliptic, 4–6 × 1–1.7 cm, acute at apex, attenuate at base, serrate, glabrous, coriaceous; petioles 0.8–0.9 cm long, terete, slender, sparsely hairy. Stipules subulate, 5–6 × *c.* 1 mm, acuminate at apex, entire, sparsely hairy. Flowers solitary, axillary, non-fragrant; pedicels *c.* 10 mm long, slender, narrow, glabrous. Calyx campanulate; lobes 5, ovate-orbicular, 4–5 × 4–4.5 mm, acute at apex, entire, glabrous. Petals 5, free, elliptic-obovate, 8–10 × 8–12 mm, rounded-truncate at apex, entire, glabrous, membranous. Staminal column *c.* 3 mm long, stellate hairy, erect; filaments *c.* 4 mm long, glabrous, slender. Ovary ovoid, sparsely pubescent; styles *c.* 11 mm long, slender, glabrous; stigmas globose, sticky. Schizocarps globose.

Distribution: Native range is W. Tropical Africa and Indian Subcontinent (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and moist deciduous forests; *Fl. & Ft.*: September-February.

Specimens examined: Munnar, 12.02.2001, *Priya P.D.* 73846; *Ibid.*, 12.02.2001, *Prajeesha P.* 72913 (CALI).

Urena L.,

Genera Plantarum ed. 5. 1754.

Urena lobata L., Sp. Pl. 692. 1753; Hook.f., Fl. Brit. India 1: 329. 1874; Gamble, Fl. Madras 1: 92. 1915; Sivar. & Pradeep, Malvac. Southern Peninsular India 180. 1996; M.Mohanan & A.V.N.Rao in P.Daniel (ed.), Fl. Kerala 1: 440. 2005.



Erect branched sub-shrubs, up to 2 m tall. Stems densely stellate-pubescent, erect, branched. Leaves simple alternate, lobed, broadly to narrowly ovate, 2–4.5 × 2–6 cm, acute at apex, truncate-cordate at base, obscurely crenate-serrate, sparsely stellate-pubescent above, densely stellate-pubescent below; petioles 1.5–8 cm long, narrow, slender, stellate-pubescent. Stipules linear 4–6 × 1–2 mm, acute at apex, entire pubescent. Flowers axillary, solitary, sometimes 2 or 3 in a cluster, non-fragrant; pedicels 0.3–0.5 cm long, sparsely pubescent. Bracts 5, spathulate, connate at base, 5–5.5 × 1.5–2 mm, clothed with rigid hairs. Calyx campanulate, 5-lobed; lobes ovate-elliptic, entire, pubescent. Petals 5, free, obovate, 10–11 × 5–6 mm, rounded at apex, entire, stellate-hairy out, glabrous within. Staminal column 8–10 mm long; filaments *c.* 1 mm long, stout. Ovary sub-globose, hirsute; styles *c.* 12 mm long, slender, glabrous; stigmas capitate, sticky. Schizocarp globose.

Distribution: Native range is Tropics and Subtropics (POWO, 2023); *Habitat*: Degraded forests, also in the plains; *Fl. & Ft.*: July-February.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan* & *Santhosh Nampy* 188719; Anamudishola, 24.02.2003, *Nisha Kumari P.* 88860; Kanthallor, 25.02.2003, *Reena M.B.* 89074; *Ibid.*, 25.02.2003, *Smitha* 89153; *Ibid.*, 25.02.2003, *K.V. Radhika* 88660; *Ibid.*, 25.02.2003, *Reesha Karally* 89461; *Ibid.*, 25.02.2003, *Ligimol* 89864; *Ibid.*, 25.02.2003, *Shahanaz Beegum A.* 90160; *Ibid.*, 25.02.2003, *Reji P.* 96313; *Ibid.*, 08.01.2003, *Swapna Thomas* 97412; *Ibid.*, 08.01.2004, *Haseena K.* 97312; *Ibid.*, 08.01.2004, *Sulu Meeran* 94212; *Ibid.*, 08.01.2004, *Rakendhu K.C.* 97113; *Ibid.*, 08.01.2004, *Sairabhanu N.K.* 97013; *Ibid.*, 08.01.2004, *Sareena K.* 96812; *Ibid.*, 08.01.2004, *Amritha M.* 96914; *ibid.*, 08.01.2004,

Mini V. 97212; *Ibid.*, 08.01.2004, *Sajeena L.R.* 96412; *Ibid.*, 08.01.2004, *Jayatha Jayapalan* 96612 (CALI).

STERCULIACEAE Vent.

Parad. Lond. 2: ad t. 69. 1807, *nom. cons.*

Annual or perennial herbs, shrubs. Leaves simple, alternate, sessile-petiolate, usually stipulate, unlobed to deeply and often palmately divided. Flowers regular, hermaphrodite or rarely unisexual, solitary or in cymose inflorescences; epicalyx bracts often present. Sepals (3–) 5, sometimes united at base, valvate. Petals 5, free but often adnate to the base of the staminal tube, imbricate. Stamens 5–numerous, the filaments joined into a tube for most of their length. Ovary superior with (1–) 5–many locules with as many or twice as many styles-branches as carpels; styles-branches partly free or almost completely to completely connate. Fruits mostly loculicidal capsules or schizocarp, less often indehiscent berries or samaras.

The family includes 242 genera (POWO, 2023); 10 genera and 15 species in the study area.

Key to the genera

1. Flowers unisexual and bisexual; petals absent……2
1. Flowers only bisexual; petals present……..……..3
2. Leaves with peltate scales beneath; fruits indehiscent……..……..*Heritiera*
2. Leaves without peltate scales; fruits dehiscent ……..……4
3. Staminal tube adnate to gynophore forming a long stalk…..……5
3. Staminal tube distinct from carpels and enclosing them, sessile……..……..6
4. Follicles membranous, dehiscing before maturity……..*Firmiana*
4. Follicles woody or coriaceous, not dehiscing before maturity……....*Sterculia*
5. Fruits follicles; spirally twisted; seeds not winged……..*Helictres*
5. Fruits loculicidal capsules, not twisted; seeds winged…..……*Pterospermum*
6. Staminodes absent……....7
6. Staminodes 5 or 10……9
7. Petals caducous; staminal tube not toothed……*Eriolaena*
7. Petals marcescent; staminal tube with 5 teeth……..……8
8. Ovary 5-loculed; capsules 5-valved……..……..……*Melochia*

8. Ovary 1-loculed; capsules 2-valved……*Waltheria*

9. Petals caducous……..……*Leptonychia*

9. Petals persistent……..…*Melhania*

Eriolaena DC.

Mém. Mus. Hist. Nat. 10: 102. 1823.

Eriolaena quinquelocularis (Wight & Arn.) Drury, Handb. Ind. Fl. 1: 99. 1864; Hook.f., Fl. Brit. India 1: 371. 1874; Gamble, Fl. Madras 1: 110. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 453. 2005. *Microchlaena quinquelocularis* Wight & Arn. in Prodr. Fl. Ind. Orient. 1: 71 1834.

Trees, up to 10 m tall. Branchlets woody, terete, tomentose; bark brownish grey. Leaves simple, alternate; lamina broadly ovate-orbicular, 9–11 × 9–10 cm, acute-acuminate at apex, cordate at base, serrate, densely pubescent below, glabrous below; petioles 4–6 cm long, slender, pubescent, pulvinate. Flowers in terminal or axillary cymes; peduncles 3–5 cm long, slender, pubescent. Bracts ovate, 6–8 × *c.* 3 mm, acute at apex, entire. Calyx campanulate; lobes 5, ovate-lanceolate, 30–40 × 15–20 mm long, acuminate at apex, entire, stellate-tomentose out, simple-tomentose within. Petals obovate, 25–30 × 10–15 mm, rounded at apex, entire, tomentose out, glabrous within. Staminal column *c.* 15 mm long, stamens numerous. Ovary 5-celled, stellate-hairy; styles 5-fid at apex; stigmas globose. sticky. Capsules ellipsoid. Seeds many, winged.

Distribution: The native range of this species is India to China (S. Yunnan). (POWO, 2023); *Habitat*: Grasslands; *Fl & ft*: July-March.

Specimen examined: Kumarikulam, 12.03.1995, *Jomy Augustine* 14852 (KFRI).

Firmiana Marsili

Saggi Sci. Lett. Accad. Padova 1. 1786.

Firmiana colorata (Roxb.) R.Br., Pterocymbium 235. 1844; Gamble, Fl. Madras 1: 107. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 454. 2005. *Sterculia colorata* Roxb., Pl. Coromandel 1: 26. 1795; Hook.f., Fl. Brit. India 1: 359. 1874.

Sterculia rubicunda Wall. ex Mast. in Hook.f, Fl. Brit. India 1: 360. 1874.

Deciduous trees, up to 10 m tall. Stems woody, terete; bark grey-black, rough, longitudinally fissured. Leaves simple, alternate; lamina palmately 3–5-lobed; lamina 10–30 × 8–25 cm, cordate at base, lobes oblong, acuminate at apex, entire, glabrous; petioles *c.* 10 cm long, slender, pubescent, pulvinate. Stipules free, ovate, 0.4–0.5 × 0.2–0.4 cm, acute at apex, entire, deciduous. Flowers in terminal panicled racemes, non-fragrant; peduncles 2–4 cm, clothed with orange-red tomentum; pedicels *c.* 2 cm, clothed with orange-red tomentum. Calyx tube, *c.* 20 mm long; lobes 5, ovate, *c.* 3 × 2 mm, acuminate at apex, entire, covered with stellate tomentum. Petals absent. Gynandrophore slender, *c.* 30 mm long, erect. Carpels 5, glabrous; styles short, recurved; stigmas acute. Fruit an aggregate of 5 follicles.

Distribution: Native range is Indian Subcontinent to China (S. Yunnan) and Sumatera (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests; *Fl & ft*: December-June.

Specimen examined: Sabarimala, 16.12.1995, *Jomy Augustine* 17706 (CALI).

Helicteres L.

Sp. Pl. 2: 963. 1753.

Helicteres isora L., Sp. Pl. 963. 1753; Hook.f., Fl. Brit. India 1: 365. 1874; Gamble, Fl. Madras 1: 107. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 456. 2005.



Erect large branching shrubs. Stems woody, terete; bark pale greyish. Leaves simple, alternate; lamina obovate to sub-orbicular, 3.5–12 × 2.2–8.5 cm, acuminate at apex, cordate at base, irregularly crenate- serrate, scabrous above and stellate tomentose below; petioles *c.* 1 cm long, hirsute. Flowers in axillary few-flowered cymes, non-fragrant; pedicels 0.3–0.6 cm long, terete,

golden-brown pubescent. Bracts linear, *c.* 3 × 1.5 mm, with glands in the axil of bracts. Calyx tubular, 2-lipped, *c.* 15 mm long , golden brown tomentose out, persistent. Petals 5, unequal, obovate, 20–25 × 5–8 mm, rounded at apex, entire, glabrous, crimson coloured. Staminal column *c.* 3 cm long, cylindric, glabrous; stamens 10. Ovary at the tip of gynophore; styles 5; stigmas subulate. Follicles 5, spirally twisted, stellate-tomentose, beaked.

Distribution: Native range is China (S. Yunnan) to Tropical Asia (POWO, 2023); *Habitat*: Deciduous forests, also in plantations and plains; *Fl. & Ft.*: November-March.

Specimens examined: Meenmutty, 15.02.1982, *C.N. Mohanan* 73280 (MH); Neriyamangalam, 02.11.2021, *Vishnu Mohan* & *Santhosh Nampy* 185632 (CALI); Panamkutty, 27.12.1983, *A.G. Pandurangan* 62559; Pooyamkutty, 13.12.1988, *P. Bhargavan* 87500 (MH).

Heritiera Aiton

Hort. Kew. 3: 546. 1789.

Heritiera papilio Bedd., Fl. Sylv. S. India: t. 218. 1872; Hook.f., Fl. Brit. India 1: 363. 1874; Gamble, Fl. Madras 104. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 458. 2005.

Evergreen trees, up to 25 m tall. Stems woody, bark greyish-brown, golden brown soft tomentose when young, glabrous when old. Leaves simple, alternate; lamina ovate or ovate-lanceolate, 4–9 × 3.5–4.5 cm, acute at apex, round at base, entire, glabrous above, scaly beneath, coriaceous; petioles *c.* 10 cm long, stout, peltate scaly, swollen tipped. Stipules free, lateral, deciduous. Flowers unisexual, in axillary panicles, non-fragrant; peduncles 4–9 cm long, sparsely pubescent; pedicels 0.5–0.8 cm long, slender, glabrous. Male flowers: Calyx campanulate, 5-lobed; lobes ovate, *c.* 4 × 2 mm, rounded at apex, entire. Petals absent. Anthers adnate on an androgynophore. Female flowers: Calyx campanulate, 5-lobed; lobes ovate, 4–6 × 2–3 mm entire. Petals absent. Carpels 5, superior, alternating with pair of staminodes; styles short; stigmas 5, thick. Samara wing membranous. Seed one.

Distribution: Native range is Indian Subcontinent to Myanmar (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-May.

Specimen examined: Upper Manalar, *s.d.*, *Jomy Augustine* 14444 (CALI).

Leptonychia Turcz.

Bull. Soc. Imp. Naturalistes Moscou 31(1): 222. 1858.

Leptonychia caudata (Wall. ex G.Don) Burret, Notizbl. Bot. Gart. Berlin-Dahlem 9: 729. 1926; Chithra in P.Daniel (ed.), Fl. Kerala 1: 460. 2005. *Grewia caudata* Wall. ex G.Don, Gen. Hist. 1: 547. 1831.

Leptonychia glabra Turcz., Bull. Soc. Imp. Naturalistes Moscou 31(1): 222. 1858; Hook.f., Fl. Brit. India 1: 379. 1874.

Leptonychia moacurroides Bedd., Fl. Sylv. S. India: t. 114. 1871; Hook.f., Fl. Brit. India 1: 379. 1874; Gamble, Fl. Madras 112. 1915.

Small trees or shrubs, up to 15 m tall. Stems woody, terete; bark brown, smooth, lenticellate. Leaves simple, alternate; lamina oblong or elliptic, 12–14.5 × 5–6 cm, acuminate-caudate at apex, rounded at base, entire, glabrous; petioles *c.* 1 cm long, glabrescent. Stipules lanceolate, 3–5 × *c.* 2 mm, acute at apex, entire, velutinous out, glabrous within, caducous. Flowers axillary solitary, non-fragrant; pedicels *c.* 0.6 cm long, slender. Bracts ovate, 1–3 × *c.* 1 mm, acute at apex, entire, velutinous out, glabrous within. Sepals linear-lanceolate, *c.* 10 × 4 mm, acuminate at apex, entire, finely pubescent out, glabrous within. Petals orbicular, *c.* 2 × 2 mm, acute at apex, ciliate, densely villous out, glabrous within. Stamens 10, united at base; filaments in pairs, 30–50 mm long, alternating with staminodes. Ovary obovoid; styles *c.* 5 mm long, pubescent. Capsules globose-obovoid. Seeds ovoid, shining black with an orange fleshy aril.

Distribution: Native range is SW. India, Indo-China to W. & Central Malesia (POWO, 2021); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: June-March.

Specimens examined: Meenmutty, 13.12.1982, *C.N. Mohanan* 76627 (MH); Peringalkutthu, 21.03.1989, *N. Sasidharan* 5361 (CALI).

Melhania Forssk.

Fl. Aegypt.-Arab. 64. 1775.

Melhania incana B.Heyne ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 68. 1834; Hook.f., Fl. Brit. India 1: 372. 1874; Gamble, Fl. Madras 1: 113. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 461. 2005.

Herbs, up to 20 cm tall. Stems terete, pubescent when young. Leaves simple, alternate; lamina ovate, 3–5 × 1.5–2 cm, obtuse at apex, slightly cordate at base, minutely serrate, pubescent; petioles 0.5−1 cm long, slender, pubescent. Stipules linear, 3–3.5 × *c.* 1.5 mm, acuminate at apex, entire, glabrous. Flowers in axillary cymes; peduncles 0.5–1.5 cm long, slender, sparsely pubescent; pedicels 0.4–0.6 cm long, stout, sparsely pubescent. Bracts linear, *c.* 7 × 3 mm, acuminate at apex, entire, sparsely pubescent out, glabrous within. Sepals campanulate; lobes 5, lanceolate, acuminate, pubescent out, glabrous within. Petals 5, obovate, 5–7 × *c.* 3 mm, rounded at apex, entire, glabrous. Stamens 5; filaments 5–6 mm long, slender, glabrous. Ovary orbicular, pubescent; styles *c.* 4 mm long, slender, glabrous; stigmas 5-partite, stigmas. Capsules loculicidal, dehisce from apex to base and connate basally.

Distribution: The native range of this species is Somalia, Socotra, SW. Arabian Peninsula and S. India (POWO, 2023); *Habitat*: Scrub jungles and dry deciduous forests; *Fl. & Ft.*: July-December.

Specimen examined: Chinnar, 25.08.1995, *K.K. Sajeev* 15809 (KFRI).

Melochia L.

Sp. Pl. 674. 1754.

Melochia corchorifolia L., Sp. Pl. 2: 675. 1753; Hook.f., Fl. Brit. India 1: 374. 1874; Gamble, Fl. Madras 1: 110. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 462. 2005.

Erect branched undershrubs, up to 50 cm tall. Stems woody, terete, pubescent on young stems, glabrous when old. Leaves simple, alternate; lamina ovate, 1–5 × 0.7–1.8 cm, acute at apex, truncate at base, serrate, glabrous above, sparsely hairy on nerves at back; petioles 0.6–1 cm long, sparsely pubescent out, glabrous within. Flowers in terminal capitate cymes; pedicels very much reduced. Bracts linear-lanceolate, *c.* 3 × 1.5 mm, acute at apex, ciliate on

margins, sparsely pubescent. Calyx 5-lobed, campanulate, lobes lanceolate, *c.* 3 × 1.5 mm, acuminate at apex, entire, ciliate. Petals 5, free, pink, obovate, *c.* 5 × 3 mm, truncate at apex, entire, glabrous. Stamens 5, filaments united at base. Ovary ovoid; styles 5; stigmas capitate. Capsules sub-globose, 5-valved. Seeds dark brown or greyish.



Distribution: Native range is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Degraded deciduous forest areas and waste places; *Fl. & Ft.*: July-April.

Specimen examined: Neriyamangalam, 17.11.2020, *Vishnu Mohan & Santhosh Nampy* 173345 (CALI).

Pterospermum Schreb.

Gen. Pl. ed. 8, 2: 461. 1791.

Key to the species

1. Leaves < 8 cm long; capsules cylindric.....*P. rubiginosum*

1. Leaves > 8 cm long; capsules 5-angled.....2

2. Sepals < 4 cm long; capsules oblong.....*P. reticulatum*

2. Sepals > 4 cm long; capsules sub-clavate.....*P. diversifolium*

Pterospermum diversifolium Blume, Bijdr. Fl. Ned. Ind. 2: 88. 1825; Hook.f., Fl. Brit. India 1: 367. 1874; Gamble, Fl. Madras 1: 108. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 465. 2005.

Trees, up to 18 m tall. Stems woody, terete, bark brown. Leaves simple, alternate, distichous; lamina ovate-elliptic, 9–17 × 6–14.5 cm, acuminate-irregularly lobed at apex, cordate at base, entire, glabrous above, silvery pubescent beneath, coriaceous; petioles 2–5 cm long, stellate hairy. Stipules

linear *c.* 7 × 4 mm, acuminate at apex, cauducous. Flowers bisexual, axillary, solitary. Calyx fused at base, rusty tomentose out, grey-pubescent within, 5-fid; lobes linear-lanceolate, *c.* 80–90 × 4–8 mm, acute at apex, entire. Petals 5, oblong, *c.* 100 × 15 mm, rounded at apex, entire, glabrous. Staminal column adnate to the gynophores; stamens 15, alternate with staminodes. Styles entire. Capsules sub-clavate, 5-angled. Seeds winged at one end.

Distribution: Native range is India to Malesia (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: October-April.

Specimens examined: Erattayar, 15.10.1982, *C.N. Mohanan* 7471 (MH); Pambavalley, 10.01.1996, *Jomy Augustine* 17081 (CALI).

Pterospermum reticulatum Wight & Arn., Prodr. Fl. Ind. Orient. 1: 69. 1834; Hook.f., Fl. Brit. India 1: 368. 1874; Gamble, Fl. Madras 1: 108. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 467. 2005.

Trees, up to 15 m tall. Stems woody, stellate hairy in younger parts, glabrous when old. Leaves simple, alternate; lamina oblong, 8–15 × 4–7 cm, acuminate at apex, obtuse at base, entire, except for the dentate tip, glabrous above, tomentose with stellate hairs beneath, coriaceous; petioles *c.* 0.5 cm long, stout, erect, tomentose. Flowers bisexual, in terminal or axillary fascicles, non-fragrant. Bracts numerous, laciniate, lobes *c.* 4 mm long, glabrous, caducous. Calyx tubular, 5-partite, linear, 25–40 × 5–9 mm, acuminate at apex, entire, pubescent out, glabrous within, recurved. Petals 5, oblong, *c.* 25 × 8 mm, rounded at apex, entire, white. Staminal column adnate to the gynophore, bearing 15 stamens alternate with staminodes; staminodes filiform. Ovary hairy; stigmas simple. Capsules oblong, obtusely 5-angled, hard, brown stellate pubescent outside. Seeds 4 in each cell, winged.

Distribution: Native range is SW. India and Myanmar (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: January-November.

Specimen examined: Pamba, 10.01.1996, *Jomy Augustine* 17085 (CALI).

Pterospermum rubiginosum B.Heyne ex G.Don, Gen. Hist. 1: 538. 1831; Hook.f., Fl. Brit. India 1: 368. 1874; Gamble, Fl. Madras 1: 109. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 467. 2005.

Evergreen trees, up to 20 m tall. Stems woody, bark brown; branchlets pubescent on younger parts, glabrous when old. Leaves simple, alternate; lamina ovate, 5–8 × 2–3 cm, acuminate at apex, oblique at base, entire, glabrous above, densely tomentose beneath, coriaceous; petioles *c.* 0.3 cm long, stout, pubescent. Stipules lateral, filiform, oblique, densely pubescent out, glabrous inside, caducous. Flowers bisexual, solitary, axillary. Calyx tubular, cylindric, brown-hoary outside, glabrous inside, splitting into 5 linear lobes, *c.* 50 × 2 mm, acute at apex, entire, tomentose out, white silky within. Petals 5, white, linear-oblong, *c.* 35 × 2 mm, rounded at apex, entire, glabrous. Staminal column adnate to the gynophore, bearing 15 stamens alternate with staminodes. Ovary cylindric, tomentose; styles hairy at base; stigmas simple. Capsules cylindric, brown. Seeds winged at one end.

Distribution: Native range is SW. India and Assam (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: November-April.

Specimen examined: Kuruthode, 16.04.1995, *Jomy Augustine* 15119 (CALI).

Sterculia L.

Sp. Pl. 2: 1007. 1753.

Key to the species

1. Leaves digitate or palmately lobed……2
1. Leaves simple ……*S. guttata*
2. Calyx densely stellate hairy, follicles glabrous……..……..……*S. foetida*
2. Calyx lobes glandular of glandular hairy, follicles villous or with stinging hairs……..……3
3. Follicles radiating with strap stinging hairs……*S. urens*
3. Follicles spreading, rusty-villous, without stinging hairs ……....*S. villosa*

Sterculia foetida L., Sp. Pl. 1008. 1753; Hook.f., Fl. Brit. India 1: 354. 1874; Gamble, Fl. Madras 1: 105. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 472. 2005.

Trees, up to 25 m tall. Branchlets woody, terete, pubescent; bark grey, smooth, peeling off thin scales. Leaves palmately compound, alternate, clustered at the

end of branchlets; lamina elliptic-oblanceolate, 4–10 × 2–5 cm, acuminate at apex, cuneate at base, entire, glabrous, coriaceous; rachis 10–20 cm long, slender, glabrous, pulvinate; petiolule 0.3–0.4 cm long, stout, glabrous. Stipules lanceolate, 5–6 × 3–3.5 mm, acuminate at apex, entire, glabrous, caducous. Flowers unisexual or polygamous, in axillary or terminal racemes. Calyx campanulate, deeply 5-partite; lobes lanceolate, acuminate, entire, densely stellate hairy. Petals absent. Male flowers: staminal column curved, hairy at base, anthers at its tip. Female flowers: ovary orbicular; gynophore stout; styles deflexed, hairy; staminodes sub-sessile. Follicles 5-lobed, woody, glabrous. Seeds black, numerous, ellipsoid, smooth, with a small yellow aril.

Distribution: The native range of this species is Indian Subcontinent to W. & Central Malesia (POWO, 2023); *Habitat*: Moist deciduous forests and in the plains along coastal areas; *Fl. & Ft.*: February-November.

Specimens examined: Kuttampuzha, 13.10.1990, *P. Bhargavan* 92085; Thadyampadu, 12.11.1981, *V.S. Raju* 71236; Thekkady, 15.03.1973, *B.D. Sharma* 43885 (MH).

Sterculia guttata Roxb., Hort. Bengal. 50. 1814; Hook.f., Fl. Brit. India 1: 355. 1874; Gamble, Fl. Madras 1: 106. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 472. 2005.

Trees, up to 20 m tall. Branchlets woody, terete, stellate tomentose; bark greyish-brownish, smooth, exfoliating in thin scales. Leaves simple, alternate; lamina broadly ovate-obovate, 10–23 × 6–15 cm, acuminate at apex, obtuse at base, entire, glabrous above, stellate-tomentose beneath, coriaceous; petioles 2–4.6 cm long stout, pulvinate, stellate-tomentose. Stipules lanceolate, 5–6 × *c.* 3 mm, acuminate at apex, entire, cauducous. Flowers in axillary cymes; peduncles 3–4 cm long, slender, sparsely pubescent; pedicels *c.* 2 cm long, slender, pubescent. Bracts lanceolate, 4–6 × *c.* 3 mm, acute at apex, entire, pubescent out, glabrous within. Calyx campanulate, united to middle; lobes 5, acute, entire, stellate hairy out, glabrous within. Petals absent. Male flowers: staminal column *c.* 10 mm long, slender, hairy at apex. Bisexual flowers: ovary globose, strigose, stellate hairy; gynophore *c.* 10 mm long, stout; styles 7–9 mm

long, stout; stigmas 5, globose, sticky. Follicles obovoid, tomentose, smooth. Seeds ovoid, black, smooth, shining.

Distribution: The native range of this species is Indian Subcontinent to Indo-China (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests, also in the plains; *Fl. & Ft.*: September-March.

Specimen examined: Thekkady, 16.01.1994, *Jomy Augustine* 13062 (MH).

Sterculia urens Roxb., Pl. Coromandel 1: 25. 1795; Hook.f., Fl. Brit. India 1: 355. 1874; Gamble, Fl. Madras 1: 106. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 473. 2005.

Deciduous trees, to 15 m high, bark white or greenish-grey, smooth, exfoliating in large, thin, papery flakes; blaze red; exudation yellowish-white, sticky; branches horizontal; branchlets pubescent. Leaves simple, palmately 3–5-lobed, alternate, clustered at the tips of branchlets; lamina orbicular, 15–30 × 18–30 cm, cordate at base, entire, glabrous above, velvety pubescent beneath, coriaceous; petioles8–18 cm long, pubescent. Flowers polygamous, in axillary panicles; peduncles 5–20 cm long, sticky, glandular hairy; pedicels 0.5–0.8 cm long, stellate sticky hairy. Calyx campanulate, hairy; lobes 5, ovate, 6–10 × 3–5 mm, acuminate at apex, entire, glandular hairy. Petals absent. Male flowers: staminal column *c.* 10 mm long, slender. Bisexual flowers: stamens in a ring round the carpel. Carpels 5, on a short stout gynophore; styles *c.* 5 mm long, thick, hairy; stigmas 5, sticky. Follicles radiating with strap stinging hairs. Seeds brown or black.

Distribution: The native range of this species is Indian Subcontinent to Indo-China (POWO, 2023); *Habitat*: Moist and dry deciduous forests; *Fl. & Ft.*: October-April.

Specimen examined: Chinnar, 28.02.1996, *K.K. Sajeev* 15975 (KFRI).

Sterculia villosa Roxb. ex Sm. in A.Rees, Cycl. 34: n. 16. 1816; Hook.f., Fl. Brit. India 1: 355. 1874; Gamble, Fl. Madras 1: 106. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 474. 2005.

Deciduous trees, up to 10 m tall. Stems woody, pubescent on younger parts, glabrous when old. Leaves simple, alternate; lamina palmately 5–7-lobed, 20–25 × 20–26 cm, lobes oblong-ovate or ovate, acuminate at apex, cordate at base,

entire, glabrous above, velvetish beneath, coriaceous; petioles 15–25 cm long, stout, erect, pulvinate, pubescent. Stipules triangular, *c.* 1.5 × 1 cm, acute at apex, entire, pubescent out, glabrous within, caducous. Flowers polygamous, in long drooping panicles, non-fragrant; peduncles 3–7 cm long, slender; pedicels 0.7–0.9 cm long, glabrous. Male flowers: Calyx campanulate, divided to the middle; lobes 5, ovate, *c.* 5 × 3 mm, acute at apex, entire, glandular. Petals absent. Staminal column recurved. Female flowers: same as male flowers. Carpels 5, free, strigose with stellate hairs; gynophore stout, cylindric; styles stout, hairy, deflexed; staminodes on a ring. Follicles spreading, rusty-villous, stinging hairs. Seeds many, black, smooth.

Distribution: Native range is Indian Subcontinent to China (SW. Yunnan) and Indo-China (POWO, 2023); *Habitat*: Moist deciduous forests; *Fl. & Ft.*: February-April.

Specimen examined: Swamikkayam, 19.01.1994, *Jomy Augustine* 13102 (CALI).

Waltheria L.

Sp. Pl. 2: 673. 1753.

Waltheria indica L., Sp. Pl. 2: 673. 1753; Hook.f., Fl. Brit. India 1: 374. 1874; Gamble, Fl. Madras 1: 111. 1915; Chithra in P.Daniel (ed.), Fl. Kerala 1: 476. 2005.



Sub-shrubs, up to 1 m tall. Stems woody, erect, branched, terete, pubescent, smooth. Leaves simple, alternate; lamina elliptic-ovate, 3–4 × 1.5 cm, obtuse at apex, rounded at base, crenate, tomentose; petioles *c.* 1 cm long, erect, stout, pubescent. Stipules linear, *c.* 0.4 × 0.1 cm, acuminate at apex, entire, pubescent. Flowers in axillary clusters, non-fragrant; peduncles compressed; pedicels compressed. Sepals campanulate, lobes ovate, *c.* 3 × 1 mm, acute at apex, entire, stellate

hairy out, pubescent within. Petals oblanceolate, *c.* 3 × 1 mm, rounded at apex, entire, glabrous. Stamens united below into a tube surrounding the styles. Ovary sessile, globose; stigmas fimbriate. Capsules glabrous. Seed 1, enclosed in calyx, dark brown.

Distribution: Native range is Tropical & Subtropical America (POWO, 2023); *Habitat*: Degraded moist deciduous fores t areas, also in the plains; *Fl. & Ft.*: October-February.

Specimen examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175951 (CALI).

TILIACEAE Juss.

Gen. Pl. 289. 1789, *nom. cons*.

Annual or perennial herbs, shrubs or less often trees. Leaves alternate, sessile-petiolate. Flowers regular, hermaphrodite or rarely unisexual, solitary or in cymose inflorescences; epicalyx bracts often present. Calyx-lobes (3–) 5, sometimes united at base. Petals 5, free. Stamens 5–numerous. Ovary superior with (1–) 5-many locules with as many or twice as many styles-branches as carpels. Styles-branches partly free or almost completely connate. Fruits mostly loculicidal capsules or schizocarp.

The family includes 242 genera in the world (POWO, 2023); 3 genera and 12 species in the study area.

Key to the genera

1. Fruit a capsule…… *Grewia*

1. Fruit a drupe……..2

2. Petals eglandular at base; capsules not echinate …….. *Triumfetta*

2. Petals glandular at base; capsules echinate..…….. *Corchorus*

Corchorus L.

Sp. Pl. 1: 529. 1753.

Corchorus aestuans L., Syst. Nat. ed. 10, 2: 1079. 1759.

Corchorus acutangulus Lam., Encycl. 2(1): 104. 1786; Hook.f., Fl. Brit. India 1: 398. 1874; Gamble, Fl. Madras 1: 121. 1915; P.Daniel (ed.), Fl. Kerala 1: 480. 2005.

Annual much branched herbs, up to 0.6 m tall. Stems woody, terete, pilose. Leaves simple alternate; lamina ovate, 2–7 × 1.5–3.5 cm, acute at apex, rounded at base, serrate, glabrous above, pilose below; petioles 1.5–3 cm long, erect, glabrous. Stipules lanceolate-linear, *c.* 5 × 2 mm, acuminate at apex, entire, sparsely hairy. Flowers in leaf-opposed cymes, non-fragrant; pedicels *c.* 2 mm long, sparsely pubescent. Bracts ovate, 5–6 × *c.* 2 mm, acute at apex, entire, filiform. Sepals 5, oblong, 4–6 × 2–2.5 mm, rounded at apex, entire, hooded. Petals 5, obovate, 6–7 × *c.* 3 mm, rounded at apex, entire, glabrous. Stamens many; filaments erect, slender. Ovary cylindric, 3-loculed; styles 3-fid; stigmas 2-lobed. Capsules angled, winged. Seeds numerous, dark brown.

Distribution: Native range is Tropics & Subtropics (POWO, 2023); *Habitat*: Degraded deciduous forests, also in the wastelands; *Fl. & Ft.*: August-February.

Specimens examined: Champakadu, 10.09.1995, *K.K. Sajeev* 11774 (KFRI); Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 188881 (CALI).

Grewia L.

Sp. Pl. 2: 964. 1753.

Key to the species

1. Peduncles shorter than petioles……2
1. Peduncles longer than petioles……...5
2. Flower buds > 1 cm long……*G. flavescens*
2. Flower buds < 1 cm long……...3
3. Stipules auricled……*G. tilifolia*
3. Stipules not auricled……4
4. Leaves villous beneath……*G. villosa*
4. Leaves stellate tomentose beneath……*G. abutilifolia*
5. Plants with bisexual and unisexual flowers ……..……*G. hirsuta*
5. Plants with bisexual flowers only……..……6
6. Inflorescence axillary and leaf opposed……...7
6. Inflorescence axillary only……..8
7. Plants trees…...……..…..*G. oppositifolia*

7. Plants scandent shrubs……..……..*G. umbellifera*

8. Drupes 2-lobed, glabrous when mature……..……..*G. serrulata*

8. Drupes 4-lobed, pilose or bristly when mature……..9

9. Petals reflexed; drupes pilose……..……*G. bracteata*

9. Petals not reflexed; drupes bristly……..……..……..*G. lanceaefolia*

Grewia abutilifolia Vent. ex Juss., Ann. Mus. Natl. Hist. Nat. 4: 92. 1804; Hook.f., Fl. Brit. India 1: 390. 1874; P.Daniel (ed.), Fl. Kerala 1: 485. 2005.

Grewia aspera Roxb., *sensu*; Gamble, Fl. Madras 119. 1915.

Large shrubs, up to 10 m tall. Branchlets woody, terete, tomentose. Leaves simple, alternate; lamina broadly ovate, 10–13 × 6–8 cm, acute at apex, rounded at base, serrate, scabrous above, stellate tomentose below; petioles 1–2 cm long, stout, glabrous. Stipules lanceolate, 0.6–0.8 × 0.2–0.3 cm, acuminate at apex, entire, sparsely pubescent, not auricled. Flowers in axillary umbels, non-fragrant; peduncles 0.3–0.5 cm long, stout, tomentose; pedicels 0.8–1.2 cm long, slender, tomentose. Flower buds 5–7 mm long. Sepals 5, oblong-lanceolate, 12–15 × 3–4 mm, rounded at apex, entire, pubescent out, glabrous within. Petals 5, oblong, 15–20 × *c.* 4 mm, rounded at apex, entire, tomentose out, glabrous within. Stamens unequal; filaments *c.* 5 mm long, slender, glabrous. Ovary globose, glabrous, tomentose; styles *c.* 10 mm long, slender; stigmas capitate. Drupes ovoid.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Moist deciduous forests and forest plantations; *Fl. & Ft.:* August-December.

Specimen examined: Thannikudy, 05.09.1993, *Jomy Augustine* 12350 (KFRI).

Grewia bracteata B.Heyne ex Roth, Nov. Pl. Sp. 243. 1821; Hook.f., Fl. Brit. India 1: 384. 1874; P.Daniel (ed.), Fl. Kerala 1: 486. 2005.

Grewia obtusa Wall. ex Dunn in Gamble, Fl. Madras 1: 117. 1915.

Large shrubs, up to 8 m tall. Branchlets woody, terete, tomentose; bark lenticellate. Leaves simple, alternate; lamina ovate-elliptic, 10–13 × 4–6 cm, obtuse at apex and base, finely serrate, glabrous, coriaceous; petioles 1.5–2 cm long, stout, glabrous. Stipules lanceolate, 0.4–0.7 × 0.2–0.3 cm, acuminate at

apex, entire, tomentose out, glabrous within. Flowers in axillary few flowered cymes, golden tomentose; peduncles 0.4–0.6 cm long, slender; pedicels 0.7–1 cm long, slender, glabrous. Bracts ovate, 7–9 × *c.* 3 mm, acute at apex, entire, glabrous. Sepals 5, oblong, 20–30 × *c.* 5 mm, acute at apex, entire, hispid out, glabrous within. Petals 5, elliptic-oblong, 5–8 × *c.* 3 mm, rounded at apex, entire, glabrous, reflexed. Stamens numerous; filaments unequal, 10–15 mm long, slender, glabrous. Ovary hirsute; styles *c.* 12 mm long, glabrous; stigmas capitate. Drupes 4-lobed, pilose when mature.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.:* April-July.

Specimens examined: Chinnar, 11.05.1995, *K.K. Sajeev* 15673; PTR, 13.05.1995, *Jomy Augustine* 15251 (KFRI).

Grewia flavescens Juss., Ann. Mus. Natl. Hist. Nat. Paris 4: 91. 1804; Gamble, Fl. Pres. Madras 1: 119. 1915; P.Daniel & M.Chandra. in B.D.Sharma & Sanjappa, Fl. India 3: 498. 1993; P.Daniel (ed.), Fl. Kerala 1: 486. 2005.

Small trees, up to 5 m tall. Branchlets woody, terete, stellate hairy on young parts, glabrous when old. Leaves simple, alternate; lamina elliptic, 3.5–7.5 × 1.3–2.8 cm, acute at apex, rounded at base, serrate, sparsely stellate hairy; petioles 0.5–0.8 cm long, stellate hairy. Flowers axillary, non-fragrant; peduncles 0.3–0.5 cm long, stout, hispid, stellate hairy; pedicels *c.* 0.4 cm long, stout, stellate hairy. Flower buds more than 1 cm long. Bracts ovate, 5–6 × 2–2.5 mm, rounded at apex, entire, puberulous. Sepals 5, free, oblong, 13–15 × *c.* 3 mm, acute at apex, entire, pubescent out, glabrous within. Petals 5, narrowly elliptic, 10–12 × 2–3 mm, rounded at apex, entire, glabrous, with a gland at base. Stamens many; filaments 10–12 mm long, narrow. Ovary hirsute, styles *c.* 1.5 cm long; stigmas capitate, 2-fid, sticky. Drupes globose, stellate hairy.

Distribution: The native range is Tropical & S. Africa to India (POWO, 2023); *Habitat*: Dry and moist deciduous forests; *Fl. & Ft.*: November-June.

Specimens examined: Chinnar, 09.06.2017, *Vishnu Mohan & Santhosh Nampy* 152166 (CALI); *Ibid.*, 16.11.1994, *K.K. Sajeev* 11585 (KFRI).

Grewia hirsuta Vahl, Symb. Bot. 1: 84. 1790; Hook.f., Fl. Brit. India 1: 391. 1874; Gamble, Fl. Madras 1: 119. 1915; P.Daniel (ed.), Fl. Kerala 1: 488. 2005. Small trees, up to 7 m tall. Stems terete, densely pubescent. Leaves simple, alternate; lamina elliptic-lanceolate, 1.5–6 × 1–1.5 cm, acuminate at apex, oblique at base, serrate, puberulous above, densely tomentose below; petioles 0.2–0.3 cm, terete, erect, tomentose. Stipules absent. Flowers bisexual and unisexual, in axillary cymes, non-fragrant; peduncles 1–1.5 cm long, erect, terete, tomentose. Bracts and bracteoles lanceolate, *c.* 3 × 1.5 mm, acute at apex, entire, pubescent. Sepals 5, free, oblong, *c.* 6 × 3 mm, acute at apex, entire, tomentose out, glabrous in. Petals oblong, *c.* 3 × 2 mm, rounded at apex, entire, glabrous in, pubescent below. Stamens many; filaments erect, narrow, *c.* 4 mm long. Ovary globose, densely villous; stigmas lobed. Drupes sub-globose, 4-lobed, hirsute.

Distribution: The native range is India to China (S. Guangxi, Guangdong) and Peninsula Malaysia (POWO, 2023); *Habitat*: Moist and dry deciduous forests, also in grasslands; *Fl. & Ft.:* December-January.

Specimens examined: Chinnar, 19.05.1999, *Lisha K.* 78647 (CALI); Mangaladevi, 20.08.1995, *Jomy Augustine* 16360 (KFRI).

Grewia lanceifolia Roxb., Fl. Ind. ed., 1832. 2: 586. 1832; Gamble, Fl. Madras 1: 118. 1915; P.Daniel (ed.), Fl. Kerala 1: 489. 2005.

Grewia diplocarpa Thwaites, Enum. Pl. Zeyl. 31. 1858; Hook.f., Fl. Brit. India 1: 390. 1874.

Small trees, up to 5 m tall. Branchlets woody, terete, pubescent on younger parts, glabrous when old. Leaves simple, alternate; lamina lanceolate-elliptic, 4–11.5 × 1.5–4 cm, acuminate at apex, attenuate-rounded at base, serrate, glabrous above, densely stellate-hairy below; petioles *c.* 1 cm long, terete, slender, stellate hairy. Stipules linear *c.* 0.5 × 0.1 cm, acuminate at apex, entire, glabrous. Flowers non-fragrant, solitary, in axillary cymes; pedicels 0.9–1 cm long, stout, stellate-hairy. Sepals linear, 10–12 × *c.* 2 mm, acute at apex, entire, hairy. Petals ovate, 2–3.5 × 1.5–2 mm, acute at apex, entire, glabrous, not reflexed. Stamens many; filaments *c.* 7 mm long; gynandrophore

hairy at base. Ovary sub-globose; styles pubescent below; stigmas peltate, lobed. Drupes 4-lobed, bristly when mature.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.:* November-December.

Specimen examined: Kottamala, 11.11.1994, *Jomy Augustine* 13781 (CALI).

Grewia oppositifolia Buch.-Ham. ex DC., Prodr. 1: 509. 1824; Hook.f., Fl. Brit. India 1: 384. 1874; P.Daniel (ed.), Fl. Kerala 1: 490. 2005.

Grewia emarginata Wight & Arn., Prodr. Fl. Ind. Orient. 1: 79. 1834; Hook.f., Fl. Brit. India 1: 384. 1874; Gamble, Fl. Madras 1: 117. 1915.

Small trees, up to 10 m tall. Branchlets woody, terete, tomentose. Leaves simple, alternate; lamina ovate-elliptic, 6–8 × 4–5 cm, obtusely acute at apex, rounded at base, finely serrate, scabrous above, spreading tomentose below; petioles0.1–1.2 cm, stout, pubescent. Flowers in axillary cymes or leaf opposed, non-fragrant; peduncles 1–2 cm long, slender, pubescent; pedicels 0.5–0.8 cm long, stout, pubescent. Bracts ovate, 10–12 × 2–4 mm, acuminate at apex, entire, pubescent out, glabrous within. Sepals 5, ovate, 8–12 × *c.* 2 mm, acuminate at apex, entire, pubescent out, glabrous within. Petals 5, oblong, 6–8 × 3–4 mm, acute at apex, entire, glandular at base. Stamens many; filaments 8–10 mm long. Ovary ovate, pubescent; styles *c.* 10 mm long, slender, glabrous; stigmas capitate. Drupes 4- lobed, hispid.

Distribution: The native range of this species is W. Himalaya, SW. India and Sri Lanka (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.:* October-December.

Specimen examined: Chinnar, 17.11.1994, *K.K. Sajeev* 11626 (KFRI).

Grewia serrulata DC., Prodr. 1: 510. 1824; Ansari, Fl. Kasaragod Div. 83. 1985; P.Daniel (ed.), Fl. Kerala 1: 492. 2005.

Grewia disperma Rottler ex Spreng., Syst. Veg. ed., 16. 2: 579. 1825; Gamble, Fl. Madras 1: 118. 1915.



Small trees, up to 5 m tall. Stems woody, terete, sparsely hairy on younger parts, glabrous when old. Leaves simple, alternate; lamina elliptic-lanceolate, 6–9 × 1.5–2.8 cm, acuminate at apex, rounded at base, serrate, sparsely stellate-pubescent when young, glabrous when old; petioles 0.5–0.7 cm long, slender, stellate-pubescent. Stipules absent. Flowers axillary in umbellate cymes, non-fragrant; peduncles *c.* 1 cm long, sparsely hairy; pedicels 0.5–0.6 cm long, erect, stellate hairy. Bracts lanceolate, 3–4 × 1–2 mm, acuminate at apex, entire, glabrous. Sepals 5, free, oblong, 8–10 × 3–4 mm, rounded at apex, entire, stellate pubescent out, glabrous in. Petals 5, ovate, 4–6 × 2–3 mm, acute at apex, entire, glabrous. Stamens many; filaments 5–6 mm long, erect. Ovary ovoid, notched above; styles longer than stamens; stigmas fimbriate. Drupes 2-lobed, glabrous when mature.

Distribution: The native range is Indian Subcontinent to Indo-China (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests; *Fl. & Ft.*: August-November.

Specimens examined: Kumily, 25.12.1974, *K. Vivekananthan* 50515 (MH); Mullakkudy, 10.06.1995, *Jomy Augustine* 15408; Neriyamangalam, 07.11.2020, *Vishnu Mohan & Santhosh Nampy* 173342; Thekkady, 10.08.1993, *Jomy Augustine* 12366 (CALI).

Grewia tiliifolia Vahl Symb. Bot. 1: 35 1790, nom. cons.; Hook.f., Fl. Brit. India 1: 386. 1874; Gamble, Fl. Madras 1: 118. 1915; P.Daniel (ed.), Fl. Kerala 1: 493. 2005.

Trees, up to 10 m tall. Branchlets woody, terete, stellate-tomentose on younger parts, glabrous when old. Leaves simple, alternate; lamina ovate, 4–11 × 3–7 cm, acute at apex, obliquely rounded at base, serrate, glabrescent above, pubescent beneath, coriaceous; petioles 1–1.3 cm long, terete, slender, stellate hairy. Stipules lanceolate, 0.7–1 × *c.* 0.2 cm, acuminate at apex, entire,

glabrous, auricled. Flowers bisexual, in axillary umbels, non-fragrant; peduncles 1.5–2 cm long, slender, stellate hairy; pedicels 0.8–1.6 cm long, slender, pubescent. Flower bud less than 7 mm long. Sepals 5, oblong, *c.* 5 × 2 mm, rounded at apex, entire, pubescent out, glabrous within. Petals 5, free, elliptic, 3–5 × 1–2 mm, slightly notched at apex, entire, densely tomentose out, glabrous within. Stamens many, free. Ovary globose, hirsute; styles subulate; stigmas obscurely lobed, recurved. Drupes globose, 2-lobed, sparsely hairy.



Distribution: The native range is Indian Subcontinent to China (SW. Yunnan, Guangxi) and Peninsula Malaysia (POWO, 2023); *Habitat*: Moist deciduous forests; *Fl. & Ft.*: February-August.

Specimens examined: Chinnar, 26.08.1995, *N. Sasidharan* 15836 (KFRI); Erattayar dam, 03.04.2018, *Vishnu Mohan & Santhosh Nampy* 158421 (CALI); Kumily, 28.05.1965, *K. Vivekananthan* 243557; Meenmutty, 30.05.1982, *V.S. Ramachandran* 74097; Peerumedu, 24.05.1965, *K. Vivekananthan* 24313 (MH).

Grewia umbellifera Bedd., Fl. Sylv. S. India 37. 1871; Hook.f., Fl. Brit. India 1: 393. 1874; Gamble, Fl. Pres. Madras 1: 117. 1915; P.Daniel (ed.), Fl. Kerala 1: 494. 2005.

Large scandent woody shrubs, up to 5 m tall. Stems woody, branching, terete, pubescent. Leaves simple, alternate; lamina ovate-elliptic, 5–10 × 2.5–4 cm, acuminate at apex, rounded at base, dentate, hispid above at veins, sparsely stellate hairy below when young; petioles erect, stout, densely pubescent. Flowers in leaf opposed umbels, non-fragrant; peduncles 1.5–3 cm long, densely pubescent. Bracts lanceolate, *c.* 5 × 2 mm, acuminate at apex, entire, densely pubescent out, glabrous within. Sepals 5, ovate, 10–12 × *c.* 4 mm, rounded at apex, entire, densely pubescent out, glabrous within, deflexed. Petals 5, free, white, oblong, *c.* 10 × 4 mm, rounded at apex, entire, glabrous.

Stamens 12; filaments erect, narrow, slender. Ovary globose, hispid; styles reduced; stigmas velvetish. Drupes 4-lobed, glabrous.

Distribution: The native range is W. & S. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: March-November.

Specimens examined: Mathikettan Shola National Park, 06.01.2017, *Vishnu Mohan & Santhosh Nampy* 151617; Nallathanni kallar, 10.06.2018, *Vishnu Mohan & Santhosh Nampy* 159311 (CALI); Periyar, 07.11.1981, *C.N. Mohanan* 72406; Valara, 07.021984, *K. Ramamurthi* 80401 (MH).

Grewia villosa Willd., Neue Schriften Ges. Naturf. Freunde Berlin 4: 205. 1803; Hook.f., Fl. Brit. India 1: 388. 1874; Gamble, Fl. Madras 1: 119. 1915; P.Daniel (ed.), Fl. Kerala 1: 495. 2005.

Large shrubs, up to 5 m tall. Branchlets woody, terete, pubescent on young parts, glabrous when old. Leaves simple, alternate; lamina orbicular, 2–4 × 9–10 cm, rounded at apex, cordate at base, serrate, villous beneath, glabrous above; petioles 0.3–0.8 cm, stout, densely pubescent. Stipules lanceolate, 0.4–0.6 × *c.* 0.3 cm, acuminate at apex, entire, not auricled. Flowers in axillary cymes, non-fragrant; peduncles 2–3 cm long, stout, densely pubescent; pedicels 0.5–1 cm long, pubescent. Flower bud 4–6 mm long. Bracts, lanceolate, *c.* 5 × 2 mm, acuminate at apex, entire, pubescent. Sepals oblong, 8–9 × *c.* 2 mm, rounded at apex, entire, densely pubescent out, glabrous within. Petals 5, elliptic, *c.* 2 × 2 mm, rounded at apex, entire, glabrous. Stamens many; filaments slender, narrow, erect. Ovary sub-globose, densely villous; stigmas laciniate. Drupes sub-globose, 4-lobed, villous.

Distribution: The native range is Africa to Indian Subcontinent (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: October-May.

Specimens examined: Chinnar, 19.05.1999, *Sindhu C.* 151617; *Ibid.*, 19.05.1999, *Satheesh George* 79257; *Ibid.*, 19.05.1999, *Prashy P.* 79453 (CALI).

Triumfetta L.

Sp. Pl. 1: 444. 1753.

Key to the species

1. Plant shrubs; capsules patent hairy…….. *T. pilosa*

1. Plant herbs; capsules not as above……..….2

2. Leaves 3–5-lobed; cymes leaf opposed……..*T. rhomboidea*

2. Leaves not lobed; cymes axillary…….……..…….. *T. annua*

Triumfetta annua L., Mant. Pl. 1: 73. 1767; Hook.f., Fl. Brit. India 1: 396. 1874; Gamble, Fl. Madras 120. 1915; P.Daniel (ed.), Fl. Kerala 1: 496. 2005.

Annual herbs, up to 60 cm tall. Stems woody, terete, villous, woody. Leaves simple, alternate; lamina ovate, 3–6 × 1–3.5 cm, caudate-acuminate at apex, rounded at base, serrate, membranous, sparsely hairy; petioles 1–3 cm long, slender, narrow, pubescent. Flowers in few flowered axillary fascicles, non-fragrant; pedicels 5–10 mm long, narrow, pubescent. Bracts lanceolate, 5–6 × *c.* 3 mm, acuminate at apex, entire, hispid. Sepals 5, free, elliptic, *c.* 6 × 2 mm, rounded at apex, entire, pubescent out, glabrous within. Petals 5, oblong, 4–6 × 2–3 mm, rounded at apex, entire, glabrous. Stamens 10; filaments free, *c.* 4 mm long, erect, narrow, glabrous. Ovary 5-celled, globose, 4-lobed; stigmas 5-lobed. Capsules globose, hooked hairy.

Distribution: The native range is Tropical & S. Africa, Madagascar, Indian Subcontinent to S. China and Peninsula Malaysia (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests; *Fl. & Ft.*: August-March.

Specimens examined: Lockhert gap, 10.10.1963, *K.M. Sebastine* 17496 (MH); Meenuliyanpara, 29.11.2019, *Vishnu Mohan & Santhosh Nampy* 164628; MSNP, 11.12.2016, *Vishnu Mohan & Santhosh Nampy* 151472 (CALI); Uppupara, 26.09.1972, *B.D. Sharma* 41687 (MH).

Triumfetta pilosa Roth, Nov. Pl. Sp. 223. 1821; Hook.f., Fl. Brit. India 1: 394. 1874; Gamble, Fl. Madras 1: 120. 1915; P.Daniel (ed.), Fl. Kerala 1: 496. 2005.

Shrubs, up to 1 m tall. Branchlets terete, tomentose. Leaves simple, alternate; lamina ovate, 5–15 × 2–7.5 cm, acute at apex, obtuse at base, serrate, puberulous above, densely white tomentose below; petioles 1–4 cm long,

slender, densely pubescent. Stipules lanceolate-linear, *c.* 8 × 2 mm, acuminate at apex, entire, pubescent. Flowers on axillary cymes, non-fragrant; pedicels *c.* 5 mm long, densely pubescent. Bracts linear, 4–5 × *c.* 1 mm, acuminate at apex, entire, glabrous. Sepals 5, oblong, *c.* 9 × 3 mm, rounded at apex, entire, hairy out, glabrous within. Petals 5, oblong, 6–8 × *c.* 2 mm, clefted at apex, entire, glabrous. Stamens 10, free, unequal; filaments *c.* 7 mm long, narrow, slender. Ovary globose, pubescent; styles *c.* 2 mm long; stigmas capitate. Capsules globose, with patent hairs all around.



Distribution: The native range is Eritrea to Limpopo, Madagascar, Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and moist deciduous forests; *Fl. & Ft.:* November-February.

Specimens examined: Kanthallur, 25.02.2003, *Reena M.B.* 89076 KFRI; way to Mannavan shola, 08.01.2004, *Mini V.* 97227; *Ibid*., 08.01.2004, *Amritha M.* 96928; *Ibid*., 08.01.2004, *Sreena K.* 96828; *Ibid*., 08.01.2004, *Sairabhanu N.K.* 97029; *Ibid*., 08.01.2004, *Jayatha Jayapalan* 96627; *Ibid*., 08.01.2004, *Rakendhu K.C.* 97127; *Ibid*., 08.01.2004, *Sreenivas V.K.* 96527; *Ibid*., 08.01.2004, *Ibid*., 08.01.2004, *Swapna Thomas A.* 97428; *Ibid*., 08.01.2004, *Sajeena L.R.* 96427; *Ibid*., 26.02.2003, *Roshni B.* 89962; Palkkulamedu, 01.12.2019, *Vishnu Mohan & Santhosh Nampy* 164672 (CALI); Thannikudy, 24.10.1993, *Jomu Augustine* 12626 (KFRI).

Triumfetta rhomboidea Jacq., Enum. Syst. Pl. 22. 1760; Hook.f., Fl. Brit. India 1: 395. 1874; Gamble, Fl. Madras 1: 120. 1915; P.Daniel (ed.), Fl. Kerala 1: 497. 2005.

Erect herbs, up to 1 m tall. Stems terete, branched, densely hairy on younger parts, glabrous when old. Leaves simple, alternate; lamina rhomboid, 3–5-lobed, 2.5–7 × 2.5–6 cm, rounded at base, acute at apex, irregularly serrate, sparsely stellate-pubescent; petioles *c.* 4 cm long, densely pubescent. Stipules

linear, *c.* 4 × 1 mm, acuminate at apex, entire, sparsely pubescent. Flowers in terminal or leaf-opposed cymes, non-fragrant; pedicels 0.4–0.6 cm long, narrow, pubescent. Sepals 5 free, lanceolate, 5–7 × *c.* 2 mm, acute at apex, entire, pubescent out, glabrous within. Petals 5, oblong-obovate, *c.* 6 × 3 mm, acute-rounded at apex, entire, glabrous. Stamens many; filaments erect, slender, *c.* 5 mm long. Ovary ovoid, setose; styles *c.* 3 mm long, glabrous; stigmas sticky. Capsules sub-globose, hooked hairy all around.



Distribution: The native range is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Degraded deciduous forests, also in the plains; *Fl. & Ft.*: August-February.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 176121; Kanthallur, 25.02.2003, *Reena M.B.* 89058 (CALI); Thannikudy, 02.10.1995, *Jomy Augustine* 16867 (KFRI).

ELAEOCARPACEAE Juss.

Essai Propr. Méd. Pl. ed. 2: 87. 1816, *nom. cons.*

Trees. Leaves simple, alternate or rarely opposite. Stipulate or not. Inflorescence axillary or terminal, racemose, corymbose, paniculate, or sometimes fascicled or flowers solitary. Flowers bisexual or polygamous, 4- or 5-merous, actinomorphic, with or without bracts. Sepals 4 or 5, basally connate or free, usually valvate. Petals 4 or 5, margin laciniate or rarely entire. Stamens 8 to numerous; filaments free and borne on disc; anthers 2-celled, dehiscent by apical or longitudinal slits, awned or hairy at apices. Disc circular or glandularly lobed. Ovary superior; ovules 2 to several per locule; styles connate or free. Fruit a drupe or capsule. Seeds with copious endosperm; embryo flat.

The family includes 12 genera and 792 species (POWO, 2023); two genera and six species in the study area.

Key to the genera

1. Flowers in racemes; ovary 3-celled……*Elaeocarpus*
1. Flowers solitary or in pairs; ovary 5-celled……*Muntingia*

Elaeocarpus L.

Sp. Pl. 1: 515. 1753.

Key to the species

1. Leaves longitudinally recurved……*E. recurvatus*
1. Leaves not recurved……..……..2
2. Sepals ciliate; seed one……..….3
2. Sepals villous at margin; seeds two……*E. glandulosus*
3. Anthers awned; filaments pubescent……..4
3. Anthers bristly; filaments glabrous……..……*E. serratus*
4. Petals with 25–35 apical frills; filaments swollen at base….*E. tuberculatus*
4. Petals with 10–13 apical frills; filaments not swollen at base…..*E. munroii*

Elaeocarpus glandulosus Wall ex Merr., J. Arnold Arbor. 32: 194. 1951; Manilal, Fl. Silent Valley 36. 1988; M.Reema *et al*. in P.Daniel (ed.), Fl. Kerala 1: 499. 2005.

Trees, up to 20 m high. Branchlets woody, terete, sparsely pubescent on young parts, glabrous when old. Leaves simple, alternate, clustered to the tip of branchlets; lamina obovate, 5–10 × 2–5 cm, acute at apex, obtuse at base, crenate, glabrous; petioles 1–1.5 cm long, slender, glabrous, slightly swollen at tip and base, grooved. Flowers bisexual, in short drooping axillary racemes; peduncles erect, slender, narrow, 1.5–2 cm long, pubescent; pedicels 5–8 mm long, slender, narrow, erect, pubescent. Sepals 5, ovate, *c.* 8 × 4 mm, acute at apex, villous, pubescent out, glabrous within. Petals 5, free, obovate, 6–9 × 4–6 mm, cuneate at base, broad and frilled at apex, glandular at base, glabrous. Stamens many, inserted between the glands on the disc; filaments 2–2.5 mm long, puberulous. Ovary superior, sub-globose, densely tomentose; styles subulate, entire. Drupes oblong. Seeds two.

Distribution: The native range of this species is W. & S. India (POWO, 2023); *Habitat*: Moist deciduous and evergreen forests; *Fl.* & *Ft.*: May-October.

Specimen examined: Koruthode, 10.08.1993, *Jomy Augustine* 12227 (CALI).

Elaeocarpus munroi (Wight) Mast. in Hook.f., Fl. Brit. India 1: 407. 1874; Gamble, Fl. Madras 1: 124. 1915; M.Reema *et al*. in P.Daniel (ed.), Fl. Kerala 1: 500. 2005.

Trees, up to 20 m high. Branchlets woody, terete, glabrous; bark greyish brown. Leaves simple, alternate, clustered at the tip of branchlets; lamina ovate, 4–8 × 2–4 cm, acuminate at apex, rounded at base, crenate, glabrous, coriaceous; petioles 2–3 cm long, slender, glabrous, slightly swollen at base. Flowers bisexual, in short drooping axillary racemes; peduncles 3–5 cm long, slender, narrow, glabrous; pedicels *c.* 10 mm long, slender, narrow, drooping, glabrous. Sepals 5, free, ovate-lanceolate, 8–10 × 2–3 mm, acuminate at apex, entire, ciliate, glabrous, pale green. Petals 5, obovate, 6–8 × 4 mm, frilled at apex, cuenate at base, entire, densely silky hairy, with 10−13 apical frills. Stamens numerous, awned, inserted on the disc; filaments *c.* 1.5 mm long, pubescent, not swollen at base. Ovary ovoid, silky hairy; styles subulate. Drupes blue, oblong, glabrous Seeds two.

Distribution: The native range of this species is W. & S. India (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl.* & *Ft.*: August-April.

Specimens examined: Devikulam, 11.09.1968, *D.B. Deb* 30737 (MH); way to Kanketty, 20.12.2019, *Vishnu Mohan & Santhosh Nampy* 164582 (CALI); Meenmutty, 11.11.1981, *C.N. Mohanan* 72466 (MH); Pachakkanam, 10.08.1994, *Jomy Augustine* 14086; Pambadum Shola National Park, 19.12.2018, *Vishnu Mohan & Santhosh Nampy* 167838 (CALI).

Elaeocarpus recurvatus Corner, Gard. Bull. Straits Settlem. 10: 325. 1939; M.Reema *et al*. in P.Daniel (ed.), Fl. Kerala 1: 501. 2005. *Elaeocarpus ferrugineus* Bedd., Fl. Sylv. S. India: t. 112. 1871, *nom. illeg*; Hook.f., Fl. Brit. India 1: 406. 1874; Gamble, Fl. Madras 1: 124. 1915.



Trees, up to 13 m tall. Branchlets woody, terete, with persistent leaf base, pubescent on young parts, glabrous when young. Leaves simple, alternate, clustered at the tip of branchlets; lamina elliptic-lanceolate, 7–12 × 4–7 cm, acute at apex and base, entire, glabrous above, tomentose in, recurved, coriaceous; petioles1.5–2 cm, stout, tomentose. Stipules lanceolate, *c.* 4 × 1 mm, acuminate at apex, entire, glabrous, cauducous. Flowers bisexual, in short axillary racemes; peduncles erect, slender, 2–5 cm long, hispid; pedicels 5–10 mm long, drooping, stout, hispid. Sepals 5, lanceolate, 8–10 × 2–3 mm, acute at apex, entire, pubescent out, glabrous within. Petals 5, obovate, 10–13 × *c.* 5 mm, frilled at apex, cuenate at base, entire, pubescent, glandular disc. Stamens numerous; filaments 3–4 mm long, stout, pubescent. Ovary superior, sub-globose, densely silky outside; styles 2–2.5 mm long, stout; stigmas globose. Drupes ovoid, glabrous. Seed one.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Shola forests; *Fl.* & *Ft.*: November-May.

Specimens examined: Meesappulimala, 06.05.2019, *Vishnu Mohan & Santhosh Nampy* 159141 (CALI); Umiyamala, 17.11.1965, *B.V. Shetty* 26481; Vaguvarai, 16.10.1989, *P. Bhargavan* 90956 (MH).

Elaeocarpus serratus L., Sp. Pl. 1: 515. 1753; Hook.f., Fl. Brit. India 1: 401. 1874; Gamble, Fl. Madras 1: 123. 1915; M.Reema *et al.* in P.Daniel (ed.), Fl. Kerala 1: 502. 2005.

Trees, up to 20 m tall. Branchlets woody, terete, glabrous; bark brown. Leaves simple, alternate; lamina elliptic, 2.5–7 × 2–4 cm, acute-rounded at apex, acute at base, crenate-serrate, glabrous, coriaceous; petioles 1–1.5 cm long, slender, glabrous, swollen tipped. Flowers bisexual, in axillary racemes. peduncles 4.5–

6 cm long, slender, narrow, glabrous; pedicels 5–7 mm long, slender, narrow, glabrous. Sepals 5, ovate, 4–5 × 1.5–2 mm, acuminate at apex, ciliate, pubescent out, glabrous within. Petals 5, obovate, 6–8 × *c.* 4 mm, frilled at apex, entire, glabrous, inserted round the base of glandular disc. Stamens many, bristly; filaments *c.* 1 mm long, glabrous. Ovary superior, densely tomentose, ovoid; styles subulate, entire. Drupes subglobose, green, glabrous. Seed one.

Distribution: The native range of this species is W. & S. India, Sri Lanka, Assam to Bangledesh (POWO, 2023); *Habitat*: Semi-evergreen forests, also in the plains; *Fl.* & *Ft.*: August-December.

Specimens examined: Kulamavu, 20.08.1977, *K. Vivekananthan* 50434; Meenmutty, 23.12.1983, *A.G. Pandurangan* 66445 (MH); Pachakkanam, 10.09.1993, *Jomy Augustine* 12659; Pamba, 10.05.1994, *Jomy Augustine* 13757 (CALI); Vazhathoppe, 23.12.1983, *C.N. Mohanan* 73365 (MH).

Elaeocarpus tuberculatus Roxb., Fl. Ind., ed. 1832. 2: 594. 1832; Hook.f., Fl. Brit. India 1: 404. 1874; Gamble, Fl. Madras 1: 124. 1915; M.Reema *et al.* in P.Daniel (ed.), Fl. Kerala 1: 503. 2005.



Trees, up to 25 m tall. Branchlets woody terete, with persistent leaf base, glabrous; bark greyish brown. Leaves simple, alternate, clustered at the tip of branchlets; lamina obovate, 10–18 × 5–10 cm, acute at apex, cuneate at base, entire, glabrous above, ferruginous pubescent beneath; petioles 1–2 cm long, stout, pubescent, swollen tipped, grooved above. Stipules lanceolate, *c.* 6 × 4 mm, acuminate at apex, entire, hispid out, glabrous within. Flowers bisexual, in axillary racemes; peduncles 8–10 cm long, golden tomentose, drooping, terete; pedicels 10–20 mm long, deflexed, terete, golden tomentose. Sepals 5, lanceolate, 12–15 × 2–3 mm, acuminate at apex, entire, ciliate,

tomentose out, glabrous within. Petals 5, free, obovate, 15–20 × *c.* 10 mm, fimbriate at apex, attenuate at base, entire, golden tomentose out, sparsely tomentose within, with 25–35 apical frills. Stamens numerous, awned, inserted on the disc; filaments *c.* 1.5 mm long, pubescent, swollen at base. Ovary superior, sub-globose, densely tomentose; styles subulate, tomentose, entire. Drupes oblong or ellipsoid, green, ferruginous tomentose. Seed one.

Distribution: The native range of this species is W. & S. India, Andaman Islands, Bangladesh to Myanmar and Jawa (POWO; 2023); *Habitat*: Along banks of streams in evergreen and shola forests; *Fl.* & *Ft.*: December-August.

Specimens examined: Nakshathrakutthu, 04.12.2018, *Vishnu Mohan & Santhosh Nampy* 168849; Pachakkanam, 12.01.1994, *Jomy Augustine* 12704; Pambla dam, 08.03.2017, *Vishnu Mohan & Santhosh Nampy* 152024; Pethotti, 15.01.2018, *Vishnu Mohan & Santhosh Nampy* 152911 (CALI).

Muntingia L.

Sp. Pl. 1: 509. 1753.

Muntingia calabura L., Sp. Pl. 1: 509. 1753; Hook.f., Fl. Brit. India 1: 407. 1874; Gamble, Fl. Madras 1: 124. 1915; M.Reema *et al.* in P.Daniel (ed.), Fl. Kerala 1: 505. 2005.



Sub-shrubs, up to 7 m tall. Branchlets woody, terete, slender, glandular-pubescent. Leaves simple, alternate; lamina elliptic, 2.5–11 × 1–4.5 cm, acuminate at apex, obliquely sub-cordate at base, serrate, glandular hairy above, woolly beneath; petioles 0.5–1 cm long, stout, pubescent. Stipules linear, 5–6 × *c.* 1 mm, acuminate at apex, pubescent out. Flowers bisexual, in axillary fascicles; pedicels 10–15 mm long, slender,

pubescent. Sepals 5, lanceolate, 10–15 × 3–5 mm, acuminate at apex, entire, densely pubescent out, glabrous within. Petals 5, free, ovate, 14–18 × 5–8 mm, rounded at apex, shortly clawed at base, entire, glabrous. Stamens many; filaments 8–10 mm long, slender glabrous. Ovary superior, ellipsoid; styles condensed; stigmas capitate. Berries globose. Seeds many.

Distribution: The native range of this species is Mexico to S. Tropical America (POWO, 2023); *Habitat*: Road sides; *Fl.* & *Ft.*: Throughout the year.

Specimen examined: Adimali, 07.08.2019, *Vishnu Mohan & Santhosh Nampy* 170251 (CALI).

LINACEAE DC. ex Perleb

Vers. Arzenikr. Pfl. 107. 1818, *nom. cons.*

Trees, shrubs, rarely herbs; branches sometimes climbing by hooks. Leaves simple, alternate or opposite; stipules present or absent, sometimes gland-like. Flowers actinomorphic, bisexual. Sepals 4 or 5, free or partly united, imbricate. Petals free, contorted, fugacious. Stamens as many as petals, sometimes alternating with small staminodes. Ovary superior, 3–5-celled; styles 3–5, free or partly united, with simple capitate stigmas. Fruit drupe orsepticidal capsule.

The family includes nine genera and 282 species in the world (POWO 2023); three species in Idukki district.

Key to the genera

1. Erect annuals; leaf length up to 1.5 cm long; petals obovate ……. *Linum*

1. Shrubs; leaf length up to 9 cm long; petals oblong…….. *Erythroxylum*

Erythroxylum P.Browne

Civ. Nat. Hist. Jamaica: 278 1756.

Key to the species

1. Stipules lanceolate, caducous……..*E. obtusifolium*

1. Stipules 3-angled, persistent…….... *E. monogynum*

Erythroxylum monogynum Roxb., Pl. Coromandel 1: 61. 1798; Hook.f., Fl. Brit. India 1: 414. 1874; Gamble, Fl. Madras 127. 1915.

Erythroxylum indicum (DC.) Elliot in Fl. Andhirica: 46 (1859)

Erythroxylum sideroxyloides Roxb. in Fl. Ind., ed. 1832. 2: 449 (1832), *nom. illeg*.

Sethia indica DC., Prodr. 1: 576. 1824.

Large shrubs, up to 7 m tall. Branchlets woody, terete, glabrous; bark dark-brown, very rough, lenticellate. Leaves simple, alternate, rarely distichous; lamina obovate or oblanceolate, 2–6.5 × 1–3 cm, obtuse at apex, attenuate at base, entire at margins, glabrous, coriaceous; petioles 0.3–0.8 cm long, glabrous, slender, grooved above. Stipules intrapetiolar, on the arrested shoots, 3-angled, *c.* 4 × 2 mm, acuminate at apex, entire at margins, glabrous, scaly, persistent. Flowers solitary or in axillary fascicles, non-fragrant; pedicels 0.3–0.6 cm long, slender, glabrous. Bracts absent. Sepals 5, ovate, 5–6 × *c.* 3 mm, acute at apex, entire at margins, glabrous. Petals 5, oblong, 5–6 × *c.* 3 mm, acute at apex, entire at margins, glabrous, membranous, white. Stamens 10; filaments *c.* 3 mm long, erect, slender, glabrous. Ovary ovate, glabrous; styles *c.* 3 mm long, erect, glabrous; stigmas capitate. Drupes ellipsoid, apiculate, glabrous. Seed one.

Distribution: The native range of this species is India to Myanmar, Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: December-May.

Specimens examined: Painavu, 16.12.1982, *C.N. Mohanan* 76154 (MH); Meenmutty, 23.12.1983 *A.G. Pandurangan* 66444 (MH).

Erythroxylum obtusifolium (Wight) Hook.f., Fl. Brit. India 1: 415. 1874; Gamble, Fl. Madras 127. 1915. *Sethia lanceolata* Wight var. *obtusifolia* Wight, Ill. Ind. Bot. 1: 136. 1840.

Shrubs, up to 5 m tall. Branchlets woody, terete, glabrous; bark grownish black, smooth. Leaves simple, alternate; lamina elliptic-obovate, 4–9 × 2–5 cm, acute at apex, cuneate to obtuse at base, entire at margins, glabrous, coriaceous; petioles 0.5–0.8 cm long, glabrous, pulvinate. Stipules lanceolate, *c.* 7 × 3 mm long, acuminate at apex, entire at margins, glabrous, caducous

leaving a scar. Flowers axillary, solitary or in pairs, non-fragrant; pedicels *c.* 0.3 cm long, slender, glabrous. Calyx lobes 5, ovate, *c.* 1.5 × 1 mm, acute at apex, entire at margins, glabrous, scaly. Petals 5, oblong, *c.* 4–5 × 1.5–2 mm, rounded at apex, entire at margins, glabrous, membranous. Stamens 5, equal; staminal tube *c.* 1.5 mm long, erect, slender, glabrous. Ovary obovoid, glabrous; styles *c.* 1 mm long, erect, stout, glabrous; stigmas depressed-capitate. Fruits oblong, longitudinally ridged.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: February-May.

Specimens examined: Meenmutty, 25.02.1984, *A.G. Pandurangan* 78081 (MH); Painavu, 18.02.1983 *C.N. Mohanan* 76228; *Ibid.*, 28.04.1984, *C.N. Mohanan* 81647 (MH).

Linum L.

Sp. Pl. 1: 277. 1753.

Linum mysorense B.Heyne ex Benth., Edwards's Bot. Reg. 16: t. 1326. 1830; Hook.f., Fl. Brit. India 1: 411. 1874; Gamble, Fl. Madras 1: 125. 1915; J.L.Ellis & W.Arisdason in P.Daniel (ed.), Fl. Kerala 1: 508. 2005.



Annual erect herbs. Stems terete, glabrous, branching at top. Leaves simple, alternate; lamina elliptic, *c.* 1.5 × 0.3 cm, acute-rounded at apex, acute at base, entire at margins, glabrous on both sides, sessile. Flowers in terminal panicled cymes. Peduncles erect, slender, narrow, glabrous, 2–3.5 cm long; pedicels narrow, delicate, thin, *c.* 0.5 cm long, glabrous. Sepals 5, free, ovate, *c.* 2 × 1 mm, acuminate at apex, entire at margins, glabrous. Petals obovate, *c.* 5 × 3 mm, rounded at apex, entire at margins, glabrous. Stamens 5, free; filaments united at base, *c.* 4 mm long,

narrow, slender. Ovary 5-celled, depressed globose; styles 5, free. Capsules glabrous, apiculate. Seeds many.

Distribution: Indian Subcontinent to Myanmar; *Habitat*: Grasslands (POWO, 2023); *Fl. & Ft.*: October-December.

Specimens examined: Kattappata, 15.11.2019, *Vishnu Mohan & Santhosh Nampy* 176513; Mangaladevi, 14.10.1993, *Jomy Augustine* 12682 (CALI).

MALPIGHIACEAE Juss.

Gen. Pl. 252. 1789, *nom. cons.*

Mostly woody climbers, sometimes shrubs or small trees. Leaves opposite, ternate or alternate, simple and entire, often with glands; stipules present or absent. Inflorescence terminal or axillary, many-flowered, racemose; bracts and bracteoles present. Flowers actinomorphic or zygomorphic, bisexual. Sepals 5, free or connate at base, persistent, often with glands outside. Petals 5, frequently clawed, free, imbricate, entire. Stamens 10. Ovary superior, syncarpous; styles as many as carpels. Fruit a schizocarp, usually winged, rarely a fleshy drupe.

The family includes 77 genera in the world (POWO, 2023), two genera and two species in the study area.

Key to the genera

1. Calyx glandular……*Hiptage*

1. Calyx eglandular……*Aspidopterys*

Aspidopterys A.Juss. ex Endl.

Gen. Pl. 1060. 1840.

Aspidopterys canarensis Dalzell, Hooker's J. Bot. Kew Gard. Misc. 3: 37. 1851; Hook.f., Fl. Brit. India 1: 420. 1874; Gamble, Fl. Madras 1: 129. 1915; Chandra. in P.Daniel (ed.), Fl. Kerala 1: 514. 2005.

Aspidopterys glomerata Wight, Icon. Pl. Ind. Orient. 6: t. 1986. 1853.

Climbing shrubs. Branchlets woody, terete, glabrous; bark greyish, smooth. Leaves simple, opposite; lamina ovate-elliptic, 8–11 × 3.5–5 cm, acuminate at apex, rounded at base, entire, glabrous, coriaceous; petioles *c.* 0.8 cm long, glabrous, stout, slightly grooved above. Flowers non-fragrant, in axillary

fascicles; peduncles 0.5–0.9 cm long, stout, glabrous; pedicels 0.5–1 cm long, erect, slender, narrow, rusty puberulose. Bracts elliptic, 3–6 × 2–3 mm, acute at apex, entire, rusty tomentose out, glabrous within, smooth. Calyx lobes 5, ovate, *c.* 5 × 3 mm, acute at apex, entire, sparsely eglandular. Petals 5, oblong, *c.* 8 × 4 mm, rounded-truncate at apex, entire, glabrous, membranous, yellow. Stamens 10; filaments *c.* 2 mm long, erect, slender, glabrous. Ovary superior; styles *c.* 3 mm long, erect, glabrous; stigmas capitate. Samara sub-orbicular, papery.

Distribution: Native range is India (POWO, 2023): *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: February-May.

Specimen examined: Aladi, 10.03.1994, *Jomy Augustine* 13559 (CALI).

Hiptage Gaertn.

Fruct. Sem. Pl. ii. 69. T. 116. 1791.

Hiptage benghalensis (L.) Kurz, J. Asiat. Soc. Bengal 43: 136. 1874; Chandra. in P.Daniel (ed.), Fl. Kerala 1: 516. 2005. *Banisteria benghalensis* L., Sp. Pl. 427. 1753.

Woody climbing shrubs, up to 10 m tall. Branchlets woody, terete, sparsely pubescent on younger parts, glabrous when old; bark greyish. Leaves simple, opposite; lamina elliptic-oblong, 4–14 × 4–7 cm, apiculate at apex, entire, glabrous, coriaceous; petioles *c.* 1.5 cm long, with a pair of glands, glabrous, stout, grooved. Flowers in axillary or terminal racemes, fragrant, bisexual; peduncles *c.* 5–7 cm long, sparsely pubescent; petioles *c.* 0.5 cm long, sparsely pubescent. Sepals 5, ovate, 8–10 × 2–4 mm, acute at apex, entire, glandular pubescent out, glabrous within, smooth. Petals 5, free, obovate, *c.* 10 × 4 mm, rounded at apex, entire, glabrous, membranous, clawed, reflexed. Stamens 10; filaments *c.* 6 mm long, slender, glabrous. Ovary 3-celled; styles *c.* 3 mm long, slender, glabrous; stigmas capitate. Samara 3-winged.

Distribution: Native range is Tropical & Subtropical Asia (POWO, 2023): *Habitat*: Along river banks in semi-evergreen and evergreen forests; *Fl. & Ft.*: January-November.

Specimens examined: Chinnar, 16.03.1995, *Sasidharan* 11966 (KFRI); Koruthode, 10.06.1995, *Jomy Augustine* 16268 (CALI).

ZYGOPHYLLACEAE R.Br.

Voy. Terra Austral. 2: 545. 1814, *nom. cons.*

Shrubs or herbs, woody at base, rarely trees; branches often jointed at nodes. Leaves simple, opposite or alternate, pinnate, rarely 3-foliolate. Stipules persistent. Flowers hermaphrodite, actinomorphic or zygomorphic. Sepals 5, rarely 4, free or rarely connate at base, imbricate, rarely valvate. Petals 4–5, rarely absent, hypogynous, free, imbricate or contorted, rarely valvate. Disk mostly present. Stamens the same number to three times the number of petals, often unequal in length; filaments free. Ovary superior, sessile or rarely stipitate; styles simple, short, or stigmas sessile; ovules 2 or more in each cell, axile.

The family includes 286 species under 22 genera (POWO, 2023); only one species is present in the study area.

Tribulus L.

Sp. Pl. 1: 386. 1753.

Tribulus terrestris L., Sp. Pl. 1: 387. 1753; Hook.f., Fl. Brit. India 1: 423. 1874; Gamble, Fl. Madras 1: 130. 1915; Vajr. in P.Daniel (ed.), Fl. Kerala 1: 518. 2005.



Prostrate silky herbs. Stems silky hairy, terete, branching. Leaves opposite, imparipinnate; leaflets opposite, oblong, 8–10 × *c.* 3 mm, mucronate at apex, obliquely rounded at base, entire, sparsely hairy above, densely hispid below; petioles *c.* 1 mm, long, densely pubescent. Stipules lanceolate, *c.* 5 × 2 mm, acuminate at apex, entire, hispid. Flowers axillary, solitary, non-

fragrant; pedicels *c.* 1.5 cm long, terete, hispid. Sepals 5, free, ovate, *c.* 7 × 3 mm, acute at apex, entire, pubescent out, glabrous within. Petals 5, free, obovate, *c.* 7 × 4 mm, truncate at apex, entire, glabrous. Stamens 10; filaments *c.* 5 mm long, glabrous. Ovary 5-lobed, hirsute with bulbous hairs; stigmas 5. Fruits globose, 5-angled, spinose.

Distribution: The native range is Old World (POWO, 2023); *Habitat*: Deciduous forests; *Fl.* & *Ft.*: October-June.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 188836; *Ibid*., 19.05.1999, *Satheesh George* 79243; *Ibid*., 18.05.1999, *Shamina M.* 78935; *Ibid*., 19.05.1999, *Resmi T.* 78374; *Ibid*., 19.05.1999, *Thushar K.V.* 79340; *Ibid*., 18.05.1999, *Prashy P.* 79434; *Ibid*., 18.05.1998, *Shylaja M.K.* 60139; *Ibid*., 14.03.2001, *Nazeedha M.K.* 736649; *Ibid*., 14.02.2001, *Deepa K.A.* 73778; *Ibid*., 14.02.2001, *Sheeba M.V.* 73058; *Ibid*., 14.02.2001, *Sonia K.* 72659; *Ibid*., 14.02.2001, *Priya P.D.* 73898; *Ibid*., 19.05.1999, *Omana P.* 78756 (CALI).

GERANIACEAE Juss.

Gen. Pl. 268. 1789, *nom. cons.*

Annual or perennial herbs. Leaves alternate or opposite, palmate or pinnately divided, petiolate. Stipules present. Inflorescence a cyme or pseudo umbel. Flowers bisexual, usually actinomorphic. Sepals 5, usually distinct, imbricate. Petals 5, distinct. Fertile stamens 5 or 10, usually in 2 whorls, sometimes a whorl reduced to staminode; anthers 2-locular, longitudinally dehiscing. Ovary superior; carpels 5, fused; ovules pendulous, anatropous. Fruit a schizocarp.

Currently the families Balsaminaceae and Oxalidaceae are treated separately (R. A.Prince & J.D.Palmer, 1993) Since the families are arranged according to Bentham and Hooker's classification (1862–1883), Balsaminaceae is treated as a large family including Oxalidaceae. The family includes 15 genera and 2533 species; five genera and 55 species in study area.

Key to the genera

1. Leaves peltate; petioles tubular…….. *Tropaeolum*
1. Leaves simple or lobed; petioles not tubular……2

2. Flowers irregular……..*Impatiens*

2. Flowers regular……3

3. Leaves compound……4

3. Leaves simple palminerved……*Geranium*

4. Leaves 3-foliate……*Oxalis*

4. Leaves abruptly pinnate……..……*Biophytum*

Biophytum DC.

Prodr. 1: 689. 1824.

Key to the species

1. Sepals glabrous or sparsely strigose……..……2

1. Sepals strigose and glandular hairy……..……*B. sensitivum*

2. Seeds tubercled……..……3

2. Seeds not tubercled……..…… *B. veldkampii*

3. Rachis bears leaflets throughout; sepals shorter than fruits…….

…… *B. intermedium*

3. Rachis barren in lower half; sepals longer than fruit ……..…*B. reinwardtii*

Biophytum intermedium Wight, Ill. Ind. Bot. 1: 162. 1840; Hook.f., Fl. Brit. India 1: 438. 1874; Gamble, Fl. Madras 1: 133. 1918; N.P.Balakr. & Arisdason in P.Daniel (ed.), Fl. Kerala 1: 571. 2005.

Branching annual herbs, up to 50 cm tall. Stems terete, semi woody at base, erect, pubescent. Leaves pinnatifid, rosulate; leaflets 15–25 pairs, lowest smallest, scarcely overlapping, oblong, 0.3–1.3 × 0.2–0.5 cm, obliquely apiculate at apex, rounded-truncate at base, entire, sparsely strigose hairy; rachis 2–6 cm long, erect, pubescent. Flowers non-fragrant, in terminal many-flowered umbels; peduncles up to 5 cm long, densely pubescent; pedicels 0.5–0.6 cm long, narrow, erect. Bracts subulate, *c.* 3 × 1 mm, acuminate at apex, entire, pubescent. Sepals 5, lanceolate, 3–4 × *c.* 2 mm, acuminate at apex, entire, glandular pubescent. Petals 5, campanulate, lobes truncate, 9–10 mm long, entire, glabrous. Stamens 6; filaments *c.* 2 mm long, slender. Ovary deeply furrowed; styles glandular pubescent; stigmas papilose. Capsules as long as sepals. Seeds tuberculate, 5−10 mm long.

Distribution: The native range is S. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: February-June.

Specimen examined: Kottamalapallam, 12.03.2020, *Vishnu Mohan & Santhosh Nampy* 17777 (CALI).

Biophytum reinwardtii (Zucc.) Klotzsch, Naturw. Reise Mossambique 6 (Bot., 1): 85. 1861; Hook.f., Fl. Brit. India 1: 437. 1874; Gamble, Fl. Madras 1: 133. 1915; N.P.Balakr. & Arisdason in P.Daniel (ed.), Fl. Kerala 1: 573. 2005.

Erect non branching annual herbs, up to 15 cm tall. Stems terete, woody at base, pubescent. Leaves pinnately compound, rosulate; leaflets overlapping, terminal largest, oblong, falcate, 0.3–1 × *c.* 0.5 cm, asymmetric, obliquely apiculate at apex, rounded-truncate at base, entire, glabrous; rachis 4–7.5 cm long, slender, sparsely puberulous; petioles very much reduced. Flowers non-fragrant, in many-flowered terminal umbels; peduncles up to 12 cm long, erect, narrow, pubescent; pedicels *c.* 0.5 cm long, slender, narrow, hispid. Bracts ovate-attenuate, 1–1.5 × *c.* 1 mm, acute at apex, entire, sparsely pubescent. Sepals 5, ovate, *c.* 2.5 × 1 mm, acute-acuminate at apex, entire, sparsely hairy, 7-nerved. Petals companulate, 6–8 mm long; lobes truncate, entire, glabrous. Stamens 5; filaments *c.* 1.5 mm long, sparsely ciliate. Ovary glabrous; styles minute, stigmas flat. Fruits glandular hairy on the ribs. Seeds transversely ridged and tubercled, *c.* 2 mm long.

Distribution: The native range of this species is S. China to Tropical Asia (POWO, 2023); *Habitat*: Moist deciduous forests and plantations, also in the plains; *Fl. & Ft.*: July-December.

Specimen examined: Kalvarimala, 10.11.1993, *Jomy Augustine* 12698 (CALI).

Biophytum sensitivum (L.) DC., Prodr. 1: 690. 1824; Hook.f., Fl. Brit. India 1: 436. 1874; Gamble, Fl. Madras 133. 1915; N.P.Balakr. & Arisdason in P.Daniel (ed.), Fl. Kerala 1: 571. 2005.

Annual erect herbs, up to 30 cm tall. Stems semi woody, terete, pubescent. Leaves pinnately compound, rosulate; leaflets oblong, falcate, 5–25 pairs, 0.2–1.5 × 0.2–0.5 cm, obliquely apiculate at apex, rounded-truncate at base, entire,



glabrous-sparsely hairy on upper side, brown tomentose on back; rachis 0.5–12 cm long, hispid, slender; petioles very short. Flowers non-fragrant, 4–8 in terminal umbels; peduncles 2.5–18 cm long, slender, erect, narrow, hispid; pedicels 0.2–0.5 cm long. Bracts linear, lanceolate, *c.* 3 × 1 mm, acute at apex, entire, hispid out, glabrous within. Sepals 5, ovate-lanceolate, 4–5 × *c.* 1 mm, acuminate at apex, entire, sparsely hairy out, glabrous within. Petals 5, connate at base, recurved, *c.* 8 mm long, hispid outside. Stamens 5+5; filaments *c.* 5 mm long, free. Ovary oblong, green; styles 5; stigmas 2-lobed. Capsules oblong as long as sepals; Seeds tuberculate.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: February-June.

Specimens examined: Aduvizhunthznkudi, Mathikettan Shola ational Park, 22.11.2014, *S. Syam Radh & Santhosh Nampy* 143598; Kalvary mount, 19.03.2018, *Vishnu Mohan & Santhosh Nampy,* 154389; Kattappana, 14.03.2018, *Vishnu Mohan & Santhosh Nampy* 170397; Koruthode, 10.06.1996, *Jomy Augustine* 16265; Mangaladevi, 10.11.1996, *Jomy Augustine* 16891; Venmoney, 16.07.2021, *Vishnu Mohan & Santhosh Nampy* 176035 (CALI).

Biophytum veldkampii A.E.S.Khan, E.S.S.Kumar, Binu & Pushp., Rheedea 8(1): 79. 1998; N.P. Balakr. & Arisdason in P.Daniel (ed.), Fl. Kerala 1: 575. 2005.

Annual erect herbs, up to 30 cm tall. Stems terete, glabrous. Leaves pinnately compound, rosulate at tip; leaflets overlapping, oblong, falcate; terminal largest, obovate, 3–13 × 3–5 mm, asymmetric, obliquely apiculate at apex,

rounded-truncate at base, entire, glabrous; rachis 0.5–12 cm long, sparsely hispid, slender. Flowers non-fragrant, in terminal many-flowered umbels; peduncles up to 20 cm long, sparsely hairy; pedicels up to 0.6 cm long, slender, hispid. Bracts ovate-attenuate, 1–1.5 × *c.* 1 mm, attenuate at apex, entire, pubescent. Sepals 5, ovate, 2–2.5 × 1–1.25 mm, ovate, acute-acuminate at apex, entire, ciliate. Petals yellow, companulate, 3.5–4.5 mm long, elliptic, emarginated at apex, glabrous. Stamens 5; filaments *c.* 4 mm long, glabrous. Ovary ovate, ciliate; styles erect; stigmas flat. Fruits glandular hairy on the ribs. Seeds not tubercled.

Distribution: The native range of this species is India (Kerala). (POWO, 2023); *Habitat*: Moist deciduous forests and plantations, also in the plains; *Fl. & Ft.*: July-December.

Specimen examined: Kaliyar, 13.09.2018, *Vishnu Mohan* & *Santhosh Nampy* 185624 (CALI).

Geranium L.

Sp. Pl. 2: 676. 1753.

Geranium nepalense Sweet, Geraniaceae 1. t. 12. 1820; Hook.f., Fl. Brit. India 1: 430. 1875; Gamble, Fl. Madras 1: 131. 1915; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 522. 2005.



Perennial diffusely branching prostrate creeping tuberous herbs. Stems branched, white hairy at apex, glabrous when old. Leaves digitately compound, opposite; lamina 3–5-fid, leaflets rhomboid, *c.* 1.5 × 1 cm, attenuate at apex, serrate, strigose above, pubescent below; petioles slender, erect, narrow, pilose. Stipules lanceolate *c.* 5 × 1 mm, attenuate at apex, entire, ciliate, glabrous. Flowers non-fragrant, pink on 2-flowered axillary cyme; pedicels 2–2.5 cm long, narrow, erect,

slender, pilose. Sepals 4, elliptic-lanceolate, 4–5 × *c.* 2 mm, short mucronate at apex, entire, pilose out, glabrous within. Petals 5, free, ovate-oblong, *c.* 0.8 × 0.5 cm, rounded-truncate at apex, entire, glabrous. Stamens 10; filaments 2–3 mm long, dilated at base. Ovary elliptic, 5-merous; stigmas 5, curved. Capsules ellipsoid, non-glandular hairy.

Distribution: The native to E. Afghanistan to Korea and Indo-China, N. Sumatera; *Habitat*: Open high altitudinal grasslands; *Fl. & Ft.:* October-November.

Specimens examined: Eravikulam, 29.11.1979, *Nambiar* 1101 (MH); Meesapulimala, 21.11.2018, *Vishnu Mohan & Santhosh Nampy* 167751(CALI).

Impatiens L.

Sp. Pl. 2: 937. 1753.

Key to the species

1. Plants scapigerous (flowers in racemose scape); leaves radicle……2
1. Plants non scapigerous (flowers not in scape); leaves cauline……8
2. Lower sepal spurless……..……*I. pandata*
2. Lower sepal spurred……..3
3. Distal petal of lateral united petal 2-lobed……..……..4
3. Distal petal of lateral united petal unlobed……..……..…*I. acaulis*
4. Spur more than 3.5 cm long..……..……..5
4. Spur less than 1.5 cm long..……...6
5. Plants stoloniferous……..*I. grandispora*
5. Plants not stoloniferous……..……*I. scapiflora*
6. Spur long and narrow……..……..……...7
6. Spur short and saccate……..……...*I. modesta*
7. Leaves orbicular, cordate at base, thick……..…*I. levingei*
7. Leaves ovate, truncate at base, membranous……*I. nidholapathra*
8. Epiphytic (rarely lithophytic) perennials, stems woody, with prominent leaf scars, wing petals and lip fleshy, lip mostly jug or vase shaped; wings almost concealed in the mouth of lipor projecting from the upper region……9

8. Ground plants, annuals or perennials, stems woody in perennials; wing petals and lip membranous, wings showy and exposed out of lips……..……10

9. Dorsal petals with a narrow crest above, wing petal much exposed, lower lobe red, basal lobe green, wings and standard petals prominently nerved, standard, lower part of lip and basal lobe green……*I. viridiflora*

9. Dorsal petal with a narrow crest above, wing petals hid within lip or standard, lower and basal lobes green or greenish yellow or yellowish green, lower part of lip red……..……..*I. parasitica*

10. Leaves opposite-decussate, or whorled; seeds black, shiny, globose, hairless ……11

10. Leaves usually alternate, rarely opposite or sub-opposite or alternate on the same plant, or whorled; seeds brown, soft coated, globose or almond-shaped, usually with long or shotrt vestigial hairs……..22

11. Leaves whorled, ciliate, seeds with dimorphic hairs……..*I. gardneriana*

11. Leaves opposite decussate, serrate, seeds with monomorphic hairs…….12

12. Plants densely tomentose or pubescent, including pedicels……..……13

12. Plants glabrous everywhere……..……14

13. Plants puberlous; wings long stipitate……..……*I. pallidiflora*

13. Plants rufuous hairy; wings sessile……*I. tomentosa*

14. Spur absent..……..……15

14. Spur present……..…16

15. Lower sepal cymbiform……..……..……*I. herbicola*

15. Lower sepal saccate……..……...*I. inconspicua*

16. Wings without a basal lobe……..……...17

16. Wings with a basal lobe……..……..18

17. Dorsal auricle present……..……..……*I. ligulata*

17. Dorsal auricle absent……..……...*I. minor*

18. Basal lobe of wing petals linear, acuminate or acute……..…*I. diversifolia*

18. Basal lobe of wing petal ovate, broad, fin like, round……..……19

19. Lip with a short spur or absent……..20

19. Lip with well-developed spur, 5 mm or more long……23

20. Dorsal auricle of wings ±5 mm long, strap shaped……*I. aliciae*

20. Dorsal auricle of wings <1 mm long, just a projection……..21

21. Lip, spur, standard, lateral sepals pedicels distinctly long hairy……..*I. oppositifolia*

21. Lip, spur, standard, lateral sepals, pedicels glabrous……..……

……...*I. rupicola* var. *nataliae*

22. Flowers 1.5–2.5 mm across, spur incurved, lip with a yellow eye……

……..*I. chinensis*

22. Flowers 1 cm across, sour straight-slightly curved……..……*I. tenella*

23. Lateral sepals short and minute……24

23. Lateral sepals not minute, normally ovate or linear, oblong…… 29

24. Peduncles, spur and fruit hairy……*I. trichocarpa*

24. Peduncles, spur and fruit glabrous……25

25. Seeds glabrous……*I. flaccida*

25. Seeds hairy……..……26

26. Hairs on seeds with spiral bands……..……*I. dasysperma*

26. Hairs on seeds with very much reduced to short papillae or granules or head……..……..27

27. Hairs on seeds with reticulate banding……...*I. latifolia*

27. Hairs on seeds without reticulate ……..……28

28. Lip funnel shaped; hairs on seerds with spiral banding……*I. cuspidata*

28. Lip cymbiform; hairs on seeds with 1 or 2 round band……..*I. leschenaultii*

29. Plant perennial shrubs…… *I. henslowiana*

29. Plant annual herbs……..……30

30. Flowers in sub-umbellate, or umbellate inflorescence……..……31

30. Flowers in elongated peduncled axillary raceme……..44

31. Stem, branches and or pedicels viscous or sticky……..32

31. Stem or branches or pedicels not viscous or sticky……...36

32. Spur of lip equal or longer than wings, inflated……*I. viscosa*

32. Spur of lip shorter than wings or 0, if present not inflated……....34

33. Distal lobe of wing petal rounded or undivided……35

33. Distal lobe of wing petal shallowly or deeply divided……..……36

34. Dorsal auricle and spur short or 0, seed hairs with 8–15 horizontal rings……...*I. parvifolia*

34. Dorsal auricle and spur prominent, seed hairs spirally banded to moniliform type……*I. raktakesara*

35. Flowers white or cream or pale pink, distal lobe of wing petal shallowly lobed, pollen 4-colpate ……..……..*I. omissa*

35. Flowers pink rarely pale pink or white, distal lobe of wing petal deeply divided, pollen 5-colpate……..……..*I. goughi*

36. Leaves rosulate at the top of stem……..……..……37

36. Leaves not rosulate……..……38

37. Sepal spurred……..……...*I. mankulamensis*

37. Sepal not spurred……..……*I. panduranganii*

38. Plant perennial shrubs or under shrubs……39

38. Plant annual herbs……..……..41

39. Stems slender, often herbaceous, less than 1 cm across the base……..……..…*I. campanulate*

39. Stems very thick, woody, 1–3 cm across at the base……40

40. Flowers gorgeous, 3–5 cm across, showy white often streaked purple inside the throat ……...*I. grandis*

40. Flowers mediun sized, 1, 5–2 cm across, bright red or scattered red……..……..*I. verticillate*

41. Seeds glabrous or faintly minute hairy; extra petiolar glands present…42

41. Seeds distinctly long hairy; extra petiolar glands absent……..…..43

42. Spur thick or stout, constricted at the region of insertion……..*I. uncinate*

42. Spur slender, narrow, incurved……*I. leptura*

43. Spur completely absent……..……..*I. elegans*

43. Spur present……..……...*I. cordata*

44. Lower sepal tubiform……..……..…45

44. Lower sepal cymbiform……..……....46

45. Spur green……..……..……..…*I. coelotropis*

45. Spur red……..*I. phonicea*

46. Wings with prominent veins or ribs……..……...*I. maculate*

46. Wings without veins or ribs.....47

47. Leaves obscurely whorled.....*I. tangachee*

47. Leaves not whorled.....48

48. Peducles with flowers all along their length.....*I. wightiana*

48. Peduncles with flowers only at their ends.....*I. platyadena*

Impatiens acaulis Arn. in Compan., Bot. Mag. 1: 325. 1836; Hook.f., Fl. Brit. India 1: 443. 1874; Gamble, Fl. Madras 1: 138. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 530. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 45. 2012.



Tuberous scapigerous herbs, up to 20 cm tall. Leaves radical; lamina sub-orbicular, 6–9 × 5–9 cm, rounded-acute at apex, cordate at base, crenate, glabrous; petioles 5–15 cm long, erect, slender glabrous. Flowers pale pink-white in terminal scapes. Peduncles up to 20 cm long, glabrous; pedicels 2−3 cm long, glabrous. Bracts ovate, *c.* 5 × 2 mm, acute at apex, entire, glabrous. Sepals 3, free; lateral sepals linear, *c.* 4 × 2 mm, acute at apex, entire, glabrous; lower sepal cymbiform; spur *c.* 3.5 cm long, tubular, slender, glabrous. Petals 3; dorsal petal pink-white, orbicular, *c.* 8 × 8 mm, acute-rounded at apex, entire, glabrous; lateral united petals 2; distal petal oblong, *c.* 15 × 5 mm, unlobed, falcate, truncate at apex, entire, glabrous; basal petal 20–25 × *c.* 5 mm, truncate at apex, entire, auricle absent. Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; stigmas sticky, capitate. Capsules ellipsoid, acute, glabrous. Seeds sub-globose, shining.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: On moist rocks in grasslands; Fl. & Ft.: July-November.

Specimen examined: Venmony-Kattappana way side, 06.07.2021, *Vishnu Mohan* & *Santhosh Nampy* 178426 (CALI).

Impatiens aliciae C.E.C.Fisch., Bull. Misc. Inform. Kew 1934: 389. 1934; Gamble, Fl. Madras 1870. 1935; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 531. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 122. 2012.



Annual herbs, up to 50 cm long. Stems quadrangular, glabrous, salmon-red. Leaves simple, opposite; lamina linear-narrowly elliptic, 5–8 × 0.5–0.9 cm, acute at apex, cuneate-rounded at base, distantly serrate, glabrous; petioles 0.1–0.2 cm long, stout. Flowers in 2–5-flowered axillary fascicles; peduncles obscure; pedicels 2.3–3.7 cm long. Bracts linear, *c*. 0.5 × 0.5 mm, acuminate at apex, entire, glabrous, brownish red. Flowers *c*. 1 cm in diam., deep pink. Sepals 3; lateral sepals 2, falcate, 2–5 × *c*. 1 mm, acute at apex, entire, glabrous; lower sepal saccate; spur 4 mm long, tubular, pink. Petals 3; dorsal petal orbicular, *c*. 5 × 6 mm, mucronate at apex, entire; lateral united petals 2, pink with deep pink striations at the joining; distal petal unlobed; basal petal small; dorsal auricle slender, *c*. 4 mm long, glabrous. Stamens 5; filaments and anthers fused. Ovary fusiform *c*. 1.5 × 1 mm, green, glabrous; stigmas crested. Capsules fusiform, 10–15 × *c*. 5 mm, glabrous. Seeds ovoid, glabrous, black.

Distribution: The native range of this species is SW. India (Kerala) (POWO, 2023); *Habitat*: Dripping rocks and forest margins; *Fl.* & *Ft.*: September-January.

Specimen examined: Neryamangalam-Valara way side, 17.11.2020, *Vishnu Mohan* & *Santhosh Nampy* 154134 (CALI).

Impatiens campanulata Wight, Madras J. Lit. Sci. ser. 1. 5: 11. 1837; Hook.f., Fl. Brit. India 463. 1874; Gamble, Fl. Madras 1: 143. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 533. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 236. 2012.



Caulescent erect perennial herbs, up to 80 cm tall. Stems fleshy, sparsely branched, glabrous. Leaves simple, alternate-opposite, lamina ovate-lanceolate, 4–10 × 2.5–4.5 cm, acute at apex, cuneate at base, crenate, minutely puberulous above, glabrous and glaucous beneath; petioles 2.5–5 cm long, grooved, succulent, glabrous. Flowers white, in axillary sub-umbellate inflorescence; pedicels *c*. 5 cm long, erect, glabrous. Bracts ovate-lanceolate, *c*. 10 × 5 mm, acuminate at apex, entire, glabrous. Sepals 3; lateral 2 sepals lanceolate, *c*. 5 × 3 mm, acuminate at apex, entire, glabrous; lower sepal cymbiform with purple streaks; spur sub-saccate, short, constricted at the junction of lip. Petals 3; dorsal petal obovate, keeled, entire, glabrous; lateral united petals 2; distal petal obovate-semicircular, entire, glabrous, unlobed; basal petal ovate; auricle filiform. Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; stigmas sticky. Capsules ellipsoid.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Evergreen forests; *Fl.* & *Ft*.: June-September.

Specimens examined: Choondal, MSNP, 22.06.2014, *S. Syam Radh & Santhosh Nampy* 137851 (CALI); Devikulam, 11.09.1968, *D.B. Deb* 30738 (MH); Devikulam, 16.06.1963 *K.M. Sebastine* 16530 (MH); Karimutty, 10.02.2021, *Vishnu Mohan & Santhosh Nampy* 186626 (CALI); Lakshmi Estate, 30769, *D.B. Deb* 30769 (MH).

Impatiens chinensis L., Sp. Pl. 937. 1753; Gamble, Fl. Madras 1: 139. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 534. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 126. 2012.

Annual herbs, up to 60 cm tall. Stems angled, glabrescent. Leaves opposite; lamina linear-oblong, lanceolate, 4–7 × 0.5–1 cm, acute at apex, rounded at base, serrate, villous above, glaucous beneath; sub-sessile. Stipules subulate, 0.4–0.4.5 × 0.1–0.2 cm, acuminate at apex, entire, recurved, glandular. Flowers axillary, solitary; pedicels 3–5 cm long, slender, deflexed in fruit. Sepals 3; lateral sepals 2, linear or falcate, *c*. 8 × 2 mm, acute at apex, entire, glabrous; lower sepal cymbiform, 10–12 × *c*. 7 mm, slender, glabrous, incurved; spur 3–3.5 cm long, slender. Petals 3; dorsal petal orbicular, 10–12 × *c*. 15 mm, horned, entire; lateral united petals 2; distal petal orbicular or obovate, unlobed; basal petal minute, auricled at base, glabrous. Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; stigmas sticky. Capsules ellipsoid, tapering at both ends. Seeds oblong.

Distribution: The native range of this species is Indian Subcontinent to S. China and Peninsula Malaysia (POWO, 2023); *Habitat*: Marshy areas in grasslands; *Fl. & Ft*.: March-September.

Specimen examined: PTR, 21.03.1995, *N. Sasidharan* 14906 (KFRI).

Impatiens coelotropis C.E.C.Fisch., Bull. Misc. Inform. Kew 1934: 390. 1934; Gamble, Fl. Madras 1871. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 536. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 263. 2012.

Erect undershrubs, up to 1 m tall. Stems terete, glabrous, leaf scar persistent, woody at base. Leaves simple, alternate; lamina lanceolate, 5–10 × 2.5–4.5 cm, attenuate at apex, cuneate at base, crenulate, glabrous; petioles 1.5–4 cm long, glabrous, pale green; petiolar glands 2–4, thin, slender, with a hooked tip, green. Flowers *c*. 2.5 cm in diam., in condensed axillary racemes; peduncles



1.5–2 cm long, erect, glabrous; pedicels 0.8–2.5 cm long, glabrous, green. Bracts narrowly elliptic, 3–4 × 1–1.5 mm, acuminate at apex, entire. Sepals 3; lateral sepals 2, orbicular, *c.* 7 × 5 mm, mucronate at apex, entire, glossy bright red, glabrous; lower sepal saccate, compressed laterally, spurred, cymbiform at apex; spur tubular, upcurved and appressed to the lip, glabrous, glossy green. Petals 3; dorsal petal 1, broadly ovate, *c.* 1.5 × 1.6–2 mm, cymbiform, acute at apex, glabrous, glossy bright red; lateral united petals 2, distal petal unlobed; lower petal triangular; auricle absent. Stamens 5; filaments and anthers fused. Ovary ellipsoid, fusiform *c.* 4 × 1 mm, pale green, glabrous; stigmas beaked. Capsules narrowly fusiform, *c.* 1.5 cm long, glabrous, many seeded. Seeds kidney-shaped, compressed.

Distribution: The native range of this species is SW. India (Kerala) (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: August-December.

Specimens examined; way side to Anamudi base camp, 31.08.2019, *Vishnu Mohan & Santhosh Nampy* 170261; Neymakkad, 24.01.2017, *Vishnu Mohan & Santhosh Nampy* 158169; Pettimudi, 29.12.2019, *Vishnu Mohan & Santhosh Nampy* 164876 (CALI); Umiyamala, 20.11.1965, *B.V. Shetty* 26574 (MH).

Impatiens cordata Wight, Madras J. Lit. Sci. 5: 10. 1837; Hook.f., Fl. Brit. India 1: 462. 1874; Gamble, Fl. Madras 1: 144. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 536. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 238. 2012.



Fleshy annual herbs, up to 40 cm tall. Stems fleshy, glabrous. Leaves simple, alternate; lamina ovate-cordate, 5–8 × 2–5 cm, acuminate at apex, rounded at base, slightly serrate, sparsely hairy along nerves, glabrous beneath; petioles 2–6 cm long, slender, grooved, fleshy, glabrous. Flowers pink in axillary sub-umbels; peduncles erect, slender, glabrous. Bracts ovate, *c.* 5 × 3 mm, acute at

apex, entire, glabrous. Sepals 3, free; lateral sepals 2, obliquely ovate, acuminate at apex, entire, glabrous; lower sepal 1, ovate-acuminate, funnel-shaped; spur *c.* 2 cm long, white, incurved, slender, glabrous. Petals 3, pink; dorsal petal 1, emarginated, cordate, acute at apex, entire, glabrous; lateral united petals 2; distal petal obovate, acute at apex, entire, glabrous, unlobed; basal petal reduced. Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; styles absent; stigmas sticky. Capsule fusiform. Seeds almond-shaped, spirally coiled hairy.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Near water courses in evergreen forests; *Fl. & Ft.*: October-March.

Specimens examined: Mankulam, 15.01.2019, *Vishnu Mohan & Santhosh Nampy* 159305 (CALI); PTR, 23.10.1993, *Jomy Augustine* 12594 (KFRI).

Impatiens cuspidata Wight & Arn., Compan. Bot. Mag. 1: 321. 1836; Gamble, Fl. Madras 1: 142. 1915; Rathakr. *et al.* in P.Daniel (ed.), Fl. Kerala 1: 537. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 191. 2012.



Perennial branching shrubs, up to 80 cm tall. Stems fistular, globose at node, woody at base, glabrous. Leaves simple, alternate-opposite, crowded towards apex; lamina elliptic-lanceolate, 8–10 × *c.* 3 cm, acuminate at apex, cuneate at base, crenate, glabrous. Flowers pale pink-blue in axillary fascicles; pedicels 4–5 cm long, slender, glabrous. Sepal 3, free; lateral sepals 2, linear-lanceolate, acute at apex, entire, glabrous, pale green; lower sepal 1, cymbiform, funnel-shaped, cuspidate; spur *c.* 2.5 cm long, glabrous. Petals 3, free; dorsal petal obcordate, emarginate at apex, rounded at base, entire; lateral united petals 2; distal petal elliptic, rounded at apex, unlobed; basal petal obtuse, entire.

Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; stigmas sticky. Capsules ellipsoid.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft*.: August-December.

Specimens examined: Anamudishola 27.11.1979, *Nambiar* 1015; PTR, 13.12.1993, *N. Sasidharan* 12974 (KFRI); Puthukkad-Mankulam, 30.08.2019*, Vishnu Mohan & Santhosh Nampy* 176080 (CALI).

Impatiens dasysperma Wight, Madras J. Lit. Sci. 5: 7 1837; Hook.f., Fl. Brit. India 457. 1874; Gamble, Fl. Madras 1: 143. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 538. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 193. 2012.



Annual erect caulescent herbs, up to 1 m tall. Stems fleshy, terete, glabrous. Leaves simple, opposite-whorled; lamina ovate-elliptic, 6–10 × 3–5 cm, acuminate at apex, cuneate at base, serrate, sparsely pubescent; petioles *c*. 3 cm long, glabrous, grooved. Flowers solitary or paired, axillary; peduncles reduced; pedicels *c*. 2 cm long, sparsely hairy. Sepals 3; lateral sepals 2, ovate, *c*. 3 × 2 mm, acute at apex, entire, sparsely hairy out, glabrous within; lower sepal cymbiform, glabrous, pink; spur *c*. 2 cm long, tubular, slightly incurved, glabrous, white. Petals 3, free, pink; dorsal petal oblong-obcordate, *c*. 1 × 0.6 cm, keeled; lateral united petals 2; distal petal elliptic, rounded at apex, entire, unlobed; basal petal emarginate at apex, entire, clawed. Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; stigmas sticky. Capsules fusiform, green.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Near streams; *Fl. & Ft*.: October-December.

Specimen examined: Sivanpara, MSNP, 22.11.2017, *S. Syam Radh & Santhosh Nampy* 153442 (CALI).

Impatiens diversifolia Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 139. 1834; Hook.f., Fl. Brit. India 1: 446. 1874; Gamble, Fl. Madras 1: 140. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 539. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 193. 2012.

Diffuse flaccid herbs, up to 50 cm tall. Stems angular, glandular. Leaves simple, opposite, lamina ovate-linear, 1.5–5 × 0.8–1 cm, acute at apex, truncate-cordate at base, sparsely serrate, glabrous; petioles 1–2.5 mm long, stout. Flowers axillary, 2–4; pedicels 1–2 cm long, pubescent, deflexed in fruit. Sepals 3; lateral sepals 2, linear, 5–8 × 1–2 mm, acuminate at apex, entire, glabrous; lower sepal 1; spur saccate, 1–1.5 cm long, filiform, slender. Petals 3; dorsal petal 1; orbicular, 5–6 × *c*. 4 mm, acute at apex, entire, glabrous; lateral united petals 2; distal petal semi-obovate, 10–12 × *c*. 8 cm, rounded at apex, entire, glabrous, unlobed; basal petal minute. Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; stigmas sticky. Capsules ellipsoid, turgid. Seeds globose, smooth, shining, dark brownish.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Damp moist areas; *Fl. & Ft*.: June-November.

Specimens examined: Painavu, 20.08.1981, *V.S. Ramachandran* 71123 (MH); Venmony, 26.08.2021 *Vishnu Mohan & Santhosh Nampy* 176543 (CALI).

Impatiens elegans Bedd., Madras J. Lit. Sci. Ser. 2, 20: 67. 1859; Hook.f., Fl. Brit. India 1: 465. 1875; Gamble, Fl. Madras 1: 145. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 539. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 240. 2012.

Annual erect herbs, up to 30 cm tall. Stems fleshy, terete, brownish green, glabrous. Leaves simple alternate; lamina ovate, 4–10 × 2–4 cm, acute at apex, cordate at base, serrate, sparsely hairy above, glabrous beneath; petioles 2–3.5 cm long, slender, glabrous. Flowers 3–6, in axillary or terminal sub-umbels; pedicles *c*. 1 cm long, erect, glabrous. Bracts ovate-lanceolate, 3–4 ×

2–2.5 mm, acuminate at apex, entire, glabrous. Sepals 3, free; lateral sepals 2, ovate-lanceolate, 4–5 × 2–2.5 mm, acuminate at apex, entire, glabrous, pale green; lower sepal cymbiform, small; spur absent, white, glabrous. Petals 3, free; dorsal petal orbicular, 6–6.5 × 6–7 mm, rounded at apex, entire, glabrous, white; lateral united petals 2; distal petal obliquely ovate, unlobed; basal petal reduced. Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; stigmas sticky. Capsules ellipsoid, beaked, green, glabrous.



Distribution: The native range of this species is SW. India (Tamil Nadu) (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: September-April.

Specimens examined: Mankulam, 16.04.2018, *Vishnu Mohan & Santhosh Nampy* 159471; Sivanpara, MSNP, 08.05.2015, *S. Syam Radh & Santhosh Nampy* 137956 (CALI).

Impatiens flaccida Arn., Compan. Bot. Mag. 1: 322. 1836; Hook.f., Fl. Brit. India 1: 457. 1874; Gamble, Fl. Madras 1: 143. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 540. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 240. 2012.

Annual erect herbs, up to 1 m tall. Stems fleshy, terete, branching, glabrous. Leaves simple, alternate, usually fascicled towards apex of stem; lamina lanceolate-elliptic, 3–5 × 2–2.5 cm, acuminate at apex, cuneate at base, crenate, hispid above, glabrescent beneath; petioles 2–4 cm long, slender, glabrous. Flowers axillary, solitary or in groups; pedicels 2–4 cm long, glabrous. Sepals 3; lateral sepals ovate, 2–3 × 1.5–2 mm, acuminate at apex, entire, glabrous; lower sepal cymbiform; spur up to 4 cm long, tubular, straight-slightly curved, glabrous. Petals 3, pink; dorsal petal obovate, 1–1.5

× *c*. 1 cm, notched at apex, entire, glabrous; lateral united petals 2-lobed; distal petal obovate, rounded at apex, unlobed; basal petal notched at apex, entire. Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; styles absent; stigmas sticky. Capsules ellipsoid, beaked, green, glabrous.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Moist deciduous forests; *Fl. & Ft.*: July-October.

Specimens examined: Painavu, 21.08.1981, *V.S. Ramachandran* 71132; Puliyanmala, 26.02.1984, *A.G. Pandurangan* 78099 (MH); Venmony, 16.07.2021, *Vishnu Mohan & Santhosh Nampy* 176059 (CALI).

Impatiens gardneriana Wight, Icon. Pl. Ind. Orient. 3: t. 1050. 1846; Hook.f., Fl. Brit. India 1: 445. 1874; Gamble, Fl. Madras 1: 141. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 541. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 115. 2012..



Annual herbs, up to 40 cm tall. Stems creeping at base and rooting, ascending branched or not. Leaves simple, whorled; lamina ovate-oblong or elliptic-lanceolate, 3–12 × 1–4 cm, acuminate at apex, cuneate at base, sparsely pubescent, ciliate towards base; petioles 1.2–3.5 cm long, pubescent. Flowers axillary, solitary or in fascicles, *c*. 2.5 cm across, pink; peduncles filiform, 2–3.5 cm long, glabrous. Sepals 3; lateral sepals 2, ovate-lanceolate, acuminate, ciliate. Lower sepal cymbiform; spur curved upwards, *c*. 1.8 cm long, slender. Petals 3; dorsal petal sub-orbicular-obovate, apiculate, dorsally keeled; lateral united petals 2-lobed; lobes obovate, distal lobe larger. Stamens 5, connate to form a cup above the ovary, pinkish-white. Ovary obovoid, greenish. Capsules terete, *c*. 1.5 cm long. Seeds hairy.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: On wet rocks in grasslands and evergreen forests; *Fl. & Ft.*: July-December.

Specimen examined: Meenuliyanpara, 17.07.2022, *Vishnu Mohan & Santhosh Nampy* 175091 (CALI).

Impatiens goughii Wight, Ill. Ind. Bot. 1: 160. 1839; Hook.f., Fl. Brit. India 1: 452. 1874; Gamble, Fl. Madras 1: 144. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 542. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 241. 2012..



Annual erect herbs, 7–50 cm tall. Branches angular, fleshy, brown. Leaves simple, alternate-sub-opposite; lamina ovate-elliptic, 0.6–3.5 × 0.4–1 cm, acute-obtuse at apex, obtuse at base, serrate, glabrous; petioles 8–20 mm long, purplish, glabrous. Flowers pink/white/pale pink with a pair of dark crimson eyes followed by white blotches, 3–8, in terminal or axillary umbels; peduncles 5–10 cm long, much branched; pedicels 5–20 mm long, purplish. Sepals 3; lateral sepals 2, falcate, 1–2 × 0.5–0.8 mm, acute at apex, entire, glabrous green, lower sepals boat-shaped, *c*. 8–10 × 5–7 mm, acuminate at apex, entire, pinkish; spur 4–9 mm long, cylindrical, curved, pinkish-white. Petals 3; dorsal petal ovate-orbicular, 6–8 × 5–8 mm, rounded to acute at apex, entire, glabrous; lateral united petals 2; distal petal 2-lobed, lobes elliptic; basal petal minute. Stamens 5, connate to form a cup above the ovary, pinkish-white. Ovary obovoid, greenish. Capsules fusiform, 3–8 mm long, green, glabrous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: On wet rocks in grasslands and evergreen forests; *Fl. & Ft.*: July-December.

Specimens examined: Choondal, Mathikettan Shola National Park, 17.07.2015, *S. Syam Radh & Santhosh Nampy* 145071 (CALI); Kattappana, 05.10.1983, *A.G. Pandurangan* 79261; Lakshmi Estate, 12.09.1968, *D.B. Shetty* 30768; Lockhert gap, 10.10.1963, *K.M. Sebastine* 17510 (MH); Puthukkad-Mankulam, 15.01.2019, *Vishnu Mohan & Santhosh Nampy* 170392 (CALI).

Impatiens grandis Heyne ex Wall. in Roxb., Fl. Ind. 2: 465. 1824; Hook.f., Fl. Brit. India 1: 463. 1874; Gamble, Fl. Madras 1: 143. 1915; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 246. 2012..

Impatiens hookeriana Arn., Compan. Bot. Mag. 1: 324. 1834; Hook.f., Fl. Brit. India 1: 463. 1874.

Shrubs, up to 2 m tall. Stems succulent, glabrous. Leaves simple, alternate; lamina ovate-lanceolate, 10–18 × 5–8 cm, acute at base and apex, crenate, glabrous; petioles 4–8 cm long, glabrous, with a pair of stalked glands at base. Flowers in few-flowered axillary umbels; peduncles *c.* 10 cm long, glabrous; pedicels 7–8 cm long, slender, glabrous. Bracts ovate, *c.* 5 × 3 mm, acuminate at apex, entire, glabrous. Sepals 3; lateral sepals 2, ovate, acuminate at apex, entire, glabrous; lower sepal cymbiform, falcate; spur tubular, incurved, glabrous, red. Petals 3; dorsal petal orbicular, *c.* 1 × 1 cm, notched at apex, wavy at margins, glabrous, white; lateral united petals 2, streaked with red lines; distal petal uneven, unlobed; basal petal truncate, falcate. Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; stigmas sticky. Capsules *c.* 25 × 7 mm, glabrous. Seeds many, orbicular, glandular-pubescent, brown.

Distribution: The native range of this species is SW. India (Tamil Nadu) and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: August-December.

Specimens examined: Mangaladevi, 10.08.1993, *Jomy Augustine* 2538 (CALI); PTR, 28.08.1994, *N. Sasidharan* 14065 (KFRI).

Impatiens grandispora Nampy & M.Vishnu, Taiwania 65: 191. 2020.



Tuberous lithophytic herbs, 20–30 cm tall. Leaves radical; lamina cordate to rounded, 6–8 × 4–6.5 cm, fleshy but leathery, rounded or rarely mucronate at apex, cordate at base, serrate; petioles 6–9 cm long, glabrous. Flowers in racemose scapes; scapes 20–30 cm long, reddish-brown; 4–16-flowered; pedicels smooth, reddish-brown, 4–6 cm long. Bract ovate, 5–7 × *c.* 2 mm, acute at apex, smooth persistent. Flowers 2.5–3 × 1.8–2 cm. Sepals 3; lateral sepals 2, obliquely triangular, 5–6 × 3.5–4 cm, acute at apex, cordate at base, smooth, glabrous; lower sepal cymbiform, falcoid at apex, smooth; spur 3.8–4.3 cm long, base slightly incurved, white. Petals 3; dorsal petal cordate, 0.7–1 × 1.1–1.3 cm, acute at apex, cordate at base, smooth; lateral united petals 2; distal petal bilobed, elliptic, falcate; basal lobe elliptic, falcate, smooth; with reddish patch of papillae at center. Stamens 5; filaments papery, *c.* 5 × 8 mm. Ovary elliptic, *c.* 4 × 1.5 mm; stigmas sticky, capitate. Capsules *c.* 1.5 × 0.5 cm. Seeds numerous, golden brown, oval to elliptic with spirally coiled hairs.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: September-December.

Specimen examined: Puthukkad, 15.09.2019, *Vishnu Mohan & Santhosh Nampy* 159468 (CALI).

Note: This newly described is close to *I. stolonifera* but differs by its pollen size (50 µm *vs.* 25 µm), colour of papillae (red *vs.* white) and colour of bracts (reddish brown *vs.* pale green).

Impatiens henslowiana Arn., Compan. Bot. Mag. 1: 322. 1836; Hook.f., Fl. Brit. India 1: 458. 1875; Gamble, Fl. Madras 1: 143. 1915; Vivek. *et al*. in Hajra *et al*. Fl. India 4: 155. 1997; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 543. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 223. 2012.



Shrubs, up to 60 cm tall. Stems hard, thick. Leaves simple, alternate; laminae elliptic, 7–17 × 4–6 cm, attenuate at apex and base, serrate, scabrid; petioles 2–6 cm long, pilose. Flowers solitary, axillary; pedicels *c*. 5 cm long, hispid. Sepals 3; lateral sepals 2, lanceolate, *c*. 1.3 × 0.6 cm, caudate at apex, rounded at base, entire; lower sepal, cymbiform, spurred, *c*. 4 cm long, pale green-white, hispid. Petals 3, pale violet-white; dorsal petal obcordate, *c*. 1 × 2 cm, cordate at apex, rounded at base, entire; lateral united petals 2; distal petal slightly notched at apex; basal petal slightly notched at apex. Stamens 5; filaments and anthers fused. Ovary fusiform, *c*. 5 × 2 mm, hispid; stigmas sticky. Capsules fusiform, 2–2.5 × 0.5–0.8 cm, villous, many seeded. Seeds almond-shaped.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: April-December.

Specimens examined: Anamudi shola, 25.01.2018, *Vishnu Mohan & Santhosh Nampy* 158258 (CALI); *Ibid.*, 27.11.1979, *Nambiar* 1018 (KFRI); Neymakkad, 24.01.2017, *Vishnu Mohan & Santhosh Nampy* 158180; Puthukkad-Nallathannikallar, 15.09.2018, *Vishnu Mohan & Santhosh Nampy* 161925 (CALI).

Impatiens herbicola Hook.f., Bull. Misc. Inform. Kew 1911: 354. 1911; Gamble, Fl. Madras 1: 141. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 544. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 138. 2012.

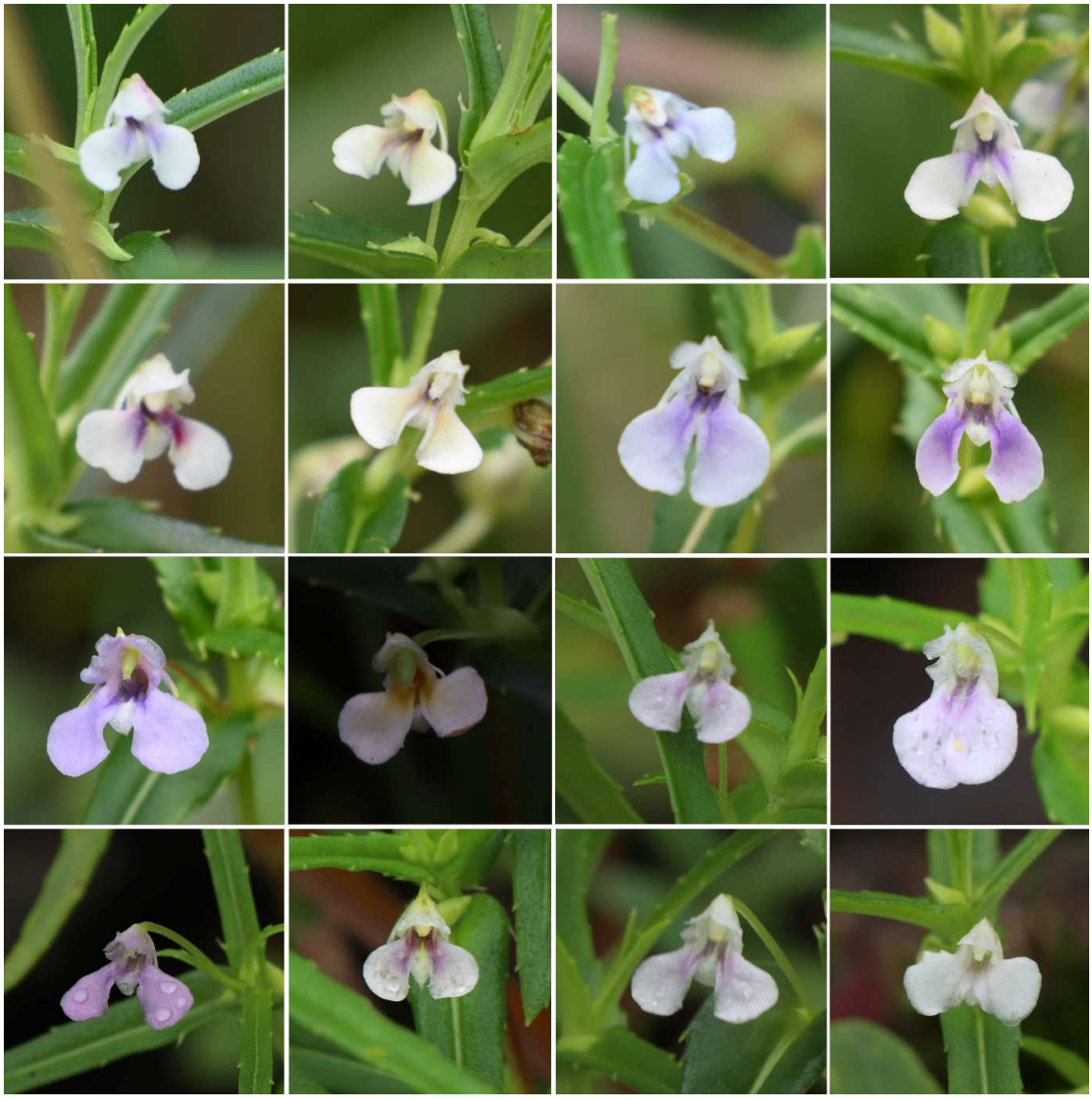


Annual erect herbs, 20–50 cm tall. Stems fleshy, pale green, glabrous. Leaves simple, decussate; lamina linear, 3–5 × *c*. 0.5 cm, acute at apex, truncate at base, serrate, sessile; extra petiolar glands greenish-red, spathulate. Flowers in axillary, 2–8-flowered fascicles; pedicels 1–1.5 cm long, brownish, hairy. Sepals 3; lateral sepals 2; linear, *c*. 2 mm long, glabrous, green; lowers sepal boat-shaped, *c*. 0.5 × 0.2 cm, greenish white; spur *c*. 2 mm long. Petals 3: Standard petals obovate, *c*. 0.4 × 0.3 cm, entire, white; lateral united petals 2; distal petal orbicular-obovate, rounded at apex, entire, unlobed; basal lobe minute.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft*.: September-May.

Specimens examined: Aduvizhunthankudi, MSNP, 22.11.2014, *S. Syam Radh & Santhosh Nampy* 137814; Pandippara, 08.10.2017, *Vishnu Mohan & SanthoshNampy* 152916 (CALI); PTR, 13,09.1994, *N. Sasidharan* 14124 (KFRI); Thommankutthu, 20.08.2021, *Vishnu Mohan & Santhosh Nampy* 176543; Venmony, 19.08.2021, *Vishnu Mohan & Santhosh Nampy* 167865 (CALI).

Note: This species shows wide range of variation in terms of flower colour from blue in white, violet in white, purple in white, pink, pale blue, yellow and white.



Impatiens inconspicua Benth. ex Wight & Arn., Prodr. Fl. Ind. Orient. 139. 1834; Hook.f., Fl. Brit. India 1: 447. 1874; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 544. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 141. 2012. *Impatiens inconspicua* var. *ramosissima* (Dalzell) Hook.f., Fl. Brit. India 1: 448. 1874; *Impatiens pusilla* var. *nematostachys* Hook.f., Bull. Misc. Inform. Kew 1910(8): 294. 1910. *Impatiens pusilla* Heyne ex Hook.f. & Thomson, J. Linn. Soc. Bot. 4: 122. 1859; Gamble, Fl. Madras 1: 140. 1915.

Slender flaccid herbs, up to 40 cm tall. Stems angular, fleshy, branching from base. Leaves simple, decussate; lamina elliptic-oblong, 1–4 × *c*. 0.5 cm, acute at apex, truncate at base, serrate; petioles 0.5–1.5 mm; extra petiolar glands present in node. Flowers axillary, solitary or in pairs, pedicels slender,

pubescent. Sepals 3; lateral sepals linear-subulate, falcate, *c.* 3 × 0.7 mm, acuminate at apex, entire, glabrous; lower sepal cymbiform, falcate, *c.* 2 × 2 mm, mucronate at apex, entire, glabrous; spur absent. Petals 3; dorsal petal cymbiform, *c.* 2 × 2 mm, acute at apex, entire, glabrous, smooth, creamish white; lateral petals 2; distal petal orbicular, entire; basal lobe minute. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 1 × 0.5 mm, pale green, glabrous; stigmas beaked. Capsules fusiform, glabrous, many seeded.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: September-December.

Specimens examined: Kalvarimala, 10.10.1994, *Jomy Augustine* 13894; Kumarikulam, 10.11.1993, *Jomy Augustine* 12778 (CALI).

Impatiens latifolia L., Sp. Pl. 937. 1753; Hook.f., Fl. Brit. India 1: 450. 1874; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 546. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 198. 2012.

Erect fleshy herbs, up to 40 cm tall. Stems terete, glabrous. Leaves simple, alternate, sub-opposite-whorled; lamina ovate-lanceolate, 5–12 × 2–6 cm, acuminate at apex, acute at base, serrate, membranous; petioles 2–5 cm long, slender, grooved, glandular. Flowers pink, solitary, 2 in axillary fascicles; pedicels *c.* 5 cm long, glabrous. Sepals 3, free; lateral sepals 2, ovate, *c.* 3 × 2 mm, acuminate at apex, entire, glabrous; distal sepal cymbiform; spur incurved, tubular, sparsely hairy. Petals 3, free; dorsal petal orbicular, rounded-notched at apex, entire, glabrous; lateral united petals 2; distal petal truncate-rounded at apex, entire; basal petal elliptic, entire, glabrous, unlobed. Stamens 5; filaments and anthers fused. Ovary fusciform, *c.* 5 × 2 mm, hispid; styles absent; stigmas sticky. Capsules ellipsoid, *c.* 2.4 cm long. Seeds oblong.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: July-November.

Specimen examined: Vaguvarai, 11.09.2017, *Vishnu Mohan & Santhosh Nampy* 176319 (CALI).

Impatiens leptura Hook.f., Fl. Brit. India 1: 467. 1875. Gamble, Fl. Madras 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 547. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 249. 2012.



Erect herbs, *c*. 50 cm tall, Stems unbranched, glabrous. Leaves simple, alternate; petioles 2–3 cm long, glabrous; lamina lanceolate, 5–8 × 2.5–4 cm, acute at apex, cuneate at base, crenate, sparsely hairy. Flowers in axillary sub-umbels; peduncles 3–5 cm long, glabrous; pedicels 1.5–3 cm long, glabrous. Bracts ovate, *c*. 4 × 2 mm, acuminate at apex, caducous. Sepals 3; lateral sepals 2, ovate, *c*. 4 × 5 mm, acute at apex, entire, white-pale green; lower sepals cymbiform, cup-shaped, pale pink-white, glabrous, spurred; spur *c*. 3 cm long, slender, incurved. Petals 3; dorsal petal widely elliptic, rounded at apex, pink, glabrous; lateral united petals 2; distal petal semi-circular, entire, glabrous, unlobed; basal lobe very small. Stamens 5; filaments and anthers fused. Ovary fusiform *c*. 3 × 1.5 mm, pale green, glabrous; stigmas beaked. Capsules fusiform, glabrous, many seeded.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Rock crevices of waterfalls; *Fl. & Ft*.: June-April.

Specimens examined: way to Anamudi peak, 26.04.2019, *Vishnu Mohan & Santhosh Nampy* 158077; Mesthirikettu, 30.12.2017, *Vishnu Mohan & Santhosh Nampy* 158077; *Ibid*., 30.12.2017, *Vishnu Mohan & Santhosh Nampy* 158081 (CALI); PTR, 23.10.1993, *Jomy Augustine* 12589 (KFRI).

Impatiens leschenaultii (DC.) Wall., Numer. List: n.°4739. 1831; Hook.f., Fl. Brit. India 1: 450. 1874; Gamble, Fl. Madras 1: 141. 1915; Rathakr. *et al.* in P.Daniel (ed.), Fl. Kerala 1: 547. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 200. 2012.



Undershrubs, up to 1.5 m tall. Stems fleshy, glabrous. Leaves simple, opposite-alternate; lamina ovate-lanceolate 2.5–8 × 1.2–3 cm, acute or acuminate at apex, cuneate at base, crenate, glabrous; petioles 3–5 cm long, glandular hairy. Flowers solitary; pedicels up to 3 cm long. Sepals 3; lateral sepals 2, ovate-lanceolate, *c.* 3 × 1.5 mm, acuminate at apex, entire; lower sepal cymbiform; spur 1–2.2 cm long incurved, slender. Petals 3; dorsal petal suborbicular, notched at apex, entire; lateral united petals; distal lobe obovate, truncate, unlobed; basal petal orbicular, rounded at apex, entire. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 3 × 1.5 mm, pale green, glabrous; stigmas beaked. Capsules ellipsoid, beaked, 3–5-seeded. Seeds obovoid, rugose or papillose, dark purplish brown.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Shola forests and grasslands; *Fl. & Ft.*: June-April.

Specimens examined: Devikulam, 07.02.1970, *B.V. Shetty* 33434 (MH).

Impatiens levingei Gamble ex Hook.f., Rec. Bot. Surv. India 4: 39. 1906; Gamble, Fl. Madras 1: 138. 1915; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 70. 2012.

Tuberous herbs, up to 20 cm tall. Leaves radical; lamina broadly ovate, *c.* 5 × 6 cm, acute at apex, deeply cordate at base, distantly serrate, glabrous; petioles up to 11 cm long, slender, glabrous. Scapes 15–18 cm long; peduncles up to 20 cm long, slender, glabrous; pedicels 1.5–2 cm long, slender. Bracts ovate, 4–6 × *c.* 2 mm, acute at apex, entire, glabrous. Sepals 3; lateral sepals ovate, *c.* 2 × 1 mm, acute at apex, entire, calcite, glabrous; lower sepals cymbiform; spur *c.*

5 mm long, cylindrical, straight, glabrous. Petals 3; dorsal petal orbicular-elliptic, rounded at apex, entire, glabrous; lateral united sepals 2; distal petal 2-lobed, elliptic, rounded at apex, entire; basal petal reduced. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 3 × 1.5 mm, pale green, glabrous; stigmas beaked. Capsules *c.* 6–8 mm long. Seeds glandular-hairy, reddish brown.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Moist rocky places in sholas; *Fl. & Ft.*: June-April.

Specimen examined: PTR, 18.08.1994, *Jomy Augustine* 13872 (KFRI).

Impatiens ligulata Bedd., Madras J. Lit. Sci. Ser. 2, 20: 67. 1859; Hook.f., Fl. Brit. India 1: 446. 1874; Gamble, Fl. Madras 1: 140. 1915; Vivek. *et al*. in Hajra *et al*., Fl. India 4: 174. 1997; Rathakr. in P.Daniel (ed.), Fl. Kerala 1: 548. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 153. 2012.



Erect herbs, up to 60 cm tall. Stems fleshy, angular, glabrous. Leaves simple, decussate; lamina linear-lanceolate, 7–11 × 0.2–0.7 cm, mucronate at apex, truncate, serrate, hispid above, glabrous below; petioles 0.1–0.2 cm long. Stipules absent. Flowers fascicled at nodes; pedicels slender, 2–3.5 cm long. Sepals 3; lateral sepals linear-lanceolate, *c.* 3 × 1 mm, acuminate at apex, entire, smooth, glabrous, pink; lower sepal cymbiform, spurred; spur falcate-straight, saccate, 5–7 mm long, middle bulged, pit pointed, incurved. Petals 3; dorsal petal cordate, *c.* 3 × 3 mm, acuminate at apex, entire, pink; lateral united petals 2; distal petal semi-circular, unlobed; lower petal reduced; auricle 5–7 mm long, thread-like, filiform. Stamens 5; filaments and anthers fused. Ovary fusciform, *c.* 3 × 1 mm, hispid; stigmas beaked. Capsules ellipsoid. Seeds glabrous, shining.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: July-October.

Specimens examined: Kattadikkadavu, 12.10.2019, *Vishnu Mohan & Santhosh Nampy* 170340; Neriyamangalam, 11.09.2018, *Vishnu Mohan & Santhosh Nampy* 159465; Pandippara, 16.07.2021, *Vishnu Mohan & Santhosh Nampy* 176021(CALI).

Impatiens maculata Wight, Madras J. Lit. Sci. 5: 12. 1837; Hook.f., Fl. Brit. India 1: 465. 1875; Gamble, Fl. Madras 1: 145. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 550. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 264. 2012.



Erect slender herbs, up to 2 m tall. Stems ribbed, hispid. Leaves simple, alternate; lamina elliptic, 6–13 × 3–6 cm, attenuate at apex, obtuse-cuenate at base, serrate, hispid; petioles 3–6 cm long, pubescent. Flowers in terminal racemes; peduncles 6–10 cm long, slender, glabrous; pedicels *c*. 2 cm long. Bracts ovate, *c*. 4 × 1 mm, acuminate at apex, ciliate, persistent. Sepals 3; lateral sepals 2, ovate, acute at apex, rounded at base, entire, glabrous; lower sepal cymbiform; spur 3–4 cm long, slender, incurved. Petals 3, pale pink; dorsal petal orbicular, acuminate at apex, rounded at base, entire; lateral united petals 2; distal petal semi-circular, with flair like striations, entire; basal petal minute; dorsal auricle absent. Stamens 5; filaments and anthers fused. Ovary fusciform, *c*. 3 × 1 mm, hispid; stigmas beaked. Capsules fusiform, 5–8 × 1–4 mm, glabrous, many seeded.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Along streams and marshes in evergreen forests; *Fl. & Ft.*: May-January.

Specimens examined: Aduvizhunthankudi, MSNP, 23.11.2014, *S. Syam Radh & Santhosh Nampy* 137832; Choondal, 22.11.2014, *S. Syam Radh & Santhosh Nampy* 137814; Mathikettan Shola National Park, 11.12.2016, *Vishnu Mohan & Santhosh Nampy* 151404; Thekkadi, 14.07.2017, *Vishnu Mohan & Santhosh Nampy* 152842; (CALI).

Impatiens mankulamensis K.M.P.Kumar, R.Jagad. & Nagaraj, Phytotaxa 296 (3): 281. 2017.



Tuberous lithophytic annual herbs, up to 13 cm tall. Stems succulent, unbranched, glabrous. Leaves simple, rosulate; lamina elliptic-lanceolate, 1.8–9.5 × 0.5–1.5 cm, attenuate at apex and base, crenulate, with moniliform trichomes on adaxial surface, glabrous on abaxial surface; petioles 0.5–2 cm long, glabrous. Flowers in sub-umbellate cymes; peduncles *c.* 5 cm long, glabrous; pedicels 5–7 mm long, glabrous. Bracts ovate-lanceolate, *c.* 3 × 1.5 mm, acuminate at apex, entire. Sepals 3; lateral sepals elliptic-orbicular, *c.* 5 × 2.5 mm, acuminate at apex, white with a brown tinge at apex, glabrous; lower sepal cymbiform at apex; spur *c.* 3 mm long, straight, pale pink, glabrous. Petals 3; dorsal petal broadly ovate, 5–6 × 6–7 mm, shortly mucronate apex, pale purple, glabrous; lateral united petals 2; distal petal triangular, acute at apex, entire, glabrous, unlobed; basal petal minute; dorsal auricle 0. Stamens 5; filaments and anthers fused. Ovary elliptic, *c.* 1 × 0.5 mm, pale green, glabrous; stigmas glabrous. Capsules ellipsoid, 1–1.2 cm long, glabrous, many seeded. Seeds ellipsoid, compressed, both ends fringed with white hairs.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: Evergreen forests; Fl & ft: June-November.

Specimen examined: Kannadipppara-Mankulam, 08.06.2018, *Vishnu Mohan & Santhosh Nampy* 159255 (CALI).

Impatiens minor (DC.) Bennet, Indian J. Forest. 2: 283. 1979; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 550. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 154. 2012 *Balsamina minor* DC. in Prodr. 1: 686 1824. *Impatiens kleinii* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 140. 1834; Hook.f., Fl. Brit. India 1: 445. 1874; Gamble, Fl. Madras 1: 140. 1915; Rathakr. *et al*. in Daniel (ed.), Fl. Kerala 1: 550. 2005.



Annual erect herbs, 10–20 cm tall. Stems fleshy, slender. Leaves simple, opposite; lamina elliptic-lanceolate, 2–4 × 1–2 cm, acute or acuminate at apex, acute at base, serrate, pilose above, glaucous beneath; petioles *c*. 1 cm long, slender, narrow, erect, grooved, glabrous. Flowers axillary, solitary, pink-white; pedicels 0.8–1.5 cm long, slender, narrow, glabrous. Sepals 3; lateral sepals 2, linear, *c*. 3 × 1 mm, acuminate at apex, entire, glabrous; dorsal sepals cymbiform, white; lower sepal cymbiform; spur slender, 6–10 mm long, incurved, pointed at tip. Petals 3; dorsal petals orbicular, *c*. 8 × 4 mm, rounded at apex, entire; lateral united petals 2; distal petal semi-circular, entire, unlobed; basal petal obscure. Stamens 5; filaments and anthers fused. Ovary elliptic, pale green, glabrous; styles reduced; stigmas glabrous. Capsules ellipsoid, beaked. Seeds globose, shining, black.

Distribution: The native range of this species is S. India (POWO, 2023);

Habitat: Evergreen forests; *Fl. & Ft*.: August-May.

Specimen examined: Neriyamangalam, 05.08.2019, *Vishnu Mohan & Santhosh Nampy* 159496 (CALI).

Impatiens modesta Wight, Madras J. Lit. Sci. 5: 13. 1837; Hook.f., Brit. India 1: 442. 1875; Gamble, Fl. Madras 1: 138. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 551. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 71. 2012.



Tuberous epiphytic scapigerous perennial herbs. Leaves simple; lamina ovate, 2–6.5 × 2–4.5 cm, acute at apex, cordate at base, serrate, scattered hairy above, glabrous beneath; petioles 4.5–7.5 cm long, glabrous, brown. Flowers in scapes; peduncles erect, up to 35 cm long, glabrous, brown; pedicels 15–20 mm long, glabrous. Bracts elliptic, *c.* 2 × 1 mm, acute at apex, entire, persistent, brown. Sepals 3; lateral sepals 2, linear-lanceolate c. 2 × 1 mm, acute at apex, entire, glabrous; lower sepal cymbiform; spur *c.* 3 mm long, straight, saccate, blunt at apex, white. Petals 3, pink; distal petal 2-lobed, elliptic, rounded at apex, entire, glabrous; lower petal elliptic, falcate, rounded at apex, glabrous, dorsal auricle absent. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 1 × 0.75 mm; glabrous; stigmas crested. Capsules fusiform, 5–8 × 1–4 mm, glabrous, many seeded.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: On trees and rocks in evergreen forests; *Fl. & Ft.*: May-November.

Specimens examined: Chinna Anamudi, 31.08.2019 *Vishnu Mohan & Santhosh Nampy* 170258 (CALI); PTR, 27.05.1995, *Jomy Augustine* 15348 (KFRI); near Sivanpara, MSNP, 22.11.2017, *S. Syam Radh & Santhosh Nampy* 153443 (CALI)

Impatiens nidholapathra M.Vishnu & Nampy, Taiwania 65: 187 2020.

Tuberous lithophytic herbs, 10–25 cm tall. Leaves radical, pendulous; lamina elliptic to narrowly deltoid, 5–11 × 2–5.5 cm, acute or rarely obtuse at apex, cordate but rarely cuneate or obliquely cordate at base, serrate and spinose, membranous with a tuft of uniseriate trichomes above and silky lanuginose hairs below; petioles 1.5–6 cm long, glabrous. Scapes racemose, 10–25 cm long;



4–12-flowered, pink; pedicels glabrous, 0.8–1.5 cm long, pale green. Bracts linear-lanceolate, 1–1.5 × *c.* 1 mm, acute at apex, entire, persistent. Sepals 3; lateral sepals elliptic, *c.* 1.7 × 0.7 mm, acute at apex, smooth, glabrous; lower sepal cymbiform, conical at apex, smooth, white; spur 8–10 mm long, slightly incurved. Petals 3; dorsal petal cordate, *c.* 2.7 × 3.3 cm, acute at ap ex, smooth, glabrous; lateral united petals 2; distal petal 2-lobed, elliptic, straight, white papillae surround the yellow patch at base; lower sepal reduced; auricle absent. Stamens 5; filaments *c.* 2 × 3 mm. Ovary elliptic, c. 1 mm long, strigose; styles 0; stigmas sticky, capitate. Capsules *c.* 4 mm long, glabrous. Seeds numerous, golden brown, oval; testa reticulate with spirally coiled hairs.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: On rocks in evergreen forests; Fl. & Ft.: September-May. *Specimens examined*: 50th mileMankulam, 14.09.2018 *Vishnu Mohan & Santhosh Nampy* 161903; Kozhiyilakudi-Anakulam, 18.09.2018, *Vishnu Mohan & Santhosh Nampy* 161987 (CALI).

Note: *Impatiens nidholapathra* was recently described from Anakkulam. It resembles *I. tirunelvelica*, but differs by its membranous silky lanuginose leaves, pale green veins, and pink corolla with a yellow centre surrounded by white papillae against fleshy glabrous leaves, brown veins, pink corolla uniformly white at centre in *I. tirunelveica*.

Impatiens omissa Hook.f., Rec. Bot. Surv. India 4: 43. 1906; Gamble, Fl. Madras 1: 144. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 554. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 250. 2012.

Annual semi-erect or diffuse herbs, up to 20 cm long. Stems more or less quadrangular, slender. Leaves opposite or alternate; petioles to 0.1 cm long; lamina ovate, 0.8–1.6 × 0.8–1.2 cm, acute at apex, truncate at base, serrate,

pubescent below, glabrous above. Flowers in pedunculate sub-umbels or racemes; peduncles 0.8–1.5 cm long, white; pedicels up to 3 cm long, pale green, glabrous. Bracts linear, *c.* 2 mm long, pale green. Sepals 3; lateral sepals 2, ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous; lower sepal boat-shaped *c.* 6 × 4 mm, glabrous, cuspidate at apex; spur tubular, 4–6 mm long, glabrous. Petals 3; dorsal petal elliptic, *c.* 6 × 5 mm, rounded at a pex, entire, glabrous; lateral united petals 2-lobed, 14–17 × 7–10 mm, glabrous, white or pale pink; basal lobe elliptic, with bright crimson stripes; distal lobe shallowly 2-lobed; dorsal auricle filiform, 3–4 mm long, yellow or bright orange; Stamens 5, cohering above pistil, slightly curved; filaments 5, white, connate at apex. Ovary narrowly oblong, glabrous; styles rudimentary; stigmas 5-toothed. Capsules ellipsoid, *c.* 7 × 4 mm, glabrous, green, 7–15-seeded. Seeds ovoid, with tubular hairs having 8–15 circular bands.



Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: On rocks in evergreen forests; *Fl. & Ft.*: September-May. *Specimen examined*: 8th mile-Mankulam, 14.09.2018, *Vishnu Mohan & Santhosh Nampy* 161903 (CALI).

Notes: *Impatiens omissa* and *I. raktakesara* resembles very much superficially, but the hairs on seeds of both species show marked differences. Monuliform tricomes are seen in *I. rakthakesara* while pointed tubular hairs with 8–15 horizontal bands in *I. omissa*.

Impatiens oppositifolia L., Sp. Pl. 937. 1753; Hook.f., Fl. Brit. India 1: 448. 1874; Gamble, Fl. Madras 1: 141. 1915 Rathakr. *et al.* in P.Daniel (ed.), Fl. Kerala 1: 552. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 162. 2012. Herbs, up to 50 cm tall. Stem angular, glabrous. Leaves simple, opposite-decussate; lamina linear-lanceolate, 3.5–7 × 0.8–2 cm, acute-apiculate at apex,

truncate at base, crenate, hairy mostly on nerves above, glabrous below; petioles up to 0.4 cm long, glabrous. Flowers 2 or 3, axillary; pedicels 1–2.5 cm long, sparsely hairy. Bracts linear, *c.* 1.5 × 0.5 mm, acuminate at apex, glabrous. Sepals 3; lateral sepals 2, linear, *c.* 5 × 1 mm, acute at apex, entire, glabrous; lower sepal cymbiform; spur 2–4 mm long, straight or hooked, rounded, notched at apex. Petals 3; dorsal petal broadly ovate, 3–6 × 4–6 mm, emarginate to obcordate at apex, entire; lateral united petals 2; distal petal ovate, entire, unlobed; lower petal reduced. Stamens 5; filaments *c.* 2 × 3 mm. Ovary elliptic, *c.* 1 mm long, strigose; styles 0; stigmas sticky, capitate. Capsules asymmetrically ellipsoid, *c.* 1.5 × 0.4–0.5 cm, glabrous; pedicels 2–3 cm long. Seeds globose, glabrous, shining, black to brown, funicle present.

Distribution: The native range of this species is W. India, Sri Lanka and Myanmar to Thailand (POWO, 2023); *Habitat*: Evergreen forests and grasslands; *Fl. & Ft.*: July-May.

Specimen examined: PTR, 26.07.1993, *Jomy Augustine* 12153 (KFRI).

Impatiens pallidiflora Hook.f., Bull. Misc. Inform. Kew 1911: 354. 1911; Gamble, Fl. Madras 1: 141. 1915; Rathakr. *et al.* in P.Daniel (ed.), Fl. Kerala 1: 553. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 165. 2012.



Annual erect herbs, up to 45 cm tall. Stems quadrangular, hairy. Leaves simple, decussate; ovate, 3–5 × *c.* 0.8 cm, acute at apex, truncate at base, serrate, coriaceous. Flowers solitary, axillary; pedicels *c.* 2 cm long, slender, hairy. Sepals 3; lateral sepals 2, linear, *c.* 5 × 2 mm, acuminate at apex, entire, hispid; lower sepal boat-shaped; spur 8–14 mm long, conical, incurved, pink, incurved, pointed at tip. Petals 3; dorsal petal orbicular, *c.* 0.6 × 0.6 cm, acute-rounded at apex, entire; lateral united petals 2, clawed. Stamens 5, connate to form a cap above the ovary. Ovary, oblong, greenish; stigmas crested, sticky. Capsules ellipsoid, green, glabrous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: August-December.

Specimens examined: Eravikulam, 28.08.2018, *Vishnu Mohan & Santhosh Nampy* 151660; Munnar, 16.09.2018, *Vishnu Mohan & Santhosh Nampy* 187654; Vattappara, MSNP, 30.12.2014, *S. Syam Radh & Santhosh Nampy* 137941 (CALI).

Impatiens pandata E.Barnes, Bull. Misc. Inform. Kew 1938: 33. 1938; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 553. 2005. Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 76. 2012.



Tuberous scapegerous succulent herbs, 5–10 cm tall. Leaves simple, succulent; lamina cordate, 1–2 × 1–1.5 cm, acute-obtuse at apex, cordate at base, serrate, glabrous; petioles 1.5–3 cm long, glabrous, purple. Flowers in scapes; peduncles 3–10 cm long, purple, glabrous; pedicels 0.8–1.5 cm long, glabrous. Bracts elliptic, *c*. 2.5 × 1 mm, acute at apex, entire, purple. Sepals 3; lateral sepals 2, ovate, *c*. 4 × 1.5 mm, acute at apex, entire; lower sepal cymbiform, spurless, rounded at apex, purple. Petals 3, white; dorsal petal elliptic, *c*. 0.8 × 0.4 mm, rounded to acute at apex, rounded at base, entire; lateral united petals 2; distal petal 2- lobed, elliptic, rounded at apex, entire, slightly tinged with bluish-purple, hairy at base; basal petal ovate-elliptic, dorsal auricle absent. Stamens 5; filaments and anthers fused. Ovary fusiform, *c*. 3 × 1 mm, glabrous, green; stigmas crested. Capsules fusiform, *c*. 1 × 0.5 cm, glabrous. Seeds ovoid, *c*. 1 mm long, with scattered hairs, reddish brown.

Distribution: The native range of this species is SW. India (Kerala) (POWO, 2023); *Habitat*: High altitudal rocks; *Fl. & Ft.*: August-September.

Specimen examined: Umiyamala peak, 30.08.2019, *Vishnu Mohan & Santhosh Nampy* 170253 (CALI).

Impatiens panduranganii K.M.P.Kumar, R.Jagad. & G.Prasad, Phytotaxa 296(3): 285. 2017.



Lithophytic erect herbs, up to 20 cm tall. Stems terete, unbranched, glabrous. Leaves simple, rosulate at top; lamina elliptic-ovate, 2.5–4 × 1.5–2 cm, obtuse at apex, attenuate at base, crenulate, sparsely hairy above, glabrous beneath; petioles 1–4 cm long, glabrous. Flowers on umbellate cymes; peduncles up to 5 cm long, glabrous; pedicels 1.5–2 cm long, glabrous. Bracts lanceolate, *c.* 3.5 × 1.5 mm, acuminate at apex, entire. Sepals 3; lateral sepals elliptic, *c.* 5 × 2 mm, shortly acuminate apex, entire, glabrous; lower sepals cymbiform, glabrous, spur absent. Petals 3; dorsal petal ovate, 8–12 × 7–10 mm, acute, entire, glabrous; lateral united petals 2; distal triangular, truncate, entire, glabrous; lower obscure; dorsal auricle minute, yellow. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 2.5 × 1 mm, pale green, glabrous; styles 0; stigmas beaked. Capsules ellipsoid, 0.8–1.2 cm long, glabrous, many seeded.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: June-November.

Specimen examined: Mankulam, 14.09.2018, *Vishnu Mohan & Santhosh Nampy* 186624 (CALI).

Impatiens parasitica Bedd. Madras J. Lit. Sci. 2, 20: 66. 1859; Gamble, Fl. Madras 1: 139. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 554. 2005. Bhaskar Taxon. Monogr. *Impatiens* W. Ghats 263. 2012.

Impatiens jerdoniae Wight var. *parasitica* (Bedd.) Hook.f., Fl. Brit. India 1: 460. 1874.



Epiphytic herbs, up to 25 cm tall. Stems succulent, leaf scar persistent, glabrous. Leaves simple, whorled at apex; lamina ovate-lanceolate, 3–12 × 2.5–6 cm, acute at apex, rounded at base, crenate, glabrous; petioles 2–5 cm long, glabrous. Flowers in sub-umbellate racemes; peduncles erect, 1–1.5 cm long, glabrous; pedicels 1.5–3 cm long, glabrous. Bracts narrowly elliptic, minute. Sepals 3; lateral sepals linear-elliptic, 8–10 × *c.* 2 mm, attenuate at apex, entire, glabrous; lower sepal saccate, compressed laterally, spurred, cymbiform at apex; spur tubular, upcurved, bright red, glabrous. Petals 3; dorsal petal sub-orbicular, *c.* 1.5 × 1.8 mm, cymbiform, rounded-acute at apex, glabrous; lateral united petals 2; distal petal triangular, unlobed; lower petal triangular; auricle 1–2 mm long. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 5 × 1 mm, pale green, glabrous; styles 0; stigmas beaked. Capsules narrowly fusiform, *c.* 1.5 cm long, glabrous, many seeded. Seeds kidney-shaped, compressed.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: June-November.

Specimens examined: way to Chinna Anamudi, 31.08.2019, *Vishnu Mohan & Santhosh Nampy* 170258; Mankulam, 15.09.2018, *Vishnu Mohan & Santhosh Nampy* 170400; Meesappulimala, 14.10.2019, *Vishnu Mohan & Santhosh Nampy* 170365; Sivanpara, MSNP, 23.08.2014, *S. Syam Radh & Santhosh Nampy* 143541 (CALI).

Impatiens parvifolia Bedd., Madras J. Lit. Sci. 2, 20: 66. 1859; Hook.f., Fl. Brit. India 1: 453. 1874; Gamble, Fl. Madras 1: 144. 1915; Rathakr. *et al.* in P.Daniel (ed.), Fl. Kerala 1: 554. 2005. Bhaskar Taxon. Monogr. *Impatiens* W. Ghats 251. 2012.



Annual erect or straggling herbs, up to 30 cm tall. Stem more or less quadrangular, pale green. Leaves opposite or alternate; lamina lance-ovate, 12–26 × 6–10 mm, narrowly acute at apex, cuneate at base, serrate, pubescent below, glabrous above; petioles 5–20 mm long, stout. Flowers on 4–9 cm long pedunculate sub-umbels or racemes; pedicels 1–3 cm long, pale green, glabrous. Bracts linear, *c.* 2 mm long, pale green. Sepals 3; lateral sepals 2, ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous; lower sepal boat-shaped, 4–4.5 × *c.* 3 mm, glabrous; spur obscure or very short and blunt, glabrous. Petals 3; dorsal petal sub-orbicular, 4–6 × 3–5 mm, glabrous, dorsally keeled, mucronate; lateral united petals 2-lobed, 9–12 × 6–8 mm, glabrous, pink; basal lobe oblong; distal lobe 9–12 × 6–8 mm, triangular, entire; dorsal auricle obscure. Stamens 5, cohering above pistil; filaments 5, white, anthers red. Ovary narrowly oblong, glabrous; styles rudimentary; stigmas 5-toothed. Capsules ellipsoid, 4–6 × *c.* 3 mm, glabrous, green; seeds less than 7, *c.* 2 × 1.5 mm, broadly ovate, pubescent, brown.

Distribution: The native range of this species is SW. India (Kerala, Tamil Nadu) (POWO, 2023); *Habitat*: Rocky areas in grasslands*; Fl. & Ft.*: September-December.

Specimen examined: Eravikulam, 15.09.2018, *Vishnu Mohan & Santhosh Nampy* 156543 (CALI).

Impatiens phoenicea Bedd. Madras J. Lit. Sci. 2, 19: 175. 1858; Hook.f., Fl. Brit. India 1: 466. 1875; Gamble, Fl. Madras 1: 145. 1915; Rathakr. *et al.* in P.Daniel (ed.), Fl. Kerala 1: 555. 2005.



Erect suffruticose herbs, up to 60 cm tall. Stems woody, terete, glabrous. Leaves simple, alternate; lamina elliptic, 3–7.5 × 0.6–2.5 cm, attenuate at apex and base, serrate, glabrous; petioles 1–1.5 cm long, glabrous, pale green. Flowers in axillary racemes; peduncles *c.* 10 cm long, slender, glabrous; pedicels 1.5–2.5 cm long, slender, glabrous. Bracts elliptic, *c.* 5 × 2 mm, acute at apex, entire, glabrous, persistent, green. Sepals 3, glabrous; lateral sepals widely elliptic, *c.* 5 × 3 mm, acute at apex, entire, glabrous; lower sepal cymbiform, spurred; spur trumpet-shaped, incurved and coiled, red. Petals 3; dorsal petal widely elliptic, *c.* 7 × 14 mm, cymbiform, acute at apex, entire; lateral united petals 2; distal petal triangular, truncate at apex, entire, glabrous, unlobed; lowers petal triangular, entire, yellow and white patched on red, dorsal auricle 0. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 3 × 1 mm, glabrous, green; stigmas crested. Capsules elliptic, glabrous, 4–5-seeded. Seeds spherical, *c.* 2 mm long.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Stream banks in shola forests; *Fl. & Ft*: July-January.

Specimens examined: Meesappulimala, 14.10.2019, *Vishnu Mohan & Santhosh Nampy* 170374 (CALI); Munnar, 20.12.2003, *C. Murugan* 117651 (MH); *Ibid.*, 27.11.1979, *Nambiar* 1016 (KFRI); Pambadum shola, 20.12.2018, *Vishnu Mohan & Santhosh Nampy* 167851(CALI); Umiyamala, 23.11.1965, *B.V. Shetty* 26632 (MH).

Impatiens platyadena C.E.C.Fisch., Bull. Misc. Inform. Kew 1934: 393. 1934. Gamble, Fl. Madras 1: 1871. 1935; Rathakr. *et al.* in P.Daniel (ed.), Fl. Kerala 1: 555. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 267. 2012.

Erect undershrubs, up to 1.5 m tall. Stems angled, glabrous, purple spotted. Leaves simple, alternate; lamina elliptic, 8–15 × 3–5 cm, attenuate at apex,



cuneate at base, shallowly crenulate, glabrous; petioles 2–8 cm long, glabrous; petiolar glands 4, thick, stout, tip hooked, green. Flowers in axillary racemes; peduncles 4–8 cm long, glabrous; pedicels 0.5–1.5 cm long, glabrous. Bracts elliptic, *c.* 2 × 1.5 mm, acuminate at apex, entire. Sepals 3; lateral sepals 2; ovate, 5–6 × *c.* 2.5 mm, acuminate at apex, entire, glabrous; lower sepal spurred, cymbiform; spur saccate, tip curved upwards, glabrous. Petals 3; dorsal petal broadly ovate, *c.* 7 × 7–8 mm, shortly mucronate apex, entire, glabrous; lateral united petals 2; distal petal ovate, acuminate at apex, entire, glabrous, unlobed; basal lobe minute, auricle 0. Stamens 5; filaments and anthers fused. Ovary elliptic, *c.* 2 × 1 mm, pale green, glabrous; stigmas beaked. Capsules widely fusiform, 7–9 × *c.* 3.5 mm, glabrous, many seeded. Seeds almond-shaped, compressed.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Shola forests; *Fl. & Ft.*: June-September.

Specimens examined: Way sides to Pettimudi, 19.03.2019, *Vishnu Mohan & Santhosh Nampy* 159102; Pettimudi, 29.12.2019 *Vishnu Mohan & Santhosh Nampy* 164871; Neymakkad, 24.01.2018, *Vishnu Mohan & Santhosh Nampy* 158163 (CALI).

Impatiens raktakesara M.Vishnu & Nampy, Brittonia 73: 319. 2021.

Caulescent lithophytic herbs, 4–40 cm tall. Stems terete at base, grooved above, non-sticky, with scattered moniliform trichomes. Leaves simple, decussate; lamina 5–15 × 3–7 mm, ovate, attenuate at apex, rounded at base, serrate, with scattered uniseriate moniliform trichomes above, glabrous below; petioles 1.5–2 mm long, grooved, glabrous. Inflorescences axillary, 4–6-flowered umbels; peduncles 2–5 cm long, sticky, dark brown; pedicels 0.4–0.6 cm long, smooth. Bracts elliptic, 2.2–2.4 mm long, persistent. Sepals 3; lateral sepals elliptic, 3–3.3 × 2–2.2 mm, acute at apex, entire, glabrous; lower sepal

cymbiform, entire at margins; spur 4–5 mm long, straight, white with reddish patch on adaxial side. Petals 3; dorsal petal widely elliptic to obovate, 3.8–4.2 × 2.8–3.1 mm, rounded at apex and base, entire; lateral united petals 2; distal lobe triangular, entire, lower petals elliptic, entire, small; auricle 2–2.5 mm long, extending into the spur. Stamens 5; filaments 1.8–2 mm long, united. Ovary 1.8–2 × *c*. 1 mm, elliptic, pale green to reddish; sty les 0; stigmas sticky, crested. Capsules 7–9 × 2–4 mm, short-fusiform, sub-acute at apex, 1–3(-5) seeded. Seeds ovate, with spirally banded hairs throughout.



Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: high altitude areas; *Fl. & Ft.*: August-November.

Specimen examined: Umiyamala, 30.08.2019, *Vishnu Mohan & Santhosh Nampy* 170254 (CALI).

Note: This species was recently discovered from the high range areas of the study area. It is most similar to *I. goughii* but differs in having uniseriate moniliform trichomes on the upper leaf surface, unlobed lower petals, and 7–9 mm long, 1–3(-5)-seeded capsules. Ravikiran *et al*. (2023) synonymized this species under *I. goughii* without critically studying the type material of *I. raktakesara* (holotype was available at CALI, but they searched at CAL only). Also, in their publications they mentioned that they have not observed any variation in shape of capsules and seeds. A further detailed study revealed that there are several characters keeping these two species distinct (bracts 2.2–2.4 mm *vs*. 1.5–2 mm long; lateral sepal elliptic, *c*. 3.33 × 2–2.2 *vs*. lanceolate-ovate, 12–30 × 6–20 mm; number of seeds 1–3(–5) *vs*. 4–12; seeds hairs spirally banded *vs*.

granular in *I. goughii*). Hence, *I. raktakesara* is resurrected here from the synonymy of *I. goughii*.

Impatiens rupicola var. **nataliae** (Hook.f.) Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats: 174. 2012. *Impatiens nataliae* Hook.f. in Bull. Misc. Inform. Kew 1910: 294 1910.



Annual decumbent herbs, up to 40 cm long. Stem quadrangular, glabrous. Leaves simple, decussate; lamina broadly ovate-lanceolate 1–2.5 × 0.5–0.7 cm, acute at apex, rounded at base, deeply serrate; petioles 1–2 mm long, glabrous. Flowers axillary, solitary; pedicels 1.5–2 cm long, glabrous. Sepals 3; lateral sepals 2, linear, 5–6 × *c.* 0.6 mm, mucronate at apex, entire, glabrous; lower sepal 4–6 × 5–6 mm, saccate, glabrous; spur short, hooked. Petals 3; dorsal petal broadly ovate, 4.5–6 × 5–6 mm, keeled, glabrous; lateral united petals 2; distal petal orbicular, rounded at apex; basal petal ovate, small Stamens 5; filaments 1.8–2 mm long, united. Ovary 1.8–2 × *c.* 1 mm, elliptic, pale green to reddish; styles 0; stigmas sticky, crested. Capsules ellipsoid, glabrous. Seeds ovate, glabrous.

Distribution: The native range of this variety is SW. India (POWO, 2023);

Habitat: High altitudal grasslands ; *Fl. & Ft.*: May-August.

Specimen examined: Eravikulam, 24.07.2021, *Vishnu Mohan & Santhosh Nampy* 167832 (CALI).

Impatiens scapiflora B.Heyne ex Wall. in Roxb., Fl. Ind. 2: 464. 1824; Hook.f, Fl. Brit. India 1: 443. 1875; Gamble, Fl. Madras 1: 138. 1915; Vivek. *et al*. in Hajra *et al*., Fl. India 4: 208. 1997; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 557. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 80. 2012.



Scapigerous perennial herbs, 15–50 cm long. Leaves simple, radical; lamina orbicular-cordate, 4–16 × 3–9 cm, rounded-obtuse at apex, cordate-rounded at base, slightly serrate, pilose; petioles 5–14 cm long, glabrous. Flowers in scapes; peduncles 15–50 cm long, slender; pedicels 2–5 cm long, pale green. Bracts ovate, *c.* 3 × 1 mm, acute at apex, entire, glabrous. Sepals 3; lateral sepals 2, elliptic, *c.* 3 × 1 mm, acute at apex, entire, green; lower sepal spurred, cymbiform; spur 2.5–3.5 cm long, tubular, slender. Petals 3; dorsal petal cordate, *c.* 5 × 7 mm, obtuse at apex, cordate at base, entire, glabrous; lateral united petals 2; distal petal deeply 2-lobed-united; lower petal elliptic, falcate; auricle 0. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 2 × 1 mm, glabrous; styles 0; stigmas crested. Capsules fusiform, *c.* 12 × 4 mm, many seeded. Seeds brown, spirally hairy all over.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Dripping rocks; *Fl. & Ft.*: August-September.

Specimens examined: way to Cheruthoni dam, 07.09.2017 *Vishnu Mohan & Santhosh Nampy* 152986; Kalvari Mount, 06.09.2017, *Vishnu Mohan & Santhosh Nampy* 154383 (CALI); PTR, 07.09.1994, *N. Sasidharan* 14091 (KFRI); Vellappara, 05.08.2017 *Vishnu Mohan & Santhosh Nampy* 154133 (CALI).



Notes: *Impatiens scapiflora* showing variations in is morphology. Within the same population itself, it shows variation in flower colour (white shades of pink), number of lobes in distal lateral united petals (1 or 2) and its orientation (overlapping or dissenting).

Impatiens tangachee Bedd., Madras J. Lit. Sci. 2, 20: 66. 1859; Hook.f., Fl. Brit. India 1: 467. 1875; Gamble, Fl. Madras 1: 145. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 555. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 268. 2012.

Erect shrubs, up to 60 cm tall. Stems fleshy, glabrous. Leaves simple, alternate-whorled; lamina lanceolate, 2.5–7 × 0.5–1 cm, attenuate at apex and base, serrate, glabrous; petioles *c*. 1 cm long, glabrous. Flowers in axillary racemes; peduncles 4–7 cm long, glabrous; petioles *c*. 1.5 cm long, glabrous. Bracts ovate, *c*. 2 × 0.5 mm, pointed at apex, entire, glabrous. Sepals 3; lateral sepals 2; oblong, *c*. 5 × 3 mm, rounded at apex, entire, glabrous; lower sepal cymbiform, pale pink, glabrous, spurred; spur 2–2.5 cm long, slender,

incurved. Petals 3; dorsal petal ovate, bent backward, slightly clefted at apex, entire, glabrous; lateral united petals 2; distal petal semi-circular, rounded at apex, entire, glabrous, unlobed; lower petal smaller; auricle absent. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 3 × 1.5 mm, pale green, glabrous; stigmas acute. Capsules elliptic, glabrous, many seeded.



Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Rock crevices of waterfalls; *Fl. & Ft.*: June-April.

Specimens examined: way to Anamudi peak, 26.04.2019, *Vishnu Mohan & Santhosh Nampy* 158077; Mesthirikettu, 30.12.2017, *Vishnu Mohan & Santhosh Nampy* 158077; *Ibid*., 30.12.2017, *Vishnu Mohan & Santhosh Nampy* 158081 (CALI); Rajamala, 02.02.1970, *B.V. Shetty* 31789 (MH).

Impatiens tenella B.Heyne ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 140. 1834; Gamble, Fl. Madras 1: 140. 1915; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 176. 2012.

Herbs, 20–60 cm tall. Stem terete, swollen at nodes, glabrous. Leaves simple, opposite; lamina elliptic-lanceolate, 4–5.5 × 1.5–2 cm, acute at apex, cuneate at base, serrate, pubescent above, glabrous below; sessile or shortly petiolate; petiolar glands, *c.* 2 mm long. Flowers binate, axillary; pedicels slender, 2.3–2.7 cm long, pubescent with 2 rows of hairs, deflexed in fruits. Bracts linear, *c.* 2 × 0.5 mm, acute to acuminate at apex, entire, glabrous. Sepals 3; lateral sepals linear-lancoelate, *c.* 5 × 0.75 mm, acute to acuminate at apex, entire, glabrous; lower sepal cymbiform, saccate; spur *c.* 7 mm long, tubular, rounded at apex, incurved. Petals 3; dorsal petal broadly ovate, *c.* 4 × 3.5 mm, mucronate at apex, entire; lateral united petals 2; distal petal asymmetrically obovate, *c.* 6 × 4 mm, rounded to obtuse at apex, entire, glabrous; lower petal

small elliptic, unlobed; auricle *c*. 1 mm long. Stamens 5; filaments and anthers fused. Ovary fusiform, *c*. 3 × 1.5 mm, pale green, glabrous; stigmas acute. Capsules ellipsoid or oblongoid to oblanceoloid, *c*. 1.2 × 0.5 cm, glabrous. Seeds sub-globose, glabrous, shining, dark brown to black; funicle prominent.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Moist areas in grasslands; *Fl. & Ft.*: June-April.

Specimen examined: Munnar, 27.11.1979, *Nambiar* 884 (KFRI)

Impatiens tomentosa B.Heyne ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 139. 1834; Hook.f., Fl. Brit. India 1: 449. 1874; Gamble, Fl. Madras 1: 141. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 559. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 180. 2012.

Herbs, up to 40 cm tall. Stems quadrangular, reddish, tomentose. Leaves simple decussate; lamina elliptic-oblong, *c*. 6 × 1.5 cm, acute at apex, truncate to cordate at base, distantly serrate, pubescent; petioles *c*. 2 mm long, pubescent. Flower solitary, axillary; pedicels up to 1.5 cm long, slender, tomentose. Sepals 3; lateral sepal 2; linear, *c*. 7 × 1.5 mm, acuminate at apex, entire, pubescent; lower sepal saccate; spur minute, incurved, pubescent. Petals 3; dorsal petal orbicular, acute, entire, glabrous; lateral united petals 2; distal lobe orbicular, unlobed; lower lobe reduced. Stamens 5; filaments and anthers fused. Ovary fusiform, *c*. 3 × 1.5 mm, pale green, glabrous; stigmas acute. Capsules ovoid, *c*. 8 mm long. Seeds glabrous, black, shining.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Wet rocky areas; *Fl. & Ft.*: April-October.

Specimens examined: Chinnar, 29.04.1995, *K.K. Sajeev* 15625 (KFRI); Munnar, 10.10.1963, *K.M. Sebastine* 17586 (MH).

Impatiens trichocarpa Hook.f. in Hooker's, Icon. Pl. 30: t. 2914. 1910; Gamble, Fl. Madras 1: 142. 1915; Rathakr. *et al*. in P. Daniel (ed.), Fl. Kerala 1: 560. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 218. 2012.

Many branched herbs, up to 50 cm tall. Stems terete, glabrous. Leaves simple, alternate; lamina elliptic-lanceolate, *c*. 4 × 1 cm, acute at apex, cuneate at base,

serrate, glabrous when old; petioles *c.* 1 cm long. Flowers axillary; pedicels *c.* 2 cm long, slender, pubescent. Sepals 3; lateral sepals ovate-lanceolate, *c.* 3 × 1 mm, acute at apex, entire, glabrous; lower sepal cymbiform, lip spurred, saccate, spur *c.* 2 cm long, incurved pubescent. Petals 3; dorsal petal ovate, entire, glabrous; lateral united petals 2; distal lobe semi-circular, entire, glabrous, unlobed; lower petal minute. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 3 × 1.5 mm, pale green, hispid; stigmas acute. Capsules ovoid, tomentose. Seeds many.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Among rocks in grasslands; *Fl. & Ft.*: April-October.

Specimen examined: PTR, 26.08.1995, *Jomy Augustine* 16808 (KFRI).

Impatiens uncinata Wight, Madras J. Lit. Sci. 5: 11. 1837; Hook.f., Fl. Brit. India 1: 465. 1875; Gamble, Fl. Madras 1: 144. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 561. 2005.

Slender erect herbs, up to 20 cm tall. Stems terete, succulent, glabrous. Leaves simple, alternate; lamina ovate, 3–7 × 2–4 cm, acuminate at apex, rounded at base, crenate, membranous, glabrous; petioles 2–5 cm long, grooved. Flowers pale pink in axillary, sub-umbels; peduncles *c.* 5 cm long, glabrous; pedicels *c.* 2 cm long, slender, glabrous. Bracts ovate, 4–5 × 2–3 mm, acute at apex, entire, glabrous. Sepals 3; lateral sepals obliquely ovate, acuminate at apex, entire, glabrous; dorsal sepal cymbiform; spur inflated in middle, hooked at tip, short, stout. Petals 3, pink; dorsal petals elliptic-lanceolate, mucronate at apex, entire, glabrous on both sides; lateral united petals 2; distal petal obovate, rounded at apex, entire; lower petal reduced. Stamens 5; filaments papery; anthers oval, united, extrorse, longitudinally dehiscing. Ovary elliptic; styles absent; stigmas sticky. Capsules ellipsoid, *c.* 8 mm long. Seeds globose.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: September-December.

Specimen examined: Anamudi Shola, 28.10.2019, *Vishnu Mohan & Santhosh Nampy* 176081 (CALI).

Impatiens verticillata Wight, Madras J. Lit. Sci. 5: 15. 1837; Hook.f., Fl. Brit. India 1: 425. 1875; Gamble, Fl. Madras 1: 144. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 562. 2005; Bhaska r, Taxon. Monogr. *Impatiens* W. Ghats 256. 2012.



Erect shrubs, up to 50 cm tall. Stems terete, glabrous. Leaves simple, whorled; lamina lanceolate, 2.5–4 × 1.5–2 cm, attenuate at apex and base, serrulate, glabrous; petioles 1–2 cm long, glabrous. Flowers in axillary umbels; peduncles 2–4 cm long, glabrous; petioles *c.* 1.5 cm long, glabrous. Bracts subulate, *c.* 2 × 0.5 mm, pointed at apex, entire, glabrous. Sepals 3; lateral sepals 2, linear, *c.* 6 × 1.5 mm, pointed at apex, entire, glabrous; lower sepals cymbiform, glabrous, spurred; spur 2–2.5 cm long, tubular, incurved. Petals 3; dorsal petal sub-orbicular, cordate at apex, entire, glabrous; lateral united petals 2; distal petal deeply 2-lobed, elliptic, rounded at apex, entire, glabrous; lower petal minute, hairy at the junction of lobes. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 4 × 1 mm, pale green, glabrous; stigmas beaked. Capsules ellipsoid, glabrous. Seeds numerous.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Rock crevices of waterfalls; *Fl. & Ft*.: January-July.

Specimens examined: Aduvizhuthankudi, MSNP, 17.07.2015, *S. Syam Radh & Santhosh Nampy* 145069 (CALI); Chinnar, 19.04.1964, *K.M. Sebastine* 18314 (MH); Karimutty, 27.04.1995, *K.K. Sajeev* 15566 (KFRI); Koyman chola, 10.02.2021, *Vishnu Mohan & Santhosh Nampy* 188727 (CALI); Pachakkanam, 22.09.1972*, B.D. Sharma* 40823 (MH).

Impatiens viridiflora Wight, Madras J. Lit. Sci. 5: 9. 1837; Hook.f., Fl. Brit. India 1: 460. 1874; Gamble, Fl. Madras 1: 139. 1915; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 105. 2012.

Erect perenial epiphytic herbs, up to 15 cm tall. Stems succulent, cylindrical, glabrous. Leaves simple, alternate; lamina elliptic, 3–5 × 2–3 cm, acute on both ends, cerenate, glabrous; petioles 1–2 cm long, glabrous. Flowers axillary, 2-flowered cymes; peduncles *c.* 1 cm long, glabrous; pedicels *c.* 2.5 cm long, drooping, slender, glabrous. Bracts subulate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Sepals 3; lateral sepals 2, linear-lanceolate, *c.* 5 × 2 mm, acuminate at apex, entire, glabrous; lower sepal saccate, wrinkled, laterally compressed; spur *c.* 1.8 × 0.6 cm long, incurved. Petals 3; dorsal petal cordate, cymbiform, *c.* 6 × 8 mm, acute at apex, entire, glabrous; lateral united petals 2; distal petal obovate, unlobed; lower petal triangular, entire, glabrous; auricle absent. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 4 × 1 mm, pale green, glabrous; stigmas beaked. Capsules ellipsoid, glabrous.

Distribution: The native range of this species is S. India (Tamil Nadu: Shivagiri Hills) (POWO, 2023); *Habitat*: Rock crevices of waterfalls; *Fl. & Ft.*: December-April.

Specimens examined: PTR, 13.12.1993, *N. Sasidharan* 12967 (KFRI); Uppermanalar, 12.12.1994, *Jomy Augustine* 12967 (CALI).

Impatiens viscosa Bedd. Madras J. Lit. Sci. 2, 20: 68. 1859; Hook.f., Fl. Brit. India 1: 453. 1875; Gamble, Fl. Madras 1: 144. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 564. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 258. 2012.



Erect herbs, up to 50 cm tall. Stem quadrangular, viscid. Leaves simple, opposite; lamina ovate-elliptic, 0.6–5 × 0.5–2.8 cm, acute at apex, rounded-cuneate at base, serrate, sparsely hairy above; petioles 0.5–2.5 cm long, glabrous. Flowers in axillary sub-umbels; peduncles 3–5 cm long, glabrous; petioles *c.* 1.5 cm long, glabrous. Bracts narrowly elliptic, caducous. Sepals 3; lateral sepals 2; ovate, *c.* 3 × 1 mm, falcate, entire; lower sepals cymbiform, inflated, cup-shaped, pale pink-white,

glabrous, spurred; spur 5–9 cm long, slender, inflated, curved upwards. Petals 3; dorsal petal elliptic, *c.* 5 × 3 mm, acute at apex, entire, glabrous; lateral united petals 2; distal petal ovate-triangular, unlobed; lower petal minute; auricle 3–5 mm long thin, delicate, filiform. Stamens 5; filaments and anthers fused. Ovary fusiform, *c.* 2 × 1 mm, green, glabrous; stigmas crested. Capsules fusiform, 5–10 × 3–7 mm, glabrous. Seeds ovoid, hairy.

Distribution: The native range of this species is SW. India (POWO, 2022); *Habitat*: Dripping rocks and forest margins; *Fl. & Ft.*: June-January.

Specimens examined: Anchuruli, 07.09.2017, *Vishnu Mohan & Santhosh Nampy* 152914 (CALI); PTR, 19.08.1993, *N. Sasidharan* 12296 (KFRI); Vellappara, Idukki WLS, 05.08.2017, *Vishnu Mohan & Santhosh Nampy* 154134 (CALI).

Impatiens wightiana Bedd., Madras J. Lit. Sci. 2, 20: 67. 1859; Hook.f., Fl. Brit. India 1: 467. 1875; Gamble, Fl. Madras 1: 145. 1915; Rathakr. *et al*. in P.Daniel (ed.), Fl. Kerala 1: 565. 2005; Bhaskar, Taxon. Monogr. *Impatiens* W. Ghats 108. 2012.



Erect undershrubs, up to 1 m tall. Stems angled, glabrous, purple spotted. Leaves simple, alternate; petiolar glands 7, thin, slender, tip hooked, green; lamina lanceolate, 8–18 × 3–5.5 cm, attenuate at apex, obtuse at base, crenulate, glabrous; petioles 1.5–4 cm long, glabrous. Flowers in axillary racemes; peduncles 5–10 cm long, slender, glabrous; pedicels 1–1.5 cm long, glabrous, green. Bracts elliptic, *c.* 2 × 1 mm, acuminate at apex, entire, glabrous. Sepals 3; lateral sepals 2, ovate, 5–6 × *c.* 3 mm, acuminate at apex, entire, glabrous; lower sepal funnel-shaped, spurred, widely cymbiform at apex; spur hooked, incurved. Petals 3; dorsal petal broadly ovate, *c.* 7 × 7–8 mm, shortly mucronate at apex, glabrous; lateral united petals 2; distal petal

ovate, acuminate at apex, entire, glabrous; lower petal small; dorsal auricle 0. Stamens 5; filaments and anthers fused. Ovary elliptic, *c.* 4 × 1 mm, pale green, glabrous; stigmas beaked. Capsules widely fusiform, *c.* 8 × 3 mm, glabrous, many seeded. Seeds almond-shaped, compressed.

Distribution: The native range of this species is SW. India (POWO. 2023);

Habitat: Evergreen and shola forests; *Fl. & Ft.*: June-September.

Specimen examined: way to Kanketty-Mankulam, 20.12.2019, *Vishnu Mohan & Santhosh Nampy* 164806 (CALI).

Oxalis L.

Sp. Pl. 1: 433. 1753.

Key to the species

1. Flowers yellow…….. *Oxalis corniculata*

1. Flowers pink-white……*Oxalis latifolia*

Oxalis corniculata L., Sp. Pl. 1: 435. 1753; Hook.f., Fl. Brit. India 1: 436. 1874; Gamble, Fl. Madras 1: 132. 1915; N.P.Balakr. & Arisdason in P.Daniel (ed.), Fl. Kerala 1: 577. 2005.



Prostrate-erect perennial herbs. Stems slightly woody, slender, pubescent, stipulate. Leaves digitately 3-foliolate; leaflets broadly obcordate, 0.5–1.5 × 0.6–1 cm, emarginate at apex, cuneate at base, entire, glabrous above, sparsely pubescent beneath; petioles 1.5–8 cm long; stipules small, ovate, c. 3 × 1 mm, acute at apex, entire. Flowers yellow, solitary or in axillary umbels. Peduncles 4–10 cm long, sparsely hispid, narrow, erect; pedicels 0.5–1.5 cm long, narrow, erect, slender. Bracts 2, lanceolate, 3–4 × *c.* 2 mm, acute at apex, entire, pubescent. Sepals 5, ovate-lanceolate, 2–3 mm long, acute at apex, entire, pubescent outside. Petals 5, spathulate-oblong, 5–6 × 3–4 mm, rounded-truncate at apex, entire, glabrous, yellow, puberulous out. Stamens 10, in two rows; staminal

tube *c.* 1.5 mm long. Ovary 5-celled; ovules many; styles 5. Capsules linear. Seeds ovate, turbinate.

Distribution: The native range of this species is Indian Subcontinent to Japan and Philippines (POWO, 2023); *Habitat*: Degraded forests, also in the plains; *Fl. & Ft.*: March-December.

Specimens examined: Choondal, MSNP, 20.12.2017. *S. Syam Radh & Santhosh Nampy* 153422; Kattappana, 19.03.2019, *Vishnu Mohan* & *Santhosh Nampy* 158623(CALI).

Oxalis latifolia Kunth Nov. Gen. Sp. 5: 237. 1821.



Erect bulbous herbs, up to 20 cm high. Leaves a few, erect, tri-foliate; leaflets obcordate, *c.* 2 × 4 cm, incised at apex, acute at base, entire, glabrous; petioles up to 20 cm long, slender, erect, glabrous. Flowers a few, pink-white, in umbels. Peduncles up to 25 cm long, slender, erect, glabrous; pedicels narrow, erect, slender, 0.5–1 cm long, glabrous. Bracts 2, ovate, acute at apex, entire, glabrous. Sepals 5, oblong-lanceolate, *c.* 4 × 1 mm, acute at apex, entire, green. Petals 5, obliquely truncate, *c.* 10 × 5 mm, truncate at apex, entire, violet with yellowish base, glabrous. Stamens 10; filaments alternatively long and short, puberulous. Ovary *c.* 1.5 mm long, sparsely ciliate at ribs; styles *c.* 1 mm long; stigmas peltate.

Distribution: The native range of this species is Tropical & Subtropical America (POWO, 2023); *Habitat*: Degraded forest areas and roadsides; *Fl. & Ft.*: May-Auguest.

Specimens examined: Kanthalloor, 24.06.2018, *Vishnu Mohan & Santhosh Nampy* 159379; Pambadum shola, 16.08.2018, *Vishnu Mohan* & *Santhosh Nampy* 156246 (CALI).

Tropaeolum L.
Sp. Pl. 345. 1753.

Tropaeolum majus L., Sp. Pl. 1: 345; 2: errata 1753; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 523. 2005.



Perennial profusely branching creeping herbs, 20–35 cm tall. Stems terete, densely branched, glabrous. Leaves peltate; lamina cordate-circular, 4.5–11 × 4.5–1.5 cm, rounded at apex, entire, glabrous; petioles 15–30 cm long, slender, glabrous. Flowers non-fragrant, solitary, zygomorphic; pedicels 20–35 cm long, glabrous. Sepals 5, free, lanceolate, 1.3–1.9 × 3–6 mm, acute to attenuate at apex, entire, glabrous, unequal; basal connate, dorsal spurred. Petals 5, free, orbicular, rounded at apex, entire, glabrous, unequal; lower 3, orbicular, 3–3.5 × 2–2.5 cm, truncate at apex, entire, with frills at base; upper 2, orbicular, 3–3.8 × 2–2.6 cm, rounded at apex, entire, without frills. Stamens 8; filaments *c.* 7 mm long, slender. Ovary tricarpellary, globose; styles *c.* 0.5 cm long; stigmas terete. Fruits schizocarpic, rugose.

Distribution: The native range of this species is a cultigen from Peru (POWO, 2023); *Habitat*: Open lands and road sides; *Fl. & Ft.*: Throughout the year.

Specimens examined: Devikulam 07.02.2017, *Vishnu Moha*n *& Santhosh Nampy* 151647; Kanthalloor, 24.06.2017, *Vishnu Mohan & Santhosh Nampy* 159384; Munnar, 10.04.1987, *P. Yamuna Bai* 12239; Pethotti, 06.01.2017, *Vishnu Mohan & Santhosh Nampy* 151593; Thekkady, 09.04.1987, *N.P. Surayya Beegam* 13823 (CALI).

RUTACEAE Juss.

Gen. Pl. 296. 1789, *nom. cons.*

Trees or shrubs, rarely suffrutices or perennial herbs. Leaves simple or pinnate or (1) 3-foliate. Inflorescences of panicles, racemes or cymose clusters. Flowers (2–3) 4–5-merous, actinomorphic, bisexual or unisexual by abortion and dioecious. Sepals free or united, usually imbricate. Petals free, imbricate or rarely valvate. Stamens as many as or twice as many as petals. Ovary vestigial in male flowers, in female flowers of a single carpel which is sessile, sub-sessile or stipitate. Fruits baccate or drupaceous.

The family includes 152 genera worldwide (POWO, 2023); 17 species under eight genera in the study area.

Key to the genera

1. Carpels united only by styles above; fruits splitting loculicidally……..2
1. Carpels completely or incompletely connate; fruits indehiscent……3
2. Perennial herbs……..……*Ruta*
2. Trees, shrubs or climbers……..……*Xanthoxylum*
3. Carpels 2–5; fruits drupaceous……..4
3. Carpels 2–20; fruits baccate or hesperidia……..……5
4. Leaves usually opposite; flowers polygamous……..……*Acronychia*
4. Leaves alternate; flowers unisexual……..……*Vepris*
5. Plants unarmed……..6
5. Plants armed……..……...7
6. Styles short or distinct……*Glycosmis*
6. Styles distinct……*Clausena*
7. Fruits with woody pericarps……*Pleiospermium*
7. Fruits with soft pericarps……*Atalantia*

Acronychia J.R.Forst. & G.Forst.

Char. Gen. Pl. 53. 1776, *nom. cons.*

Acronychia pedunculata (L.) Miq., Fl. Ned. Ind., Eerste Bijv. 532. 1861; Premanath in P.Daniel (ed.), Fl. Kerala 1: 582. 2005. *Jambolifera pedunculata* L., Sp. Pl. 349. 1753.

Acronychia laurifolia Blume; Hook.f., Fl. Brit. India 1: 498. 1875; Gamble, Fl.

Madras 1: 152. 1915.

Small trees, up to 15 m tall. Branchlets woody, terete, glabrous. Leaves simple, sub-opposite, clustered at stems apex; lamina elliptic, 4–18 × 1.5–7 cm, obtusely acuminate at apex, acute at base, entire, glabrous, coriaceous; petioles 1.5–2 cm long, slender, glabrous. Flowers fragrant, in axillary corymbs, white; peduncles 2–6 cm long, glabrous; pedicels *c.* 0.5 cm long, glabrous. Bracts and bracteoles lanceolate, 4–5 × *c.* 2 mm, acuminate at apex, entire, glabrous. Sepals 4, connate; lobes *c.* 1 × 1.5 mm, acute at apex, entire, glabrous. Petals 4, free, linear-elliptic, *c.* 10 × 2 mm, rounded at apex, entire, glabrous out, white hairy within. Anthers 8; filaments 6–10 mm long, alternately long, glabrous. Ovary 4-celled; styles *c.* 7 mm long, glabrous; stigma capitate. Capsules globose, glabrous.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat:* Semi-evergreen forests, also in the plains; *Fl. & Ft.:* January-December.

Specimens examined: Calvary mount, 24.12.1983, *A.G. Pandurangan* 66470 (MH); Karippara, 04.01.2017, *Vishnu Mohan* & *Santhosh Nampy* 151513; Mangaladevi, 06.05.1996, *Jomy Augustine* 15217; Mathikettan Shola National Park, 11.12.2016, *Vishnu Mohan & Santhosh Nampy* 151372 (CALI); Upper Vaguvarai, 13.10.1989, *P. Bhargavan* 90915 (MH).

Atalantia Corrêa

Ann. Mus. Natl. Hist. Nat. 6: 383, 385–386. 1805, *nom. cons.*

Key to the species

1. Stamens free; berries ellipsoid……*A. wightii*
1. Stamens usually connate into a tube; berries globose or sub-globose……2
2. Flowers in umbels ……..……..……..*A. monophylla*
2. Flowers in racemes ……..*A. racemosa*

Atalantia monophylla DC., Prodr. 1: 535. 1824; Hook.f., Fl. Brit. India 1: 511. 1875; Gamble, Fl. Madras 159. 1915; K.N.Nair & M.P.Nayar in Hajra *et al.*, Fl. India 4: 266. 1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 584. 2005.

Small armed trees, up to 15 m tall. Branchlets woody, terete, glabrous; spines *c.* 2 cm long. Leaves simple, alternate; lamina ovate, 3.5–6 × 2–4 cm,

emarginate at apex, cuneate at base, entire, glabrous, coriaceous; petioles *c.* 1 cm long, stout. Flowers axillary umbels; peduncles 5–8 mm long, slender, pubescent; pedicels 0.6–1.2 cm long, slender, glabrous. Sepals 5, irregularly lobed, *c.* 3 × 1.5 mm, acute-rounded at apex, entire, glabrous. Petals 5, greensh white, elliptic-obovate, 7–9 × 3–4 mm, rounded at apex, entire. Stamens 10; filaments 8–12 mm long, unequal, connate at base. Ovary oblong; styles *c.* 3 mm long, slender; stigma capitate. Berries globose, gland dotted. Seeds few.

Distribution: The native range of this species is India to Peninsula Malaysia (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl. & Ft.:* December-March.

Specimen examined: Chinnar, 06.01.1995, *K.K. Sajeev* 11633 (KFRI).

Atalantia racemosa Wight ex Hook., Hooker's J. Bot. 1: 64. 1834; Hook.f., Fl. Brit. India 1: 512. 1875; Gamble, Fl. Madras 159. 1915; K.N.Nair & M.P.Nayar in Hajra *et al*., Fl. India 4: 269. 1999; Premanath in P.Daniel (ed.), Fl. Kerala 1: 586. 2005.

Small trees, up to 10 m tall. Branchlets woody, glabrous; spines axillary. Leaves simple, alternate; lamina ovate-oblong, 4–8 × 2–4 cm, acuminate-emarginate at apex, cuneate at base, sub-entire, glabrous, coriaceous; petioles 0.5–1 cm long, slender, glabrous. Flowers in axillary racemes; peduncles 2–4 cm long, slender, glabrous; pedicels 0.4–0.7 cm long, slender, glabrous. Sepals 5, ovate, *c*. 1.5 × 1 mm long, acute at apex, ciliate, glabrous. Petals 4 or 5, yellowish white, broadly elliptic, 6–8 × 2–4 mm, rounded, entire, glandular. Stamens 8–10; filaments 8–10 mm long, slender, glabrous, fused. Disc annular fleshy, glabrous. Ovary eglandular; stigma capitate without stylar canals. Berries sub-globose.

Distribution: The native range of this species is W. & S. India, Sri Lanka, Indo-China and Philippines (POWO, 2023); *Habitat:* Evergreen, semi-evergreen and dry deciduous forests; *Fl. & Ft.:* October-February.

Specimens examined: Chinnar, 09.02.1995, *K.K. Sajeev* 11880 (KFRI).

Atalantia wightii Yu.Tanaka, Bull. Soc. Bot. France 75: 714. 1928; Gamble, Fl. Madras 160. 1915; K.N.Nair & M.P.Nayar in Hajra *et al.,* Fl. India 4: 274. 1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 587. 2005.

Shrubs, up to 5 m tall. Branchlets woody, terete, glabrous, branching; spines erect, sharp. Leaves simple, alternate; lamina ovate-elliptic, 5–11 × 1.5–5.5 cm, acuminate at apex and base, entire, glabrous on both sides, coriaceous; petioles 0.4–0.6 cm long, glabrous. Flowers in axillary racemes; peduncles compressed; pedicels *c.* 0.5 cm long, hispid, stout, glabrous. Sepals connate at base; lobes ovate, *c.* 2 × 1 mm, acute at apex, entire, ciliate, glabrous. Petals white, elliptic-oblong, *c.* 10 × 2 mm, obtuse at apex, entire, glabrous. Stamens 8, free; filaments 3–5 mm long, inner ones smaller, erect, glabrous. Ovary ovate; styles *c.* 5 mm long, erect, glabrous; stigma capitate, sticky. Berries ellipsoid, smooth, glandular, yellowish. Seeds oblong-ellipsoid.

Distribution: The native range of this species is W. & S. India (POWO, 2023); *Habitat:* Semi-evergreen and evergreen forests; *Fl. & Ft.:* December-June.

Specimens examined: Chinnar, 16.01.1994, *Jomy Augustine* 13065 (KFRI); Thannikkudy, 10.12.1993, *Jomy Augustine* 13065 (CALI); Thekkady, 15.03.1973, *B.D. Sharma* 43868 (MH); Vallakkadavu, 11.06.1994, *Jomy Augustine* 15406 (CALI).

Clausena Burm.f.

Fl. Indica: 243 1768.

Key to the species

1. Inflorescence axillary; flowers 4-merous……*C. anisata*
1. Inflorescence terminal; flowers 5-merous……..…2
2. Leaflets lanceolate-ovate; petals elliptic……*C. austroindica*
2. Leaflets rhomboid; petals obovate……..…*C. indica*

Clausena anisata (Willd.) Hook.f. ex Benth. in Hooker, Niger Fl. 256. 1849; K.N.Nair & M.P.Nayar in Hajra *et al*., Fl. India 4: 321.1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 593. 2005. *Amyris anisata* Willd., Sp. Pl., ed. 4. 2: 337. 1799.

Clausena willdenowii Wight & Arn., Prodr. Fl. Ind. Orient. 1: 96. 1834, *nom*.

superfl.; Hook.f., Fl. Brit. India 1: 506. 1875; Gamble, Fl. Madras 155. 1915. *Clausena willdenowii* var. *pubescens* (Wight & Arn.) Hook.f., Fl. Brit. India 1: 506. 1875.

Shrubs to small trees, up to 20 m tall. Branchlets woody, terete; young branchlets pubescent. Leaves pinnate, crowded at apex; leaflets 7–11, opposite, lanceolate, 3–6 × 1.2–2.8 cm, acuminate at apex, oblique at base, entire, dentate at upper half, sparsely pubescent on younger leaves, glabrous beneath and on older leaves. Flowers 4-merous, white in axillary racemes peduncles 2–10 cm long, pubescent, erect, slender; pedicels *c.* 0.5 cm long, pubescent. Bracts ovate, caducous, *c.* 2 × 1 mm, acute at apex, entire, pubescent. Sepals 4, connate at base ovate, *c.* 1 × 1 mm, acute at apex, entire, pubescent out, glabrous inside. Petals 4; obovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous, ciliate, reflexed. Stamens 8, free; filaments *c.* 2 mm long, unequal, dilated below. Ovary 4 partite; styles thick; stigma 4-angled, capitate. Berries globose.

Distribution: The native range of this species is Tropical & S. Africa, Indian Subcontinent to S. Central China (POWO, 2023); *Habitat:* Moist deciduous and evergreen forests; *Fl. & Ft.:* March-June.

Specimen examined: Pambla Dam, 08.03.2017, *Vishnu Mohan & Santhosh Nampy* 152004 (CALI).

Clausena austroindica B.C.Stone & K.K.N.Nair, Nordic J. Bot. 14: 491. 1994; K.N.Nair & M.P.Nayar in Hajra *et al.,* Fl. India 4: 322. 1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 594. 2005.

Shrubs or small trees, up to 8 m tall. Branchlets woody, terete, minutely puberulous. Leaves pinnate, alternate; leaflets 5–9, sub-opposite to alternate, lanceolate-ovate, 7–14 × 2.5–6 cm, acute-acuminate at apex, acute at base, entire, glabrous. Flowers in terminal panicles; peduncles up to 20 cm long, terete, minutely pubescent; pedicels 0.2–0.4 cm long, slender, minutely pubescent. Bracts and bracteoles ovate-lanceolate, *c.* 1 × 1 mm, acute at apex, entire, glabrous, ciliate. Calyx lobes 5, ovate, *c.* 0.5 × 0.5 mm long, rounded at apex, entire, minutely ciliolate, glabrous. Petals 5, green, elliptic, 3–5 × 1.5–3 mm, obtuse at apex, entire, glabrous. Stamens 10; filaments in two lengths,

alternating. Ovary sub-globose; styles short, caducous, glabrous; stigma truncate. Berries globose.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests; *Fl. & Ft.:* January-August.

Specimens examined: Koruthode, 16.08.1993, *Jomy Augustine* 12234 (CALI); PTR, 12.08.1993, *Jomy Augustine* 12234 (KFRI).

Clausena indica (Dalzell) Oliv., J. Proc. Linn. Soc., Bot. 5: 36. 1861; Hook.f., Fl. Brit. India 1: 505. 1875; Gamble, Fl. Madras 155. 1915; K.N.Nair & M.P.Nayar in Hajra *et al.,* Fl. India 4: 328. 1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 595. 2005. *Piptostylis indica* Dalzell, Hooker's J. Bot. Kew Gard. Misc. 3: 33. 1851.

Shrubs or small trees, up to 10 m tall. Leaves pinnate, alternate; leaflets 7-13, alternate and opposite, rhomboid, 3.5–6 × 2–3.5 cm, obtuse at apex, oblique at base, crenulate, glabrous, gland dotted; petioles and rachis slightly zig-zag, puberulous or glabrous. Flowers in terminal paniculate cymes; peduncle up to 10 cm long, puberulous; pedicels 0.2–0.3 cm long stout. Bracts ovate, 2–3 × *c.* 2 mm, ciliate. Sepals ovate, 1–2 × *c.* 1 mm, acute at apex, entire, glabrous, ciliate. Petals 5, green, obovate, 3–4 × *c.* 1.2 mm, acute, glandular, glabrous. Stamens 10; filaments 2–4 mm long, subulate above, dilated below. Ovary sub-globose, glabrous; styles very short; stigma capitate. Berries globose. Seed 1.

Distribution: The native range of this species is W. & S. India and Sri Lanka (POWO, 2023); *Habitat:* Semi-evergreen and evergreen forests; *Fl. & Ft.:* January-June.

Specimens examined: Chinnar, 19.04.1996, *K.K. Sajeev* 17331 (CALI); Puliyanmala, 01.05.1984, *C.N. Mohanan* 81675 (MH).

Glycosmis Corrêa

Ann. Mus. Natl. Hist. Nat. 6: 384. 1805.

Key to the species

1. Ovary glabrous……2

1. Ovary pubescent ……*G. mauritiana*

2. Calyx lobe ciliate; ovary 3-loculed……*G. angustifolia*

2. Calyx lobe entire; ovary 5-loculed……3

3. Inflorescence usually from uppermost leaf axils, panicled cymes……..……*G. macrocarpa*

3. Inflorescence terminal, spiciform panicles……*G. pentaphylla*

Glycosmis angustifolia Lindl. ex Wight & Arn., Prodr. Fl, Ind. Orient. 1: 93. 1834; Premanath in P.Daniel (ed.), Fl. Kerala 1: 598. 2005. *Glycosmis pentaphylla* var. *angustifolia* (Lindl. ex Wight & Arn.) Hook.f., Fl. Brit. India 1: 500. 1875.

Shrubs, up to 3 m tall. Branchlets woody, terete. Leaves pinnate, alternate; leaflets 5, sub-opposite, ovate-lanceolate, 3–5.5 × *c.* 1.5 cm, obtusely acute at apex, acute at base, entire, glabrous; petiolules *c.* 0.2 cm long, stout, glabrous; petioles 5–10 cm long, pulvinate. Flowers in axillary panicles; peduncles 0.5–1 cm long, erect, glabrous, terete; pedicels *c.* 0.2 cm long, glabrous. Sepals 5, connate at base, ovate, *c.* 1 × 1 mm, acute at apex, entire, glabrous, ciliate. Petals 5, white, obovate, *c.* 4.5 × 2 mm, rounded at apex, entire, glabrous. Stamens 10; filaments *c.* 3 mm long, glabrous, erect. Ovary glabrous, 3-loculed; styles indistinct; stigma capitate. Berries globose, glabrous.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests; *Fl. & Ft.:* April-August.

Specimens examined: Deviar, 11.07.1993, *Jomy Augustine* 12099 (CALI); PTR, 23.04.1993, *Jomy Augustine* 12099 (KFRI).

Glycosmis macrocarpa Wight, Ill. Ind. Bot. 1: 109. 1840; K.N.Nair & M.P.Nayar in Hajra *et al.,* Fl. India 4: 338. 1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 597. 2005. *Glycosmis pentaphylla* Hook.f. var. *macrocarpa* (Wight) Hook.f., Fl. Brit. India 1: 500. 1875.

Shrubs, up to 2 m tall. Branchlets woody, terete, glabrous. Leaves pinnate, alternate; leaflets 5, alternate, ovate-elliptic, 8–14 × 3–6 cm, acuminate at apex, acute at base, entire, glabrous, coriaceous; petioles *c.* 1.5 cm long, glabrous, grooved. Flowers non-fragrant, in axillary short panicled cymes; peduncles 0.4–0.8 cm long, stout; pedicels *c.* 0.3 cm long, stout. Sepals 5, connate at base, ovate, *c.* 1 × 1 mm, acute at apex, entire, glabrous. Petals 5,

greenish white, oblong-elliptic, *c.* 3 × 1.5 mm, rounded at apex, entire, glabrous. Stamens 10; filament *c.* 2 mm long, flattened, glabrous. Ovary ovoid-cylindric, 5-locular, glabrous; styles *c.* 2 mm long, erect, glabrous; stigma depressed. Berries sub-globose, constricted at base.

Distribution: The native range of this species is SW. India and Assam (POWO, 2023); *Habitat:* Evergreen forests; *Fl. & Ft.:* January-August.

Specimens examined: Arjunankotta, 17.05.1993, *Jomy Augustine* 15068; Kurisumala, 18.01.1994, *Jomy Augustine* 13051 (CALI); PTR, 09.09.1993, *Jomy Augustine* 12369 (KFRI); Meenmutty, 24.02.1984, *A.G. Pandurangan* 78071 (MH); Sabarimala, 11.08.1993, *Jomy Augustine* 12369 (CALI); Valara, 19.03.1982, *R.Rajan* 73073 (MH).

Glycosmis mauritiana (Lam.) Tanaka, Bull. Soc. Bot. France 75: 708. 1928; K.N.Nair & M.P.Nayar in Hajra *et al*., Fl. India 4: 343. 1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 598. 2005. *Limonia mauritiana* Lam., Encycl. 3: 517. 1792.

Shrubs, up to 3 m tall. Branchlets terete, sparsely pubescent on younger parts, glabrous when old. Leaves pinnate, alternate; leaflets 3–5, sub-opposite, ovate-lanceolate, 3–13 × 1.5–5 mm, acute at apex and base, entire, glabrous, coriaceous; petiolules *c.* 0.5 cm long, stout, glabrous; petioles 1–2.5 mm long, erect, glabrous, pulvinate at base. Flowers in axillary racemes; peduncles 3–4 mm long, pubescent, stout; pedicels *c.* 2 mm long, stout, pubescent. Sepals 5, connate at base; lobes ovate, *c.* 1 × 1 mm, acute at apex, entire, glabrous. Petals 5, greenish white, elliptic-oblong, *c.* 5 × 3 mm, rounded at apex, entire, glabrous. Stamens 10; filaments 3–4 mm long, erect, glabrous. Ovary cylindric, pubescent; styles reduced; stigma capitate, sticky. Berries sub-globose, glandular.

Distribution: The native range of this species is Indian Subcontinent to Hainan and W. Malesia (POWO, 2023); *Habitat:* Evergreen forests; *Fl. & Ft.:* February-June.

Specimens examined: Chinnar, 19.05.1999, *P. Prashy* 79464; *Ibid*., 19.05.1999, *Sabitha P.K.* 79187; *Ibid*., 19.05.1999, *Satheesh George* 79264; *Ibid*., 19.05.1999, *Shamina M.* 78970; *Ibid*., 19.05.1999, *Lisha K.*

178656; *Ibid*., 14.02.2001, *Priya P.D.* 51706; *Ibid*., 14.02.2001, *Deepa K.A.* 73782 (CALI).

Glycosmis pentaphylla (Retz.) DC., Prodr. 1: 538. 1824; Hook.f., Fl. Brit. India 1: 499. 1875; K.N.Nair & M.P.Nayar in Hajra *et al.,* Fl. India 4: 343. 1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 599. 2005. *Limonia pentaphylla* Retz., Observ. Bot. 5: 24. 1788.



Erect shrubs, up to 4 m tall. Branchlets terete, glabrous. Leaves 3–7-foliolate, alternate; leaflets sub-opposite, elliptic-lanceolate, 4–15 × 2–5.5 cm, acute to rounded at apex, attenuate at base, entire to minutely crenulate-serrate, glandular; petioles up to 2 cm long, glabrous. Flowers in terminal spiciform panicles; peduncles 3–5 cm long, glabrous; pedicels 0.1–0.2 cm long, stout, glabrous. Sepals 5, connate at base; lobes ovate, 1–1.5 × 1.5 mm, acute at apex, entire, ciliate, glabrous. Petals 5, greenish white, obovate, *c.* 5 × 2.5 mm, rounded at apex, entire, glabrous and gland dotted. Stamens 10; filaments 2–3 mm long, glabrous. Ovary ovoid, 5-locular, glabrous; stigma flat or obscurely lobed. Berries ovoid.

Distribution: The native range of this species is Indian Subcontinent to China (SW. & S. Yunnan) and W. & Central Malesia (POWO, 2023); *Habitat:* Semi-evergreen and moist deciduous forests, also in the plains; *Fl. & Ft.:* August-April.

Specimens examined: Kattappana, 16.03.2018, *Vishnu Mohan & Santhosh Nampy* 158370; Pambla Dam, 08.03.2017, *Vishnu Mohan & Santhosh Nampy* 152007 (CALI); Periyar, 27.01.1983, *A.G. Pandurangan* 76651 (MH); Vellappara, 05.08.2017, *Vishnu Mohan & Santhosh Nampy* 154157 (CALI).

Pleiospermium Swingle

J. Wash. Acad. Sci. 6: 427. 1916.

Pleiospermium alatum (Wall. ex Wight & Arn.) Swingle, J. Wash. Acad. Sci. 6: 428. 1916; Hook.f., Fl. Brit. India 1: 499. 1875; K.N.Nair & M.P.Nayar in Hajra *et al*., Fl. India 4: 343. 1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 599. 2005. *Limonia alata* Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 92. 1834.

Small trees, up to 5 m tall. Branchlets woody, glabrous, armed with single axillary spines. Leaves trifoliate, alternate; leaflets obovate, 2.5–6 × 1–2.5 cm, rounded-acute at apex, attenuate at base, entire, glabrous, coriaceous; petiolules *c.* 0.2 cm long; petioles 1–3 cm long, glabrous, winged, articulated. Flowers in axillary panicles; peduncles 3–7 cm long, stout, sparsely pubescent; pedicels *c.* 1 cm long, stout, pubescent. Sepals 5, free, ovate, *c.* 2 × 1 mm, acute at apex, entire, sparsely pubescent out, glabrous within. Petals 5, white, ovate-oblong, *c.* 10 × 3 mm, rounded at apex, entire, deflexed, glandular-punctate, glabrous or shortly pubescent. Stamens 10; filaments *c.* 6 mm long, glabrous. Ovary obovoid, smoothly glandular; stigma capitate. Berries sub-globose, aromatic.

Distribution: The native range of this species is S. India, Sri Lanka and Andaman Islands (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl. & Ft.:* February-May.

Specimens examined: Chinnar, 19.05.1999, *Thushar K.V.* 79372; *Ibid*., 19.05.1999, *Sindhu C.* 78263 (CALI).

Ruta L.

Sp. Pl. 1: 383. 1753.

Ruta chalepensis L., Mant. Pl. 1: 69. 1767; K.N.Nair & M.P.Nayar in Hajra *et al*., Fl. India 4: 363. 1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 609. 2005.

Strong-smelling erect herbs, up to 1 m tall. Branchlets more or less angled, glabrous. Leaves alternate, bipinnate; leaflets sub-opposite, sessile, oblong-obovate, 0.7–1.5 × 0.3–0.8 cm, rounded at apex, attenuate at base, entire, glabrous and gland dotted. Flowers in terminal dichasial cymes; peduncles 3–

4 cm long, glabrous; pedicels 0.8–1 cm long, glabrous. Bracts leafy, lanceolate, *c.* 5 × 2 mm, acuminate at apex, narrow at base, entire or crenate. Sepals 4, ovate, 3–4 × *c.* 2 mm, acute at apex, entire, glabrous. Petals 4, yellow, spathulate, 4–6 × 3–4 mm, hooded at apex, fimbriate, yellow. Stamens 8; filaments *c.* 5 mm long, glabrous. Ovary sub-globose; styles *c.* 3.5 mm long; stigma capitate, lobed. Capsules 4 or 5-lobed.



Distribution: The native range of this species is Macaronesia and Mediterranean (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl. & Ft.:* December-August.

Specimen examined: Kudimala, 09.12.2019, *Vishnu Mohan & Santhosh Nampy* 164898 (CALI).

Vepris Comm. ex A.Juss.

Mém. Mus. Hist. Nat. 12: 509. 1825.

Vepris bilocularis Engl. in Engl. & Prantl, Nat. Pflanzenfam. 3(4): 178. 1896; Gamble, Fl. Madras 151. 1915; K.N.Nair & M.P.Nayar in Hajra *et al.*, Fl. India 4: 405. 1997; Premanath in P.Daniel (ed.), Fl. Kerala 1: 613. 2005. *Toddalia bilocularis* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 149. 1834; Hook.f., Fl. Brit. India 1: 497. 1875.

Evergreen dioecious trees, up to 25 m tall. Branchlets woody, glabrous. Leaves trifoliate, alternate; leaflets elliptic-lanceolate, 3–15 × 1.3–5 cm, acuminate at apex, acute at base, entire, revolute, glabrous, pellucid-gland dotted, coriaceous; petioles 1–3 cm long, glabrous, grooved, swollen at base. Flowers unisexual, in axillary and terminal panicles. Male flowers: Sepals 5, connate at base, lobes ovate, *c.* 1 × 1 mm, acute at apex, entire, glabrous. Petals 2–4, free, orbicular, *c.* 8 × 3 mm, rounded at apex, entire, glabrous. Stamens 6; filaments *c.* 5 mm long, equal, broad at base. Pistillodes cylindric, 2-cleft above,

glabrous. Female flowers as same as male flowers. Staminodes rudimentary. Ovary globose; stigma capitate. Berries globose, 2-celled, fleshy.

Distribution: The native range of this species is SW. and S. India (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests; *Fl. & Ft.:* February-September.

Specimens examined: Arjunankotta, 14.04.1995, *Jomy Augustine* 15008 (KFRI); Kannadippara, 17.09.2018, *Vishnu Mohan & Santhosh Nampy* 161944; Koruthode, 10.08.1993, *Jomy Augustine* 12254; Kuttikkanam, 29.04.2018, *Vishnu Mohan & Santhosh Nampy* 159244; *Ibid*., 28.04.2018, *Vishnu Mohan & Santhosh Nampy* 159249 (CALI); Mlappara, 21.04.1994, *Jomy Augustine* 13615 (KFRI).

Zanthoxylum L.

Sp. Pl. 1: 270. 1753.

Key to the species

1. Plants armed……..……2

1. Plants unarmed……..……*Z. ovalifolium*

2. Leaves palmately trifoliate……..…… *Z. asiaticum*

2. Leaves pinnately 5–9-foliate…….…… *Z. tetraspermum*

Zanthoxylum asiaticum (L.) Appelhans, Groppo& J.Wen, Molec. Phylogen. Evol. 126: 43. 2018. *Paullinia asiatica* L., Sp. Pl. 365. 1753. *Toddalia asiatica* (L.) Lam., Tabl. Encycl. 2: 116. 1797; Gamble, Fl. Madras 150. 1915; K.N.Nair & M.P.Nayar in Hajra *et al.*, Fl. India 4: 403.1997; R.K.Premanath in P.Daniel (ed.), Fl. Kerala 1: 610. 2005.

Scandent shrubs. Branchlets woody, terete, glabrous, with recurved prickles. Leaves trifoliolate, alternate; leaflets sessile, obovate-lanceolate, 3–7.5 × 1.5–4 cm, obtuse or acute at apex, attenuate at base, shallowly crenulate, thin-coriaceous, glabrous and gland dotted; petioles 2–3 cm long, glabrous, often prickly beneath. Flowers unisexual, in axillary panicles, green. Male flowers: Calyx campanulate; lobes ovate, *c.* 1 × 1 mm, acute at apex, entire, glabrous. Petals 5, oblong, *c.* 3 × 1.5 mm, acute at apex, entire, glandular. Stamens 10; filaments *c.* 3 mm long, erect, glabrous. Female flowers as same as male

flowers. Staminodes *c.* 1.5 mm long. Ovary oblong, 5-loculed; styles reduced; stigma 5-lobed, capitate. Drupes sub-globose, apiculate, glandular.

Distribution: The native range of this species is Ethiopia to Eswatini, W. Indian Ocean, Tropical and Subtropical Asia (POWO, 2023); *Habitat:* Evergreen and shola forests, also in scrub jungles; *Fl. & Ft.:* December-July.

Specimens examined: Chinnar, 12.01.1995, *K.K. Sajeev* 11798 (KFRI); Deviyar, 10.12.1996, *Jomy Augustine* 17012; Kalvarimala, 15.06.1994, *Jomy Augustine* 13910; Munnar, 18.02.1998, *Soniya* 61014; Nymakkad, 24.01.2018, *Vishnu Mohan & Santhosh Nampy* 158224; Rajamala, 17.02.1998, *Susmitha M.R.* 59890 (CALI).

Zanthoxylum ovalifolium Wight, Ill. Ind. Bot. 1: 169. 1839; Hook.f., Fl. Brit. India 1: 492. 1875; Gamble, Fl. Madras 150. 1915; K.N.Nair & M.P.Nayar in Hajra *et al.,* Fl. India 4: 384. 1997; Premanath in P. Daniel (ed.), Fl. Kerala 1: 614. 2005.



Shrubs, up to 5 m tall. Branchlets woody, terete, smooth. Leaves trifoliate, alternate; leaflets elliptic-obovate, 7–10 × 3–4.5 cm, acuminate at apex, acute at base, entire, glabrous; petioles 5–10 cm long, slender, glabrous. Flowers unisexual, in axillary racemes; peduncles 3–4 cm long, slender, glabrous; pedicels 0.3–0.4 cm long, stout. Male flowers: Sepals 4, obovate, 3–4 × *c.* 3 mm, acute at apex, entire, glabrous. Petals 5, white, elliptic, 4–6 × *c.* 2 mm, rounded at apex, entire, glabrous. Stamens 5; filaments *c.* 5 mm long, slender, glabrous. Female flowers as same as male flowers. Staminodes 4, filiform. Ovary elliptic, glabrous; styles *c.* 2 mm long, stout; stigma capitate. Capsules globose. Seed 1, globose, shining.

Distribution: The native range of this species is Tropical Asia to NE. Queensland (POWO, 2023); *Habitat:* Evergreen forests; *Fl & Ft:* May-October.

Specimen examined: Koruthode, 16.08.1993, *Jomy Augustine* 12234 (CALI).

Zanthoxylum tetraspermum Wight & Arn., Prodr. Fl. Ind. Orient. 1: 148 1834; Hook.f., Fl. Brit. India 1: 494. 1875; Gamble, Fl. Madras 150. 1915; K.N.Nair & M.P.Nayar in Hajra *et al.,* Fl. India 4: 389. 1997.

Scandent woody climbers. Branchlets woody, terete; prickles short, recurved. Leaves pinnate, alternate; leaflets 5–9, ovate, 8–10 × *c.* 5 cm, acuminate at apex, rounded at base, crenate, glabrous; petioles 5–8 cm long, slender, glabrous; petiolule 0.3–0.4 cm long, stout, glabrous. Flowers unisexual, in axillary-terminal panicles, pale green; peduncles 3–6 cm long, slender, glabrous; pedicels 0.4–0.9 cm long, slender, glabrous. Male flowers: Sepals 5, ovate, 1.5–2 × *c.* 1 mm, acute at apex, entire, glabrous. Petals 5, ovate, *c.* 3 × 2 mm, obtuse at apex, entire, glabrous. Stamens 5; filaments *c.* 3 mm long, slender. Female flowers as same as male flowers. Staminodes *c.* 1.5 mm long. Ovary ovate; styles *c.* 4 mm long; stigma capitate. Capsules 4-lobed.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests; *Fl & Ft:* April-December.

Specimen examined: Periyar Tiger Reserve, 18.05.1995, *Jomy Augustine* 15295 (KFRI).

SIMAROUBACEAE DC.

Nouv. Bull. Sci. Soc. Philom. Paris 2: 209. 1811.

Trees or shrubs. Leaves spirally arranged, pinnate or simple, exstipulate or with stipular spines. Inflorescences paniculate, racemose or cymose. Flowers bisexual, unisexual or polygamous. Sepals 3–5(–6). Petals 3–5(–9), rarely absent, usually free. Stamens 4–10, inserted at the base of a disc, free; disc annular, pulviniform. Ovary globose or 2–5(–6+)-lobed; styles (2–) 4–8, free or variously connate. Fruit a samara.

The family includes 20 genera in the world (POWO, 2023); only single species in the study area.

Ailanthus Desf.

Hist. Acad. Roy. Sci. Mém. Math. Phys. 1786 (Mém.): 265. 1788, *nom. cons.*

Ailanthus triphysa (Dennst.) Alston in H.Trimen, Handb. Fl. Ceylon 6(Suppl.): 41 1931. *Adenanthera triphysa* Dennst., Schlüssell Hortus Malab. 32. 1818. *Ailanthus malabarica* DC., Prodr. 2: 89. 1825; Hook.f., Fl. Brit. India 1: 158. 1875; Gamble, Fl. Madras 163. 1915.

Deciduous trees, up to 30 m tall. Branchlets terete, glabrous; bark grey, lenticellate. Leaves imparipinnate, alternate, crowded towards apex of branches; leaflets 11–23, opposite-subopposite; lamina oblong-ovate, 8–15 × 2–5 cm, acute-acuminate at apex, oblique at base, entire at margins, glabrous on both sides, coriaceous; rachis 25–40 cm long, stout, slightly ridged above, glabrous, pulvinate at base; petiolule 0.5–1 cm long, slender, glabrous, ridged above. Stipules absent. Bracts absent. Flowers in axillary panicles, non-fragrant. Male flowers: Sepal 5, ovate, 3–5 × 3 mm, acute at apex, rounded at base, entire at margins, pubescent out, glabrous within, non-coriaceous. Petals 5, ovate, 6–8 × 3–6 mm, acute-rounded at apex, rounded at base, entire at margins, glabrous on both sides; disc 10-lobed. Stamens 10; filaments 5 mm long, erect, slender, glabrous; pistillode rudimentary, cordate. Bisexual flowers: Sepals and petals as in male flowers. Stamens 2 or 3; filaments 3 mm long, erect, slender, glabrous, disc 10-lobed. Ovary 5 partite, superior; styles *c.* 3 mm long, erect, connate, glabrous; stigmas plumose. Samara oblong, prominently veined. Seeds oblong, winged.

Distribution: The native range of this species is Tropical & Subtropical Asia to NE. Queensland (POWO, 2023); *Habitat*: Semi-evergreen forests, also planted in the plains; *Fl & Ft.*: January-May.

Specimen examined: Moolamattam, 18.02.1982, *C.N. Mohanan* 73359 (MH).

OCHNACEAE DC.

Nouv. Bull. Sci. Soc. Philom. Paris 2(no. 40): 208. 1811, *nom. cons.*

Trees and shrubs, rarely herbs. Leaves simple, alternate, rarely pinnately compound, petiolate. stipules entire or sometimes lacerate. Inflorescences terminal or axillary, cymose or racemose, rarely 1-flowered. Flowers generally bisexual, actinomorphic. Sepals (2–4)5(10–15), free or more rarely united. Petals (3–)5(–8), mostly free, clawed to sessile, contorted or imbricate. Stamens 5–10 or numerous; filaments generally free and persistent. Gynoecium (2 or)3–5(–15)-carpellate, gynophore present or rarely absent; ovary superior, entire or deeply lobed. Fruit fleshy or non-fleshy, generally a septicidal capsule, rarely a nut with accrescent sepals or a drupe. Seeds endospermic or non-endospermic, winged or not.

The family includes 36 accepted genera (POWO, 2023); one species in Idukki district.

Ochna L.

Sp. Pl. 513. 1753.

Ochna obtusata DC., Ann. Mus. Hist. Nat. 17: 411. 1811; Safui & M.P.Nayar in Hajra *et al.,* Fl. India 4: 429. 1997; Vajr. in P.Daniel (ed.), Fl. Kerala 1: 625. 2005.

Ochna squarrosa var. *cordata* (Thwaites) A.W.Benn. in Hook.f., Fl. Brit. India 1: 524. 1875; Gamble, Fl. Madras 165. 1915.

Small deciduous trees, up to 15 m tall. Branchlets woody, terete, glabrous; bark rough. Leaves simple, alternate; lamina ovate-lanceolate, 5–12 × 2.5–4 cm, acute at apex, obtuse at base, crenate, coriaceous, glabrous; petioles 0.4–0.6 cm long, stout, glabrous. Stipules lanceolate, 3–6 × *c.* 2 mm, acuminate at apex, entire, glabrous. Flowers in axillary umbels; peduncles 3–4 mm long, stout; pedicels 20–25 mm long, slender. Sepals 5, ovate, *c.* 15 × 10 mm, acute at apex, entire, glabrous. Petals 5, obovate, 15–20 × *c.* 5 mm, rounded at apex, entire, glabrous, yellow. Stamens many; filaments 15 mm long, slender. Disc lobed. Ovary 10-lobed; styles *c.* 15 mm long; stigma sticky. Drupes 3–10-lobed.

Distribution: The native range of this species is Indian Subcontinent to Myanmar (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: January-October.

Specimen examined: Chinnar, 08.06.1995, *K.K. Sajeev* 15697 (KFRI).

BURSERACEAE Kunth

Ann. Sci. Nat. (Paris) 2: 346. 1824, *nom. cons.*

Trees, less often shrubs, rarely epiphytes. Leaves alternate, imparipinnately compound, less often unifoliolate. Flowers actinomorphic, 3–5(6)-parted, unisexual or bisexual. Calyx valvate, synsepalous, usually lobed. Corolla induplicate-valvate, apopetalous to partly sympetalous. Male flowers: Androecium diplostemsonous or rarely isostemsonous. Female flowers: Staminodes reduced. Gynoecium syncarpous; ovary superior. Fruits compound drupes or pseudocapsules, pyrenes dehiscent or remaining fused together.

The family includes 546 species and 18 genera in the world (POWO, 2023); single species in Idukki district.

Canarium strictum Roxb. Fl. Ind. 3: 138. 1832; Gamble, Fl. Madras 172. 1915; A.N.Henry & V.Chithra in P.Daniel (ed.), Fl. Kerala 1: 629. 2005.

Trees, up to 30 m tall. Branchlets woody, terete, velvety-tomentose; bark grey-brown or yellow, smooth; exudation brownish-black, resinous. Leaves imparipinnate, alternate; leaflets 7–11, opposite; lamina ovate-oblong 9–16 × 3.5–5 cm, acuminate at apex, acute at base, serrulate at margins, glabrous above, rusty tomentose beneath, coriaceous; rachis 22–42 cm long, stout, tomentose, swollen at base; petioles 10 mm long, stout, tomentose. Stipules absent. Flowers in large axillary panicles, non-fragrant. Male flowers; Pedicels *c.* 5 mm long, pubescent. Bracts absent. Calyx tube campanulate; lobes 3, ovate, 4–5 × 2.5–3 mm, acuminate at apex, entire at margins, glabrous. Petals 3, oblong, 8–9 × 4 mm, rounded at apex, entire at margins, glabrous, thick; disc annular, 6-lobed, apically pilose. Staminal tube *c.* 3 mm long; stamens 6; filaments *c.* 2 mm long. Pistillode *c.* 3 mm long, erect, slender, glabrous. Bisexual flowers: Calyx lobes 3, ovate, 4–5 × 1.5–2 mm, rounded at apex, entire at margins, pubescent outside, glabrous within. Petals 3, oblong, *c.* 1 × 5 cm,

pubescent outside, glabrous within, thick; disc obscurely lobed, pilose above. Staminal tube *c.* 3 mm long; filaments *c.* 0.5 mm long. Erect, slender, glabrous. Ovary superior, glabrous; styles *c.* 3 mm long, stout, glabrous; stigma capitate, lobed. Drupes ellipsoid, glabrous.

Distribution: Native range is S. India, Sikkim to China (S. Yunnan) and N. Thailand (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-December.

Specimen examined: Uppupara. 16.03.1994 *Jomy Augustine* 13479 (CALI).

MELIACEAE Juss.

Gen. Pl. 263. 1789, *nom. cons.*

Trees or shrubs, mostly with hard scented wood, very rarely sub-herbaceous. Leaves alternate, mostly pinnate. Flowers actinomorphic, mostly hermaphrodite. Calyx often small, imbricate, rarely valvate. Petals free or partially connate. Stamens mostly 8 or 10, rarely numerous. Ovary superior, often 3–5-celled, stigma often disc-form or capitate. Fruit baccate, capsular or rarely a drupe, often with a large central axis.

The family includes more than 200 species belongs to 58 genera (POWO, 2023); 11 genera and 17 species in the study area.

Key to the genera

1. Stamens 5, free……..……..*Toona*
1. Stamens 8–10, connate……2
2. Undershrubs; petioles winged……..……*Naregamia*
2. Shrubs or trees; petioles not winged……..3
3. Filaments connate below only……..……4
3. Filaments connate throughout……..……6
4. Leaves 3–5 foliate……..……*Walsura*
4. Leaves 5 or more foliate……..……5
5. Leaflets toothed ……..……*Cippadessa*
5. Leaflets entire……..…… *Heynea*
6. Petals 3……..……*Aphanamixis*
6. Petals 4 or 5 (6)……..……..……7

7. Staminal tube apically entire or 5-toothed……..*Aglaia*

7. Staminal tube apically lobed……8

8. Leaflets toothed……*Melia*

8. Leaflets entire……9

9. Disc annular, fleshy and flat……..*Chukrasia*

9. Disc tubular enclosing ovary……...10

10. Leaflets opposite……*Munronia*

10. Leaflets alternate……..*Dysoxylum*

Aglaia F.Allam.

Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 4: 93. 1770.

Key to the species

1. Leaves unifoliate……*A. simplicifolia*

1. Leaves multi-foliate……2

2. Infloresence and leaves rufous-scaly beneath……*A. elaeaegnoidea*

2. Inflorecence and leaves not rufous scaly beneath, either glabrous, stellate-tomentose or pubescent……3

3. Leaflets 9–13……4

3. Leaflets 3–7……5

4. Petals obovate; stamens exerted from the staminal tub……*A. tomentosa*

4. Petals elliptic; stamens included in staminal tube……..*A. perviridis*

5. Stigma capitate; seeds arillate……*A. edulis*

5. Stigma, 3-lobed; seeds exarillate……*A. lawii*

Aglaia edulis (Roxb.) Wall., Calc. Gard. Rep.: 26. 1840; Hook.f., Fl. Brit. India 1: 556. 1875; S.S.Jain & Bennet in Hajra *et al*., Fl. India 4: 461.1997. *Milnea edulis* Roxb. in Fl. Ind. 2: 430 1824.

Beddomea indica Benth. & Hook.f. in Gen. Pl. 1: 336 1862; Hook.f., Fl. Brit. India 1: 566. 1875; Gamble, Fl. Madras 184. 1915.

Aglaia indica (Hook.f.) Harms in Engl. & Prantl, Naturl. Pflanzenfam. 9:146. 1940; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 641. 2005.

Trees, up to 15 m tall. Branchlets woody, terete; bark reddish-brown, yellowish-brown; exudation white. Leaves imparipinnate, alternate; leaflets 5–7, opposite or subopposite, elliptic-obovate, 4–15 × 2–6 cm, acuminate at

apex, oblique at base, entire, coriaceous, glabrous; rachis 100–120 mm long, slender, swollen at base; petiolule 5–18 mm long, grooved above. Flowers polygamodioecious, in axillary panicles; pedicles 5–13 mm long, stout, glabrous. Male flowers; Calyx campanulate; lobes 5, acute, 3–3.5 × *c.* 2 mm, entire, scaly below. Petals 5; elliptic-orbicular, 3–4 × 3 mm, rounded at apex, entire, glabrous. Staminal tube 5–7 mm long, cup shaped, crenulate at mouth, glabrous. Female flowers; Calyx lobes 5, ovate, acute at apex, entire, pubescent out. Petals 5, orbicular, 3–4 × *c.* 3 mm, rounded at apex, entire, glabrous. Ovary superior, covered with scales; stigma capitate. Bisexual flowers as same as male and female flowers. Capsule sub-globose. Seeds arillate.

Distribution: The native range of this species is China (SE. Yunnan) to Tropical Asia (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* May-June.

Specimen examined: Kulamavu, 02.06.1982, *C.N. Mohanan* 74145 (MH)

Aglaia elaeagnoidea (A.Juss.) Benth., Fl. Austral. 1: 383 1863; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 461.1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 641. 2005. *Nemedra elaeagnoidea* A.Juss. in Bull. Sci. Nat. Géol. 23: 239 1830.

Aglaia roxburghiana (Wight & Arn.) Miq. in Ann. Mus. Bot. Lugduno-Batavi 4: 41 1868; Gamble, Fl. Madras 180. 1915.

Aglaia wallichii Hiern in J.D.Hooker, Fl. Brit. India 1: 555 1875.

Trees, up to 15 m high. Branchlets woody, terete; bark reddish-brown, smooth. Leaves imparipinnate, alternate; leaflets 5–7, opposite, elliptic-obovate, 6–10 × 3–4.5 cm, acute at apex, oblique at base, entire, rufous-scaly beneath; rachis 60–80 mm long, stout, grooved above, swollen at base; petiolule 10–14 mm long, lepidote scaly. Flowers polygamodioecious, in axillary branching panicles. Male flowers; Calyx campanulate; lobes 5, acute, 2–3 × *c.* 2 mm, ciliate. Petals 5, free, elliptic, 2.5–3 × 2 mm, rounded at apex, entire, glabrous. Staminal tube 4–6 mm long, entire at apex; anthers 5, included. Female flowers as same as male flowers; Ovary small, superior, slightly depressed, 1–2-celled. Bisexual flowers as same as male and female flowers. Berry, globose.

Distribution: The native range of this species is Tropical & Subtropical Asia to Vanuatu (POWO, 2023); *Habitat*: Evergreen forests, also in sacred groves in the plains; *Fl. & Ft.:* November-August.

Specimen examined: Puliyanmala, 15.12.1982, *C.N. Mohanan* 76127 (MH)

Aglaia lawii (Wight) C.J.Saldanha in Saldanha & Nicolson, Fl. Hassan Dist. 392. 1976; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 471.1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 642. 2005. *Nimmoia lawii* Wight in Calcutta J. Nat. Hist. 7: 13 1847. *Amoora lawii* (Wight) Bedd. in Fl. Sylv. S. India: t. 133 1871; Hook.f., Fl. Brit. India 1: 561. 1875; Gamble, Fl. Madras 1: 181. 1915.

Trees, up to 15 m tall. Branchlets woody, terete, young parts covered by yellowish-brown scales. Leaves imparipinnate, alternate; leaflets 3–5, opposite-sub-opposite, elliptic-lanceolate, 6–17 × 2.5–5.5 cm, acuminate at apex, obtuse-obliquely acute at base, entire, glabrous, coriaceous; petiolules 5–10 mm long, stout, covered with peltate scales at young parts, glabrous when old, grooved above; rachis 6–20 cm long, slender, glabrous; petiolules 5–8 mm long, glabrous. Flowers polygamodioecious, in panicles or racemes; peduncles 20–140 mm long, covered with yellow scales; pedicels 2–3 mm long, stout, erect, covered with yellow scales. Male flowers; Calyx campanulate; lobes ovate, 3–4 × *c.* 2 mm, covered by yellowish-brown scales. Petals 4, orbicular, *c.* 5 × 3 mm, rounded at apex, entire, glabrous. Stamens 10; staminal tube 3–6 mm long, slightly crenate at mouth. Female flowers as same as male flowers; Ovary superior; stigma 3-lobed. Bisexual flowers as same as male and female flowers. Capsule obovoid; seeds exarillae.

Distribution: The native range of this species is Bhutan to Taiwan and Peninsula Malaysia (POWO, 2022); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.:* December-February.

Specimens examined: Arjunankotta, 12.02.1994, *Jomy Augustine* 13166; *Ibid*., 16.04.1995, *Jomy Augustine* 15076; Karadikkavala, 10.06.1995, *Jomy Augustine* 15489 (CALI); Kulamavu, 02.06.1982, *C.N. Mohanan* 74154 (MH).

Aglaia perviridis Hiern in Hook.f., Fl. Brit. India 1: 556. 1875. *Aglaia maiae* Bourd. in J. Bombay Nat. Hist. Soc. 12: 350 1899; Gamble, Fl. Madras 1: 180. 1915.

Trees, up to 25 m tall. Branchlets woody, terete, young branchlets covered with reddish-brown peltate scales. Leaves imparipinnate, alternate; leaflets 9–13, opposite-sub-opposite, oblong-lanceolate, 10–23 × 2–6 cm, acute at apex, oblique at base, entire, glabrous; rachis *c.* 10 cm long, stout, slightly grooved above, glabrous; petiolules *c.* 10 mm long, stout, slightly grooved above, glabrous. Flowers polygamodioecious, in axillary panicles. Peduncles erect, *c.* 130 mm long, glabrous; pedicels very short, erect. Male flowers; Calyx campanulate; lobes 5, ovate, *c.* 1.5 × 1 mm, rounded at apex, entire, glabrous. Petals 5, elliptic, *c.* 2 × 1 mm, rounded at apex, entire, glabrous. Staminal tube *c.* 2 mm long; anthers 5, included. Female flowers as same as male flowers; Ovary superior, globose; stigma ovoid. Bisexual flowers as same as male and female flowers. Berries ellipsoid. Seed one, completely surrounded by aril.

Distribution: The native range of this species is E. Himalaya to China (S. & SE. Yunnan) and Peninsula Malaysia (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* March-September.

Specimen examined: Koruthode, 10.03.1994, *Jomy Augustine* 12209 (CALI).

Aglaia simplicifolia (Bedd.) Harms in Engl. & Prantl, Nat. Pflanzenfam.3(4): 300. 1896; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 474.1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 645. 2005. *Beddomea simplicifolia* Bedd., Fl. Sylv. S. India 1: t. 135. 1871; Hook.f., Fl. Brit. India 1: 566. 1875; Gamble, Fl. Madras 1: 184. 1915.

Small trees, up to 5 m tall. Branchlets woody, terete, young stems with reddish-brown stellate hairs, glabrous when old. Leaves simple, alternate; lamina ovate-lanceolate, 4–12 × 1.5–5.5 cm, acuminate at apex, cuneate at base, entire, upper glabrous shiny above; stellate hairs at lower nerves; petioles 10–15 mm long, stellate hairy, with a swollen at base. Flowers polygamodioecious on axillary panicles; peduncles up to 150 mm long, terete, stellate hairy; pedicels 15–20 mm long, narrow, erect, slender, stellate hairy.

Calyx campanulate, lobes 5, deeply divided to the base; lobes orbicular, *c.* 3 × 2 mm, rounded at apex, entire, glabrous inside, densely stellate scaly out. Petals 5, free, obovate, *c.* 4 × 2.5 mm, rounded at apex, entire, densely stellate scaly out, glabrous inside. Staminal tube *c.* 5 mm long, glabrous. Ovary sub-globose, *c.* 3 × 2 mm, densely covered with stellate scales; stigma lobed. Capsules obovoid, indehiscent, with a thick woody pericarp, densely covered with stellate hairs on the outside. Seeds arillate

Distribution: The native range of this species is SW. India, Indo-China to W. & Central Malesia (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* November-June.

Specimen examined: Chokkampetty, 10.02.1994*, Jomy Augustine* 13345 (CALI).

Aglaia tomentosa Teijsm. & Binn., Natuurk. Tijdschr. Ned.-Indie. 27: 43. 1864.

Aglaia minutiflora Bedd., Icon. Pl. Ind. Or. 1: 44.1868; Gamble, Fl. Madras 1: 181. 1915.

Aglaia minutiflora Bedd. var. *travancorica* Hiern in Hook.f., Fl. Brit. India 1: 557. 1875.

Trees, up to 20 m tall. Branchlets woody, terete, branchlets covered with dense brown stellate hairs. Leaves imparipinnate, alternate; leaflets 9–13, opposite oblong, 8–12 × 4–6 cm, acuminate at apex, slightly oblique at base, entire, recurved when dry, coriaceous, glabrous above, tomentose beneath; rachis 15–30 cm long, stellate-tomentose; petiolules *c.* 5 mm long, stout, tomentose, slightly grooved above. Flowers polygamodioecious, in axillary panicles; peduncles 70–170 mm long, slender, tomentose; pedicels 3–6 mm long, stout, pubescent. Male flowers; Calyx campanulate; lobes 5, acute, *c.* 1 × 1 mm, ciliate, densely covered with stellate hairy out, glabrous inside. Petals 5, yellow, obovate, *c.* 1.5 × 1 mm, rounded at apex, entire, glabrous. Staminal tube *c.* 1 mm long, slightly incurved and shallowly 5-lobed at the margin, stamens exerted. Female flowers as same as male flowers; Ovary superior, globose, densely covered with stellate hairs; styles reduced; stigma sub-

globose. Bisexual flower as same and female flowers. Capsules sub-globose, tomentose; seed 1, aril orange.

Distribution: The native range of this species is India to W. & Central Malesia (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* August-September.

Specimens examined: Kurisumala, 30.01.1994*, Jomy Augustine* 13052 (CALI); PTR, 15.01.1994, *Jomy Augustine* 13052 (KFRI).

Aphanamixis Blume

Bijdr. Fl. Ned. Ind. 4: 165. 1825.

Aphanamixis polystachya (Wall.) R.Parker, Indian Forester 57: 486. 1931; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 477. 1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 646. 2005. *Aglaia polystachya* Wall. in W.Roxburgh, Fl. Ind. 2: 429 1824.

Amoora rohituka (Roxb.) Wight & Arn. in R.Wight, Cat. Ind. Pl.: 24 1833; Hook.f., Fl. Brit. India 1: 559. 1875; Gamble, Fl. Madras 1: 181. 1915.

Evergreen trees, up to 15 m tall. Branchlets woody, terete, young stems pubescent, glabrous when old. Leaves imparipinnate, alternate, crowded at the end of branchlets; leaflets 7–15, opposite, ovate-oblong, 3–13 × 1.8–5.5 cm, acute at apex, oblique at base, entire, coriaceous, glabrous above and glabrescent beneath; petioles 50–70 mm long, glabrous; rachis 70–150 mm long, stout, glabrous, grooved above; petiolules *c.* 5 mm long, stout, glabrous. Flowers polygamodioecious, in axillary drooping panicles; peduncles 30–40 mm long, glabrous, terete, stout; pedicels 2–4 mm long, stout. Male flowers; Sepals 5, orbicular, *c.* 3 × 2 mm, rounded at apex, entire, glabrous. Petals 3, orbicular, *c.* 5 × 3 mm, rounded at apex, entire, glabrous. Staminal tube *c.* 4 mm long, globose; anthers 6, oblong, included. Female flowers as same as male flowers; Ovary superior, ovoid, pubescent, 3-celled; stigma 3-lobed, sub-sessile. Bisexual flowers as same as male and female flowers. Capsules orbicular, glabrous. Seeds 3, oblong, with a scarlet aril.

Distribution: The native range of this species is S. China to Tropical Asia (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and shola forests, also in sacred groves; *Fl. & Ft.:* January-November.

Specimens examined: Kokkara, 08.09.1993, *Jomy Augustine* 12501 (CALI); Periyar Tiger Reserve, 15.10.1993, *Jomy Augustine* 12501 (KFRI); Thekkady, 15.03.1973, *B.D. Sharma* 48624 (MH).

Chukrasia A.Juss.

Bull. Sci. Nat. Geol. 23: 239. 1830.

Chukrasia tabularis A.Juss. Bull. Sci. Nat. Géol. 23: 241 1830; Hook.f., Fl. Brit. India 1: 568. 1875; Gamble, Fl. Madras 1: 186. 1915; S.S.Jain & Bennet in Hajra *et al*., Fl. India 4: 481. 1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 649. 2005.

Trees, up to 20 m high. Branchlets woody, terete; bark dark brown. Leaves paripinnate, alternate; leaflets 10–20, sub-opposite, obliquely ovate, 5.5–8.5 × 2.5–5 cm, acuminate at apex, oblique at base, entire, coriaceous, glabrous above, tomentose beneath; rachis 8–12 cm long, slender, glabrous; petiolules *c.* 7 mm long, slender, glabrous. Flowers in terminal panicles. Calyx campanulate; lobes 5, widely ovate, *c.* 1 × 2 mm, acute at apex, entire, pubescent out, glabrous within. Petals 5, oblong, *c.* 15 × 5 mm, rounded at apex, entire, glabrous. Staminal tube terete, glabrous, *c.* 13 mm long. Ovary superior, stipitate, ovoid, pubescent; styles stout; stigmas capitate. Capsules valved, ovoid. Seeds many, broadly winged at base.

Distribution: The native range of this species is Indian Subcontinent to S. China and W. Malesia (POWO, 2023); *Habitat*: Semi-evergreen, moist deciduous, evergreen and shola forests; *Fl. & Ft.:* May-March.

Specimens examined: Chinnar, 18.04.1995, *Jomy Augustine* 17314 (KFRI); Thekkady, 10.04.1994, *Jomy Augustine* 13542 (CALI).

Cipadessa Blume

Bijdr. Fl. Ned. Ind. 4: 162. 1825.

Cipadessa baccifera Miq., Ann. Mus. Bot. Lugduno-Batavi 4: 6. 1868; Gamble, Fl. Madras 1: 176. 1915; S.S.Jain & Bennet in Hajra *et al*., Fl. India 4: 482. 1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 650. 2005.

Melia baccifera Roth, Nov. Pl. Sp. 215. 1821.

Cipadessa fruticosa Blume in Bijdr. Fl. Ned. Ind.: 162 1825; Hook.f., Fl. Brit. India 1: 545. 1875.



Shrubs, up to 3 m tall. Branchlets woody, terete, lenticellate. Leaves pinnate, alternate; leaflets 5–11, opposite, elliptic-lanceolate, 2–10 × 1.5–3.5 cm, acuminate at apex, acute at base, entire, rarely irregularly dentate towards apex, glabrous on both sides; rachis 80–140 mm long, glabrous; petiolules 4–8 mm long, glabrous, grooved at middle. Flowers on axillary panicles; peduncles 50–70 mm long, glabrous; pedicels *c.* 3 mm long, stout, glabrous. Calyx campanulate; lobes 5, widely ovate, *c.* 1 × 1 m m, acute at apex, entire, slightly hispid on back, glabrous within. Petals 5, ovate, 3.5–4 × *c.* 2 mm, acute-acuminate at apex, entire, glabrous. Stamens 10; staminal tube *c.* 3 mm long. Ovary angular; stigma turbinate. Drupes globose, longitudinally grooved, reddish brown.

Distribution: The native range of this species is Indian Subcontinent to S. China and W. & Central Malesia (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests, also in the sacred groves; *Fl. & Ft.:* November-July.

Specimens examined: Kanthalloor, 25.02.2003, *Thomas Mani* 290840; *Ibid*., 25.02.2003, *Divya N.* 90541; *Ibid*., 25.02.2003, *Ligimol* 89841; *Ibid*., 25.02.2003, *Shylaja N.* 88338; *Ibid*, 25.02.2003, *Smitha* 89137; *Ibid*, 25.02.2003, *Shanaz Beegum* 90138; *Ibid*., 25.02.2003, *Radhika K.V.* 88637; *Ibid*., 25.02.2003, *Reena M.B.* 89039; *Ibid*., 25.02.2003, *Nisha Kumari P.* 88838; *Ibid*., 25.02.2003, *Dhanya A.M.* 89640; *Ibid*., 25.02.2003, *Roshni Balakrishnan* 89938; *Ibid*., 25.02.2003, *Nishitha I.K.* 90439; Karimala, 15.05.1994, *Jomy Augustine* 137766; Karimanal, 09.03.2017, *Vishnu Mohan & Santhosh Nampy* 152044; way to Mannavan Shola, 08.01.2004, *Sajeena L.R.* 96432; *Ibid*., 08.01.2004, *Amritha M.* 96934; *Ibid*., 08.01.2004, *Sreena K.* 96834; *Ibid*., 08.01.2004, *Haseena K.* 97332; *Ibid*., 08.01.2004, *Rakendhu K.C.* 97134; *Swapna*

Thomas 97433; *Ibid*., 08.01.2004, *Sreenivas V.K.* 96532; *Ibid*., 08.01.2004, *Sulu Meeran* 94233; *Ibid*., 08.01.2004, *Reesha Karally* 89438; Mulakuthara, 18.03.2019, *Vishnu Mohan & Santhosh Nampy* 168988; Painavu road, 07.08.2017*, Vishnu Mohan & Santhosh Nampy* 154315; Pambla dam, 08.03.2017, *Vishnu Mohan & Santhosh Nampy* 152004; Pius Nagar, 22.06.2018, *Vishnu Mohan & Santhosh Nampy* 159328 (CALI).

Dysoxylum Blume ex Raspail

Bull. Sci. Nat. Geol. 11: 68. 1827.

Key to the species

1. Calyx campanulate, sub-entire; disc tubular, lobed…….. *D. gotadhora*

1. Calyx shortly or deeply lobed; disc not lobed……..……..……2

2. Ovary 2-loculed; capsules obovoid …….. *D. beddomei*

2. Ovary 4-loculed; capsules pyriform ……..…….…… *D. malabaricum*

Dysoxylum beddomei Hiern J.D.Hooker, Fl. Brit. India 1: 548. 1875; Gamble, Fl. Madras 1: 178. 1915; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 485. 1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 652. 2005. Trees, up to 25 m tall. Branchlets woody, terete; bark pale grey. Leaves imparipinnate, alternate; leaflets 5–9, alternate, elliptic-ovate, 6–13 × 3–6 cm, acuminate at apex, cuneate at base, entire, glabrous, coriaceous; rachis 30–120 mm long, stout, pubescent; petiolules *c.* 10 mm long, slender, grooved above, pubescent. Flowers bisexual, greenish-yellow, sub-sessile, in axillary few-flowered panicles; peduncles very compressed; pedicels 1–2 mm long, pubescent. Calyx campanulate; lobes 5, 2–3 × *c.* 2 mm, acute at apex, entire, puberulous. Petals 4, oblong, *c.* 4 × 2 mm, rounded at apex, entire, puberulous out, glabrous within. Staminal tube shortly toothed, *c.* 2.5 mm long; disc tubular, not lobed glabrous. Ovary superior, 2-loculed, hirsute; stigma broadly capitate. Capsules obovoid, ribbed, coarsely rugose; 3 seeded.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Evergreen forests; *Fl. & Ft.:* September-February.

Specimens examined: Mlappara, 08.10.1993*, Jomy Augustine* 12382; Thannikkudy, 08.08.1993, *Jomy Augustine* 12347 (CALI).

Dysoxylum gotadhora (Buch.-Ham.) Mabb., Fl. China 11: 127 2008. *Guarea gotadhora* Buch.-Ham. in Mem. Wern. Nat. Hist. Soc. 6: 307 1832.

Dysoxylum binectariferum (Roxb.) Hook.f. ex Bedd. in Trans. Linn. Soc. London 25: 212 1865; Hook.f., Fl. Brit. India 1: 546. 1875; Gamble, Fl. Madras 1: 178. 1915; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 486. 1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 652. 2005.

Trees, up to 20 m tall. Branchlets woody, terete; bark yellowish-grey. Leaves imparipinnate, alternate; leaflets 5–9, alternate, ovate-lanceolate, 6–14 × 3.5–8 cm, acute at apex, oblique at base, entire, coriaceous, glabrous; rachis 70–160 mm long, stout, angular; petiolules 4–10 mm long, stout, pubescent. Flowers bisexual, in axillary panicles; peduncles *c.* 6 cm long, pubescent; pedicels short, 5–8 mm long. Calyx copular; lobes 5, ovate, 5–6 × 3–4 mm, coriaceous, sparsely pubescent. Petals 4, oblong, *c.* 10 × 3 mm, rounded at apex, entire, minutely puberulous out, glabrous within. Staminal tube *c.* 10 mm long, cylindric, glabrous; disc surrounding, tubular, lobed. Ovary superior, ribbed, villous; stigma truncate. Capsules obovoid, depressed at apex, smooth.

Distribution: The native range of this species is SW. India, Sri Lanka, Central Himalaya to China (S. Yunnan) and Indo-China (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* March-January.

Specimens examined: PTR, 14.05.1994, *Jomy Augustine* 13724 (KFRI); Uppermanalar, 10.04.1994, *Jomy Augustine* 13726 (CALI).

Dysoxylum malabaricum Bedd. ex Hiern in Hook.f., Fl. Brit. India 1: 548. 1875; Gamble, Fl. Madras 1: 178. 1915; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 489. 1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 653. 2005.

Trees, up to 20 m tall. Branchlets woody, terete, bark greyish-yellow. Leaves imparipinnate, alternate; leaflets 7–11, opposite-sub-opposite, elliptic-oblong, 6–10 × 3–4 cm, acuminate at apex, oblique at base, entire, coriaceous, puberulous when young, glabrous when old; petiolules 5–8 mm, grooved above, glabrous; rachis 160–200 mm long, stout, angular, glabrous; petiolules 4–7 mm long, stout, glabrous. Flowers fragrant, in axillary panicles; peduncles 15 cm long, slender; pedicels 4–6 mm long, stout. Calyx campanulate; lobes 4, obtuse,

c. 3 × 3 mm, rounded at apex, entire, glabrous. Petals 4, linear-oblong, *c.* 5 × 3 mm, rounded at apex, entire, pubescent outside, glabrous within. Staminal tube *c.* 4 mm long; anthers 8, included. Ovary superior, densely pubescent, 4-loculed; stigma capitate, 4-lobed. Capsules pyriform. Seeds 3–4, reddish-brown.

Distribution: The native range of this species is SW. India (POWO, 2022); *Habitat*: Evergreen forests; *Fl. & Ft.:* February-June.

Specimen examined: Kurothose, 16.01.1995*, Jomy Augustine* 14719 (CALI).

Heynea Roxb.

Hort. Bengal. 33. 1814; et in Bot. Mag. t. 1738. 1815.

Heynea trijuga Roxb. ex Sims Bot. Mag. 42: t. 1738 1815. *Trichilia connaroides* (Wight & Arn.) Bentv., Acta Bot. Neerl. 11: 13. 1962; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 515. 1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 664. 2005; Ratheesh, Fl. Stud. Wayanad Dist. 212. 2009.

Trees, up to 15 m tall. Branchlets woody, terete, bark ash coloured. Leaves imparipinnate, alternate; leaflets 5–11, opposite, ovate, 7–12 × 3–7 cm, acuminate at apex, oblique at base, entire, coriaceous, glabrous out, glaucous beneath; petiolules 7–10 mm long, slender, grooved above, glabrous; rachis 100–170 mm long, glabrous, grooved. Flowers in axillary panicles; peduncles 200–300 mm long, glabrous, erect; pedicels *c.* 5 mm long, glabrous, slender. Calyx campanulate; lobes 5, ovate, *c.* 1 × 1 mm, acute at apex, entire, sparsely pubescent out, glabrous within. Petals 5, oblong, *c.* 4 × 2 mm, rounded at apex, entire-ciliolate. Staminal tube *c.* 5 mm long, lobed, pubescent; lobes 2-fid; stamens 10. Ovary superior, globose, glabrous; stigma capitate. Capsules globose, bright red. Seed one, surrounded by a white fleshy aril.

Distribution: The native range of this species is Indian Subcontinent to S. China and W. & Central Malesia (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and shola forests; *Fl. & Ft.:* March-September.

Specimens examined: Padikkappu, 28.12.2017, *Vishnu Mohan & Santhosh Nampy* 156574 (CALI); PTR, 25,10.1993, *N. Sasidharan* 12646

(KFRI); Umikuppan, 08.09.1993, *Jomy Augustine* 12646 (CALI); Vallakkadavu, 10.03.1994, *Jomy Augustine* 13434 (CALI).

Melia L.

Sp. Pl. 1: 384 1753.

Melia azedarach L., Sp. Pl. 1: 384. 1753; Hook.f., Fl. Brit. India 1: 544. 1875; Gamble, Fl. Madras 1: 176. 1915; S.S.Jain & Bennet in Hajra *et al*., Fl. India 4: 494. 1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 655. 2005. Trees, up to 20 m tall. Branchlets woody, terete, bark grey. Leaves bipinnate, alternate; leaflets 3–11, opposite-sub-opposite, ovate-obovate, 2.5–6 × 1–2.5 cm, acuminate at apex, oblique at base, irregularly serrate, glabrous; petiolules 1–3 mm long, slender, glabrous; rachis 120–200 mm long, slender, glabrous, terete. Flowers bisexual, in axillary panicles; peduncles up to 10 cm long, terete, erect, glabrous; pedicels 2–4 mm long, slender, erect, sparsely pubescent. Calyx campanulate; lobes 5, ovate, *c.* 1.5 × 2–3 mm, acuminate at apex, entire, pubescent out, glabrous within. Petals 5, truncate-lanceolate, *c.* 8 × 3 mm, rounded at apex, entire, glabrous. Staminal tube *c.* 7 mm long, dark purple, striate, puberulous, toothed; anthers 10. Ovary superior; styles attenuate; stigmas capitate. Drupes globose, glabrous, one seeded.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. & E. Australia (POWO, 2023); *Habitat*: Semi evergreen forests; *Fl. & Ft.:* May-December.

Specimen examined: Vellappara, 05.08.2017, *Jomy Augustine* 154138 (CALI).

Munronia Wight

Ill. Ind. Bot. 1. 147. I. 54. 1839.

Munronia pinnata (Wall.) W.Theob., Burmah, ed. 3, 2: 581 1883; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 497. 1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 656. 2005. *Turraea pinnata* Wall. in Pl. Asiat. Rar. 2: 21 1831.

Munronia wallichii Wight in Ill. Ind. Bot. 1: 117 1838; Hook.f., Fl. Brit. India 1: 543. 1875; Gamble, Fl. Madras 1: 175. 1915.

Shrubs, up to 30 cm tall. Branchlets woody, terete, villous on young parts, glabrous when old. Leaves imparipinnate, alternate; leaflets 10–14 foliolate, opposite, ovate-lanceolate, 3–10 × 1.5–4.5 cm, acuminate at apex, rounded at base, entire- slightly serrate, glabrous-hispid. Flowers in axillary cymes; peduncles 10–20 mm long, erect, pubescent; pedicels *c.* 10 mm long, pubescent. Calyx tubular; lobes 5, oblanceolate, 5–8 × *c.* 3 mm, acuminate at apex, entire, pubescent, leafy. Petals 5, spathulate, *c.* 30 × 50 mm, acuminate at apex, entire, glabrous. Staminal tube up to 20 mm long, 10-toothed; anthers 10, apiculate. Ovary 5-celled; styles *c.* 2 cm long; stigma capitate. Capsules depressed globose, hispid; seeds 5.



Distribution: The native range of this species is India to S. China and Peninsula Malaysia (Langkawi), Jawa to Lesser Sunda Islands (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* September-May.

Specimens examined: Lakkam Waterfalls, 24.01.2018*, Vishnu Mohan & Santhosh Nampy* 158193; Peerumede, 27.04.2018*, Vishnu Mohan & Santhosh Nampy* 159213 (CALI).

Naregamia Wight & Arn.

Prodr. Fl. Ind. Orient. 1: 116 1834.

Naregamia alata Wight & Arn., Prodr. Fl. Ind. Orient. 1: 117. 1834; Hook.f., Fl. Brit. India 1: 542. 1875; Gamble, Fl. Madras 1: 175. 1915; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 498. 1997; N.C.Nair & N.P.Balakr. in P.Daniel, (ed.), Fl. Kerala 1: 657. 2005.

Prostrate herbs. Stems woody, terete, glabrous. Leaves 3-foliolate; leaflets obovate, laterals oblique, 2.5–5 × 1.5–2.5 cm, obtuse at apex, cuneate at base,

entire, glabrous; petioles 15–35 mm long, winged, glabrous. Flowers axillary, solitary; pedicels *c.* 2 mm long, stout. Calyx campanulate; lobes 5, lanceolate, 3–4 × *c.* 2 mm, acute at apex, entire, glabrous. Petals 5, white, spathulate, 15–18 mm long, rounded at apex entire, glabrous. Staminal tube 15–20 mm long, cylindric, bulged at top, white with yellow at margins; anthers 10, sessile; disc annular. Ovary 3-celled; ovules 2 in each cell; styles filiform; stigma capitate. Capsules ovoid to sub-globose, 3-valved. Seeds truncate at both ends.



Distribution: The native range of this species is W. & S. India (POWO, 2023); *Habitat*: Moist deciduous forests, also in the plains; *Fl. & Ft.:* August-December.

Specimens examined: Kattappana, 26.07.2021, *Vishnu Mohan & Santhosh Nampy* 176543; Kuruthode, 08.09.1993*, Jomy Augustine* 12441 (CALI).

Toona M.Roem.

Fam. Nat. Syn. Monogr. 1: 139. 1846.

Toona ciliata M.Roem. Fam. Nat. Syn. Monogr. 1: 139. 1846; S.S.Jain & Bennet in Hajra *et al.*, Fl. India 4: 504. 1997; N.C.Nair & N.P.Balakr. in P. Daniel, (ed.), Fl. Kerala 1: 663. 2005 *Cedrela toona* Roxb. ex Rottler & Willd. in Neue Schriften Ges. Naturf. Freunde Berlin 2: 198 1803; Hook.f., Fl. Brit. India 1: 568. 1875; Gamble, Fl. Madras 1: 186. 1915.

Semi-deciduous trees, up to 30 m tall. Branchlets woody, terete; bark reddish-brown, rough, exfoliating. Leaves paripinnate, alternate, clustered at the tips of branchlets; leaflets 12–30, opposite or subopposite, ovate-lanceolate, 7–16 ×

2–7 cm, acuminate at apex, oblique at base, entire at margins, glossy above; rachis 130–900 mm long, slender, grooved above, glabrous, swollen at base; petiolules 3–5 mm long, stout. Flowers in terminal or axillary drooping panicles; peduncle 2–3 cm long, slender; pedicels 3–2 mm long, stout. Calyx copular; lobes 5, ovate, tomentose, ciliate, glabrous. Petals 5, oblong, *c.* 5 × 3 mm, rounded at apex, ciliate, glabrous. Stamens 5, free, inserted on the top of disc; filaments subulate; anthers oblong; disc thick, 5-lobed, pubescent. Ovary superior, ovoid, pubescent; styles short; stigma discoid. Capsule 5-valved. Seeds many, oblong, thin, winged at both ends.

Distribution: The native range of this species is S. China to Tropical Asia (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests; *Fl. & Ft.:* February-May.

Specimens examined: Mlappara, 12.02.1994, *Jomy Augustine* 13313 (KFRI); PTR, 16.01.1994, *Jomy Augustine* 13067 (KFRI); Thekkady, 22,12.1995, *Jomy Augustine* 17034 (KFRI)

Walsura Roxb.

Fl. Ind., ed. 1832. 2: 386. 1832.

Walsura trifoliolata (A.Juss.) Harms, H.G.A.Engler, Nat. Pflanzenfam., ed. 2. 19b(1): 119 1940; S.S.Jain & Bennet in Hajra *et al.,* Fl. India 4: 522. 1997; N.C.Nair & N.P.Balakr. in P. (ed.), Daniel, Fl. Kerala 1: 666. 2005. *Heynea trifoliolata* A.Juss. in Bull. Sci. Nat. Géol. 23: 238. 1830.

Small tress, up to 10 m tall. Branchlets woody, terete, pubescent. Leaves trifoliate, alternate; leaflets oblong, 4–8 × 3–4.5 cm, obtuse or emarginate at apex, acute at base, entire, glossy below, coriaceous; rachis 50–80 cm long, slender, glabrous; petiolules 3–5 mm long, stout, glabrous. Flowers on axillary corymbs; rachis 8–14 cm long, slender, glabrous; petiolules 2–3 mm long, stout. Calyx lobes 5, ovate, 1.5 × *c.* 1 mm, acute at apex, entire, pubescent. Petals 5, oblong, *c.* 3 × 2 mm, rounded at apex, entire, glabrous. Staminal tube pubescent, deeply lobed, lobes bifid; anthers between the teeth, exserted. Ovary 2-celled, pubescent; stigma turbinate. Berry globose; seeds solitary.

Distribution: The native range of this species is India, Sri Lanka (POWO, 2023); *Habitat*: Dry deciduous, semi-evergreen and evergreen forests; *Fl. & Ft.:* November-June.

Specimen examined: Chinnar, 08.02.1995, *K.K. Sajeev* 11850 (KFRI)

DICHAPETALACEAE Baill.

Fl. Bras. 12(1): 365. 1886, *nom. cons.*

Shrubs or rarely trees. Leaves alternate, sub-sessile or petiolate, simple, entire, often provided with glands at the base and below the apex. Stipules caducous or persistent. Inflorescence cymes. Flowers bisexual. Sepals 5. Petals 5, often 2-dentate, 2-lobed or 2-fid at the apex, sometimes united with the stamens at the base. Stamens 5. Ovary superior or semi-inferior. Fruits drupaceous, 1–2-seeded.

The family includes 205 species belongs to three genera (POWO, 2023); single species is in the study area.

Dichapetalum Thouars

Gen. Nov. Madagasc. 23. 1860.

Dichapetalum gelonioides (Roxb.) Engl. H.G.A.Engler & K.A.E.Prantl, Nat. Pflanzenfam. 3(4): 348 1896; Gamble, Fl. Madras 188. 1915; N.C.Nair in Hajra *et al.*, Fl. India 4: 528. 1997; N.C.Nair in P.Daniel, (ed.), Fl. Kerala 1: 670. 2005. *Moacurra gelonioides* Roxb. in Fl. Ind., ed. 1832. 2: 69 1832. *Chailletia gelonioides* (Roxb.) Hook.f. in Cat. Pl. Distrib. Herb. Griffith, Falconer & Helfer 2: 8 1870; Hook.f., Fl. Brit. India 1: 570. 1875.



Small tree up to 8 m tall. Branchlets woody, terete. Leaves simple, alternate; lamina elliptic, 5–8 × 1.5–2.5 cm, acuminate at apex, acute at base, entire, glabrous; petioles *c.* 5 mm long, pilose. Stipules elliptic, *c.* 3 × 1 mm, acute at apex, entire, pilose. Flowers on

axillary few-flowered unisexual cymes; peduncles *c.* 10 mm long, slender; pedicels erect, woody, *c.* 5 mm long, glabrous. Bracts lanceolate, *c.* 2 × 1 mm, acuminate at apex, entire, pilose. Male flowers: Sepals 5, ovate, *c.* 1.5 × 1 mm, acute at apex, entire, densely tomentose out, glabrous within. Petals 5, obovate, *c.* 1.5 × 1 mm, acute at apex, entire, glabrous; stamens 5; filaments stout, *c.* 2 mm long, erect. Female flowers as same as male flowers. Ovary 3 celled. Drupe oblong, bilobed, compressed.

Distribution: The native range of this species is S. India to China (Yunnan, Guangdong) and Sumatera (POWO, 2023); *Habitat*: Evergreen Forest; *Fl. & Ft.*: June-July.

Specimens examined: Mathikettan Shola National Park, 20.12.2016, *Vishnu Mohan & Santhosh Nampy* 151374 (CALI); Meenmutty, 25.01.1983, *A.G.Pandurangan* 76629 (MH); Periyar Tiger Reserve, 19.08.1993, *Jomy Augustine* 12282 (KFRI).

OLACACEAE Juss. ex R.Br.

Narr. Exped. Zaire 452. 1818, *nom. cons.*

Trees, shrubs or woody climbers. Leaves simple, alternate, exstipulate. Flowers bisexual, regular, in axillary fascicles of cymes or racemes, sometimes solitary. Sepals 3–5 (–6), small. Petals 3–5 (–6), free, valvate or partially united. Stamens 4–12. Ovary superior, semi-inferior or inferior; styles short; stigma 2–5-lobed. Fruit a berry or drupe.

The family includes 28 genera and 80 species (POWO 2023); four species in Idukki district.

Key to the genera

1. Plants climbing shrubs, usually with axillary tendrils; leaves 3–5 nerved……*Erythropalum*

1. Plants erect shrubs, trees or stragglers, without tendrils; leaves pinnately nerved……2

2. Calyx accrescent and enveloping fruit almost completely……*Olax*

2. Calyx not accrescent……..……3

3. Disc accrescent in fruit……..……. *Anacolosa*

3. Disc not accrescent in fruit…….....…….*Strombosia*

Anacolosa Blume

Mus. Bot. 1(16): 250, t. 46. 1850.

Anacolosa densiflora Bedd., Madras J. Lit. Sci. ser. 3, 1: 38. 1864; Hook.f., Fl. Brit. India 1: 580. 1875; Gamble, Fl. Madras 192. 1915; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 672. 2005.

Trees, up to 20 m tall. Branchlets woody, terete, glabrous; bark brown, smooth. Leaves simple, alternate; lamina elliptic, 6–12 × 3.5–5 cm, acuminate at apex, attenuate at base, entire, glabrous, coriaceous; petioles 0.5–1.2 cm long, glabrous, stout, grooved above. Flowers bisexual, in axillary cymes, fragrant; peduncles 0.5–0.9 cm long, glabrous; pedicels *c.* 0.5 cm long, stout, glabrous. Bracts absent. Calyx cupular, lobes not distinct, *c.* 5 mm long, glabrous, waxy. Petals 5, obovate, c. 5 × 1 mm, rounded at apex, entire, puberulous outside, densely tomentose within. Stamens 5; filaments *c.* 2 mm long, erect, slender, glabrous; disc cup shaped, surrounding the base of ovary. Ovary superior, 1-celled, ovate, glabrous; styles 3–4 mm long, conical, erect, glabrous; stigma shortly lobed. Drupe globose; disc accrescent in fruit. Seed pendulous.

Distribution: The native range of this species is SW. India (POWO, 2023):

Habitat: Evergreen forests; *Fl. & Ft.*: September-June.

Specimens examined: Pachakkanam, 10.06.1995, *Jomy Augustine* 15437 (CALI); *Ibid.,* 19.08.1993, *N. Sasidharan* 12278; Periyar Tiger Reserve, 30.04.1994, *Jomy Augustine* 13697 (KFRI).

Erythropalum Blume

Bijdr. Fl. Ned. Ind. 15: 921. 1826.

Erythropalum scandens Blume, Bijdr. Fl. Ned. Ind. 922. 1826. Hook.f., Fl. Brit. India 1: 578. 1875; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 674. 2005. *Mackaya populifolia* Arn., Jard. Mag. Zool. Bot. 2: 531. 1838. *Erythropalum populifolium* (Arn.) Mast. in Hook.f., Fl. Brit. India 1: 578. 1875; Gamble, Fl. Madras 1: 191. 1915.



Climbing shrubs, up to 8 m tall. Branchlets woody, terete, glabrous; bark greyish brown. Leaves simple, alternate, deltoid; lamina ovate, 12–15 × 6–10 cm, acuminate at apex, rounded at base, entire, glabrous and shiny above, glaucous below, membranous; petioles 1–3 cm long, glabrous, narrow, slender, slightly pulvinate. Stipules absent. Flowers in axillary peduncled umbellate cymes, non-fragrant; peduncles 1–3 cm long, slender, narrow, glabrous; pedicels 10–20 cm long, slender, glabrous. Bracts absent. Sepals cupular; lobes 5, acute, *c.* 0.5 × 1 mm long, acute at apex, entire, glabrous, sm ooth. Petals 5, oblong, *c.* 3 × 2 mm, acute at apex, entire, glabrous, smooth, yellow. Stamens 5; filaments 2–3 mm long, erect, glabrous; disc surrounds the ovary. Ovary glabrous; styles 1–2 mm long; stigma 3-fid. Berries ovoid, glabrous; seed one; aril red.

Distribution: The native range of this species is S. India, Central Himalaya to Hainan and Malaysia (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: December-June.

Specimens examined: Kumily, 16.06.2019, *Vishnu Mohan* & *Santhosh Nampy* 176316; Kuruthode, 10.01.1994, *Jomy Augustine* 13178 (CALI); Meenmutty, 25.01.1983, *A.G. Pandurangan* 78055; Painavu, 19.02.1984, *A.G.Pandurangan* 76662 (MH).

Olax L.

Sp. Pl. 1: 34. 1753.

Olax imbricata Roxb. Fl. Ind. 1: 169. 1820.

Olax wightiana Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 89. 1834; Hook.f., Fl. Brit. India 1: 575. 1875; Gamble, Fl. Madras 1: 190. 1915.

Glabrous trees, up to 15 m tall. Branchlets woody, terete, glabrous; bark brown, smooth. Leaves simple, alternate; lamina elliptic-oblong, 3.5–10 × 3–4 cm, acuminate at apex, rounded at base, entire, glabrous, coriaceous; petioles *c.* 5 mm long, glabrous, grooved. Stipules absent. Flowers solitary, axillary, fragrant; pedicels 0.3–0.5 cm long, slender, glabrous. Calyx cupular; lobes not prominent, glabrous, smooth. Petals 3, linear-lanceolate, *c.* 10 × 2 mm, rounded at apex, entire, glabrous, fleshy, recurved. Stamens 3, opposite to petals; filaments *c.* 8 mm long, erect, glabrous. Ovary 3-locular, glabrous; styles *c.* 3 mm long, erect, glabrous; stigma 3-lobed. Drupes oblong, yellow.

Distribution: Native range of this species is Tropical & Subtropical Asia to Caroline Islands (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and moist deciduous forests; *Fl. & Ft.*: January-August.

Specimens examined: Puthukkad, 29.08.2019, *Vishnu Mohan* & *Santhosh Nampy* 186635; Manaloda, 10.04.1994, *Jomy Augustine* 13618 (CALI); Thekkady, 03.06.1994, *Jomy Augustine* 13808 (KFRI).

Strombosia Blume

Bijdr. Fl. Ned. Ind. 17: 1154. 1827.

Strombosia ceylanica Gard., Calcutta J. Nat. Hist. 6: 350. 1846; Hook.f., Fl. Brit. India 1: 579. 1875; Gamble, Fl. Pres. Madras1. 191. 1915; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 677. 2005.

Trees, up to 25 m tall. Branchlets woody, terete, glabrous; bark greenish-grey, smooth. Leaves simple, alternate; lamina oblong-ovate, 8–15 × 5–6 cm, acute at apex, rounded at base, entire, glabrous, coriaceous; petioles *c.* 10 mm long, glabrous, stout, grooved above. Stipules absent. Flowers bisexual, greenish-white, in axillary cymes, non-fragrant; peduncles; pedicels *c.* 0.15 cm long, erect, glabrous. Calyx cupular, accrescent; lobes 5, ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous, smooth. Petals 5, oblong, 2–2.5 × *c.* 1 mm, rounded at apex, entire, glabrous out, tomentose within. Stamens 5, opposite to petals; filaments *c.* 3 mm long, erect, narrow, glabrous. Ovary ovate, surrounded by a lobed disc; styles *c.* 3 mm long, erect, slender, glabrous; stigma globular. Drupes pyriform; disc not accrescent in fruit. Seed 1.

Distribution: The native range of the species is Tropical & Subtropical Asia to Caroline Islands (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: January-April.

Specimens examined: Pamba, 15.03.1994, *Jomy Augustine* 13458 (CALI); PTR, 08.04.1995, *Jomy Augustine* 14960 (KFRI).

OPILIACEAE Valeton

Crit. Overz. Olacin. 136. 1886, *nom. cons*.

Trees, shrubs or woody climbers. Leaves alternate, simple. Flowers mostly hermaphrodite. Calyx minute. Petals conspicuous, 4 or 5, free or more or less united, valvate. Stamens as many as petals and opposite to them, free or united to the base of petals; anthers 2-celled, opening lengthwise by slits. Disc-glands alternating with stamens. Ovary superior or semi-inferior, 1-celled; styles slender; stigma sessile; ovule solitary, pendulous or erect. Fruit drupaceous, often fleshy.

The family includes 10 genera and 33 species in the world (POWO, 2023); one species in study area.

Cansjera Juss.

Gen. Pl. 448. 1789, *nom. cons*.

Cansjera rheedei J.F.Gmel., Syst. Nat. ed. 13. 2(1): 280. 1791; Hook.f., Fl. Brit. India 1: 582. 1875; Gamble, Fl. Madras 193. 1915; N.P.Balakr. in P.Daniel (ed.), Fl. Kerala 1: 680. 2005.

Climbing shrubs. Branchlets woody, terete, glabrous; bark greyish brown. Leaves simple, alternate; lamina ovate-elliptic, 5–8 × 2.5–4 cm, acute at apex, rounded at base, entire, glabrous, coriaceous; petioles 0.5–1 cm long, erect, slender, sparsely pubescent, slightly swollen at base. Flowers bisexual, in axillary spikes, non-fragrant; peduncles 2–5 cm long, erect, slender, glabrous; pedicels 0.3–0.5 cm long, slender, narrow, erect, glabrous. Bracts ovate, 2–3 × *c.* 1 mm, acute at apex, rounded at base, entire, tomentose. Perianth campanulate; lobes recurved, ovate, 4–4.5 × 2–2.5 mm, acute at apex, entire, glabrous, membranous. Stamens 4, free; filaments *c.* 4 mm long, erect, narrow; disc 4-lobed, thick. Ovary oblong, 1-celled; styles *c.* 3 mm long, erect, stout; stigma capitate, 4-lobed, sticky. Drupes oblong-obovoid. Seed 1.

Distribution: The native range of this species is S. China to Tropical Asia (POWO, 2023): *Habitat*: Dry deciduous forests and scrub jungles, also in sacred groves; *Fl. & Ft.*: November-August.

Specimens examined: Chinnar, 25.08.1995, *K.K. Sajeev* 15792 (KFRI); way to Churulipetty, *ibid*, 19.05.1999, *Sabitha P.K.* 79133; *Ibid*., 19.05.1999, *Resmi T.* 78398 (CALI).

ICACINACEAE Miers

Ann. Mag. Nat. Hist. ser. 2, 8: 174. 1851, *nom. cons.*

Trees, shrubs, or lianas. Leaves alternate, simple, exstipulate, coriaceous to sub-coriaceous; apex long acuminate to obtuse, rarely mucronate or emarginate; base acute or attenuate, rarely cordate. Inflorescences axillary, extra-axillary, terminal or cauliflorus, cymose or racemose. Flowers actinomorphic, rarely zygomorphic, bisexual, rarely unisexual; hypogynous. Calyx (4–) 5 lobed or-toothed, campanulate, fleshy, pubescent without, imbricate. Petals (4) 5–6, free, rarely united, pubescent or glabrous. Stamens (4) 5–6, alternate with the petals; filaments fleshy. Pistil with the ovary pubescent or glabrous.

The family includes 24 genera and 141 species in the world (POWO, 2023); three species in the study area

Key to the genera

1. Plants limbing shrubs……..……..*Miquelia*
1. Plants erect shrubs or small trees……..……..2
2. Flowers unisexual……..…*Gomphandra*
2. Flowers bisexual……..…*Mappia*

Gomphandra Wall. ex Lindl.

Intr. Nat. Syst. Bot., ed. 2. 439. 1836.

Gomphandra tetrandra (Wall.) Sleumer, Notizbl. Bot. Gart. Berlin-Dahlem 15: 238. 1940; Blumea 17: 204. 1969; Balakr. in P.Daniel, Fl. Kerala 1: 685. 2005. *Lasianthera tetrandra* Wall. in Roxb., Fl. Ind. 2: 238. 1824.

Gomphandra axillaris Wall. ex Bedd., Fl. Sylv. 61. 1870; Hook.f., Fl. Brit. India 1: 586. 1875.

Small trees, up to 15 m tall. Branchlets woody, terete, glabrous; bark greyish,

smooth. Leaves alternate, simple; lamina oblong-ovate, 5–11 × 3–4 cm, acuminate at apex, acute at base, entire at margins, glabrous, coriaceous; petioles erect, 0.5–1 cm long, glabrous, stout, grooved above. Stipules absent. Flowers in axillary cymes, non-fragrant; peduncles *c.* 1 cm long, erect, terete, glabrous; pedicels *c.* 0.3 cm long, erect, g labrous. Bracts absent. Calyx campanulate; lobes 5, acute, *c.* 1.5 × 1 mm, acute at apex, entire at margins, tomentose out, glabrous within. Corolla campanulate at base; lobes 5, lanceolate-ovate, *c.* 6 × 3 mm, acuminate at apex, entire at margins, glabrous, thick. Stamens 5; filaments 8 mm long, erect, thin, glabrous. Ovary oblong, glabrous; styles *c.* 4 mm long, erect, slender, glabrous; stigma discoid, sticky. Drupes obovate, glabrous. Seed 1.



Distribution: The Native range of this species is SW. India, Sri Lanka, Assam to S. China and Indo-China (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, also in the sacred groves; *Fl. & Ft.*: September-December.

Specimens examined: Mathikettan shola National Park, 11.12.2016, *Vishnu Mohan* & *Santhosh Nampy* 145236; Thommankutthu, 10.12.2016, *Vishnu Mohan & Santhosh Nampy* 151302 (CALI).

Mappia Heist. ex Fabr.

Enum. 58. 1759.

Mappia nimmoniana (J.Graham) Byng & Stull, Global Fl. 4: 145. 2018. *Nothapodytes nimmoniana* (Graham) Mabb. in Manilal, Bot. Hist. Hort. Malab. 88. 1980; N.P.Balakr. in P. Daniel, Fl. Kerala 1: 688. 2005. *Premna nimmoniana* Graham, Cat. Pl. Bombay 155. 1839.

Stemsonurus foetidus Wight, Ic. t. 955. 1845; *Mappia foetida* (Wight) Miers, Ann. Mag. Nat. Hist. ser. 2, 9: 395. 1852; Gamble, Fl. Madras 196. 1915; *Nothapodytes foetida* (Wight) Sleumer, Notizbl. Bot. Gart. Berlin-Dahlem. 15: 247. 1940, Blumea 17: 232. 1969.

Mappia wightiana Miers, Ann. Mag. Nat. Hist. ser. 2, 9: 397. 1852; Gamble, Fl. Madras 197. 1915.
Mappia tomentosa Miers, Ann. Mag. Nat. Hist. ser. 2, 9: 397. 1852; Hook.f., Fl. Brit. India 1: 589. 1875; Gamble, Fl. Madras 196. 1915.
Mappia ovata Miers, Ann. Mag. Nat. Hist. ser. 2. 9: 396. 1852; Hook.f., Fl. Brit. India 1: 589. 1852; Gamble, Fl. Madras 197. 1915.



Small trees or shrubs, up to 10 m tall. Branchlets woody, terete, glabrous; bark greyish brown, lenticellate. Leaves alternate, simple; lamina broadly ovate-elliptic, 7–22 × 4–11 cm, acute-acuminate at apex, rounded at base, entire at margins, glabrous above, pubescent beneath, smooth; petioles 1–8 cm long, erect, slender, glabrous. Stipules absent. Flowers in terminal cymes, non-fragrant; peduncles 4–7 cm long, slender, glabrous; pedicels *c.* 0.5 cm long, stout, glabrous. Bracts absent. Calyx campanulate; lobes 5, widely ovate-triangular, *c.* 1 × 2 mm, acute at apex, entire at margins, hispid out, glabrous within, thick. Petals 5, free, oblong-orbicular-ovate, *c.* 3 × 1 mm, rounded at apex, entire at margins, hispid out, glabrous within. Stamens 5, free; filaments *c.* 3 mm long, erect, glabrous. Ovary ovoid, hirsute; styles obscure; stigma thick, discoid. Drupes oblong, compressed. Seed 1.

Distribution: The native range of this species is Indian Subcontinent to Indo-China, Sumatera, Philippines (POWO, 2023); *Habitat:* Moist deciduous, evergreen and shola forests; *Fl. & Ft.:* June-September.

Specimens examined: Edathattu, 13.09.2018, *Vishnu Mohan* & *Santhosh Nampy* 159484; Mangaladevi Hills, 15.07.2017, *Vishnu Mohan & Santhosh Nampy* 154104 (CALI); Pachakkanam, 20.08.1993, *N. Sasidharan* 12304 (MH).

Miquelia Blume

Bull. Sci. Phys. Nat. Néerl. 1: 94. 1838

Miquelia dentata Bedd., Madras J. Lit. Sci. ser. 3, 1: 38. 1864; Hook.f., Fl. Brit. India 1: 593. 1875; Gamble, Fl. Madras 1: 197. 1915.



Climbing shrubs. Stems woody, terete, glabrous; bark brownish grey. Leaves alternate, simple; lamina ovate-elliptic, 8–18 × 4–10 cm, acute at apex, rounded at base, dentate at margins, more sharply near the base, glabrous; petioles 5–8 cm long, terete glabrous, twining. Stipules absent. Flowers in axillary peduncled globose spikes, unisexual, non-fragrant; peduncles 4–7 cm long narrow, drooping, glabrous; pedicels *c.* 10 mm long, narrow, glabrous. Bracts absent. Male flowers: Calyx cupular, 4-toothed; lobes ovate, 0.5–1 × 1 mm, acute at apex, entire at margins, glabrous. Petals 4, oblong, *c.* 3 × 1.5 mm, rounded at apex, entire at margins, glabrous. Stamens 5; filaments 3 mm long, erect, narrow, slender, glabrous. Female flowers: Calyx cupular, 4-toothed; lobes ovate, *c.* 1 × 1 mm, acute at apex, entire at margins, glabrous. Petals 4, oblong, *c.* 3 × 1.5 mm, rounded at apex, entire at margins, glabrous. Ovary 1-celled, 4-angled; styles reduced; stigma 4-angled. Drupes ovoid, sessile, yellow.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, also in the sacred groves; *Fl. & Ft.*: January-September.

Specimens examined: Karimanal, 09.03.2017, *Vishnu Mohan* & *Santhosh Nampy* 152049; Painavu, 04.04.2018, *Vishnu Mohan & Santhosh Nampy* 158472 (CALI); Periyar Tiger Reserve, 09.01.1994, *Jomy Augustine* 13037 (MH).

AQUIFOLIACEAE Bercht. & J.Presl

Prir. Rostlin Aneb. Rostl. 2: 440. 1825, *nom. cons.*

Trees or shrubs, mostly evergreen. Stipules absent or very small. Flowers frequently dioecious, actinomorphic, in umbellate fascicles. Sepals 5, connate at base. Petals free or connate at base, imbricate or valvate. Stamens free, alternate with corolla-lobes; anthers 2-thecous, opening lengthwise. Ovary superior, 3- or more-locular; styles terminal; stigma sticky; ovules 1 or 2 in each locules, pendulous. Fruit drupaceous. Seeds with copious fleshy endosperm; embryo small, straight.

One genus and 574 species world over (POWO, 2023); four species in the study area.

Ilex L.

Sp. Pl. 1: 125. 1753.

Key to the species

1. Leaves entire or rarely with a few serrations near the apex; flowers 5-merous ……..……..2
1. Leaves denticulate-serrate, coriaceous; flowers usually 4-merous……..…….. ..*I. denticulata*
2. Flowers 4–5-merous..……..……...……3
2. Flowers 6-merous..…….. *I. malabarica*
3. Leaves elliptic-ovate; calyx 4-lobed..…….. *I. walkeri*
3. Leaves ovate-lanceolate; calyx 5-lobed……...*I. gardneria*

Ilex denticulata Wall. ex Wight, Ill. Ind. Bot. 2: 147. 1850; Hook.f., Fl. Brit. India 1: 600. 1875; Gamble, Fl. Madras 200. 1915; Reema *et al.* in Daniel, Fl. Kerala 1: 693. 2005; *Ilex denticulata* Wall. ex Wight Ill. Ind. Bot. 2: 147 1850.

Evergreen trees up to 15 m tall. Branchlets terete, smooth, glabrous; bark smooth, greyish brown, lenticellate. Leaves simple, alternate; lamina elliptic-lanceolate-ovate, 4–6 × 2–3 cm, acuminate at apex, acute at base, denticulate

at margin, glabrous on both sides, coriaceous; petioles 0.7–1 cm long, glabrous, grooved, slightly pulvinate. Stipules absent. Flowers non-fragrant, white, unisexual in axillary fascicles; peduncles 6–10 mm long, stout, glabrous; pedicels 5 mm long, narrow, glabrous. Bracts absent. Male flowers: Sepals fused, 4-lobed; lobes 1–1.5 × 1 mm, rounded at apex, smooth at margins, glabrous, coriaceous, persistent. Petals 4, connate basally, oblong, 4–5 × 2–3 mm, rounded at apex, smooth at margins, glabrous, membranous. Stamens 4; filaments *c.* 4 mm long, slender, glabrous. Pistillode globose, glabrous. Female flowers: Sepals fused, 4-lobed; lobes 1–1.5 × 1 mm, rounded at apex, smooth at margins, glabrous, coriaceous, persistent. Petals 4, free, oblong, *c.* 5 × 3 mm, rounded at apex, smooth at margins, glabrous, membranous. Ovary superior, ovoid; styles 3 mm long, stout, glabrous; stigma globose. Drupes globose, brown. Seeds 4, oblong-elliptic, rugose.

Distribution: The native range is SW. India, Sri Lanka, China (S. Yunnan) (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-March.

Specimen examined: Mlappara, 10.01.1994, *Jomy Augustine* 13325 (CALI).

Ilex gardneriana Wight, Icon. Pl. Ind. Orient. 4: t. 1217. 1848; Hook.f., Fl. Brit. India 1: 603. 1875; Gamble, Fl. Madras 200. 1915; Basu in N.P.Singh *et al.*, Fl. India 5: 57. 2000.

Evergreen trees, up to 4 m tall. Branchlets terete, glabrous; bark smooth, lenticellate. Leaves simple, alternate; lamina ovate-lanceolate, 5–7 × 3 cm, acuminate at apex, obtuse or rounded at base, entire at margins, revolute, glabrous on both surfaces, coriaceous; petioles 1.5–2 cm long, glabrous, grooved above, slightly pulvinate. Stipules absent. Flowers non-fragrant, unisexual, white, solitary or in axillary umbels; peduncles *c.* 5 mm long, narrow, glabrous; pedicels 4–8 mm long, slender, glabrous. Bracts absent. Male flowers; Sepals connate at base, 5-lobed; lobes triangular, 1–1.5 × 1 mm, acute at apex, ciliate at margins, sparsely pubescent out, glabrous within, non-coriaceous. Petals connate at base, 5-lobed; lobes oblong, 5–6 × 3–4 mm,

rounded at apex, smooth at margins, glabrous on both sides, membranous. Stamens 10, adnate to the base of ovary; filaments narrow, erect, *c.* 5 mm long, erect, slender, glabrous. Female flowers as same as male flowers. Ovary superior, ovate, glabrous; styles 3–4 mm long, glabrous; stigma capitate, sticky. Berries globose, *c.* 4.5 × 3 mm, glabrous. Seeds ovate.

Distribution: The native range of this species is India (Nilgiri hills) (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: March-May.

Specimen examined: Kottamala, 16.05.1995, *Jomy Augustine* 15380 (CALI).

Ilex malabarica Bedd., Fl. Sylv. S. India t. 143. 1871; Hook.f., Fl. Brit. India 1: 600. 1875; Gamble, Fl. Madras 200. 1915; Reema *et al.* in Daniel, Fl. Kerala 1: 693. 2005.

Evergreen trees up to 20–25 m high. Branchlets terete, smooth glabrous; bark lenticellate. Leaves simple, alternate; lamina elliptic-oblong, 3–8 × 1.5–3.5 cm, retuse at apex and base, entire at margins, glabrous on both sides, coriaceous; petioles *c.* 6 mm long, glabrous. Stipules absent. Flowers non-fragrant, unisexual, 6-merous, in short axillary panicled umbels; peduncles *c.* 5 mm long, slender glabrous; pedicels *c.* 5 mm long, stout, glabrous. Bracts absent. Male flowers; Sepals fused at base, 6-lobed; lobes ovate-orbicular, 1–1.5 × 1–1.5 mm, rounded at apex, ciliate at margins, persistent, glabrous, non-coriaceous. Petals 6, orbicular, connate at base, elliptic, 2–3 × 1–1.5 mm, rounded at apex, smooth at margins, glabrous on both sides, membranous. Stamens 5; filaments 4–5 mm long, smooth, erect, glabrous. Female flowers as same as male flowers. Ovary globose, beaked, glabrous; styles 2–2.5 mm long, erect, glabrous; stigma 6-lobed, sticky. Drupes globose, red, glabrous. Seeds ovate.

Distribution: Endemic to W. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-May.

Specimen examined: Meesappulimala, 06.05.2019, *Vishnu Mohan & Santhosh Nampy* 159161 (CALI).

Ilex walkeri Wight & Gardner ex Thwaites, Enum. Pl. Zeyl. 184. 1860; Hook.f., Fl. Brit. India 1: 600. 1875.

Ilex thwaitesii Loes. ex Gamble, Fl. Madras 200. 1915; Reema *et* al. in Daniel, Fl. Kerala 1: 694. 2005.

Evergreen small trees up to 3 m tall. Stems woody, terete, branchlets glabrous; bark lenticellate, brown. Leaves simple, alternate; lamina elliptic-ovate, 1.2–5 × 1.5–2.5 cm, slightly mucronate or retuse at apex, obtuse-rounded at base, recurved at margin, glabrous on both surfaces coriaceous; petioles *c.* 3 mm long, glabrous, grooved, slightly pulvinate. Stipules absent. Flowers non-fragrant, white, unisexual, in axillary umbels; peduncles 7–14 mm long, narrow, glabrous; pedicels 2–4 mm long, narrow, glabrous. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire at margins, glabrous on both sides, non-coriaceous, persistent. Male flowers; Sepals connate at base, 4-lobed; lobes subulate, *c.* 2 × 1 mm, acute at apex, smooth at margins, glabrous on both sides, non-coriaceous. Petals 5, connate at base, ovate, 1–1.5 × 1–2 mm, rounded at apex, entire at margins, glabrous, membranous. Stamens 5; filaments adnate to the corolla, 4–4.5 mm long, erect, stout, glabrous. Female flowers as same as male flowers. Ovary 5-celled, globose, glabrous; styles *c.* 2 mm long, erect, slender, glabrous; stigma 5-lobed. Drupes globose, red. Seeds 4 or 5, hard.

Distribution: Endemic to SW. India, Sri Lanka (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: February-April.

Specimen examined: Way to Anamudi peak, 26.04.2019, *Vishnu Mohan & Santhosh Nampy* 159132 (CALI).

CELASTRACEAE R.Br.

Voy. Terra Austral. 2: 554. 1814, *nom. cons.*

Trees, shrubs, lianas, evergreen or deciduous. Leaves simple, alternate or opposite, petiolate; margins entire, crenate, serrate, or dentate; stipules small and caducous, or absent. Inflorescences axillary or terminal, few to many flowered cymes, thyrses, racemes, fascicles or rarely panicles, or flowers solitary. Flowers actinomorphic, bisexual or unisexual. Perianth (3 or) 4– or 5-merous. Stamens 3–5, alternate with petals; anther (1 or) 2-celled, basifixed to dorsifixed, dehiscing longitudinally or obliquely, introrse, extrorse, or

latrorse. Ovaries 3–5, superior to half-inferior, often partially immersed in a disc, completely or incompletely 2–5-locular; ovules erect, axile, or pendulous. Fruit a loculicidal capsule, schizocarp of 2–5 indehiscent mericarps, drupe, berry, or samara with a single surrounding wing, rarely an indehiscent capsule or nut with lateral styles, pericarp bony, leathery, chartaceous, or fleshy, capsules smooth, angular, deeply lobed, transversely flattened and lobed to base, or connate, rarely prickly, laterally winged. Seeds 1–12, smooth or occasionally furrowed, sometimes winged, wing membranous, basal, exarillate or aril basal to completely enveloping seed.

There are 98 genera in this family (POWO, 2023), of which six genera and 13 species are found in the study area.

Key to the genera

1. Plants acaulescent……*Parnassia*

1. Plants caulescent……2

2. Stamens 3……..……..*Salacia*

2. Stamens 5……..……...3

3. Leaves spiral or alternate……..……*Celastrus*

3. Leaves decussate or opposite……4

4. Petals connate at base; disc inconspicuous; fruits splitting laterally, 1-seeded ……..……*Microtropis*

4. Petals free; disc conspicuous; fruits splitting loculicidally, 3-many seeded…5

5. Ovary 2 or 1-loculed by abortion; ovules 2 in each locule; fruits drupaceous, indehiscent……..……6

5. Ovary 3–5 loculed; ovules 1–18 in each locule; fruits capsular, dehiscent…7

6. Disc not-cupular; fruits with a persistent terminal styles……. *Elaeodendron*

6. Disc cupular; fruits with a persistent lateral styles……*Pleurostylia*

7. Ovary 3-loculed; ovules 8–18 in each locule; fruits 3-angled; seeds winged ……..*Lophopetalum*

7. Ovary 5 loculed; ovules 1 or 2 in each locule; fruits 4–5 angled; seeds not winged ……*Euonymus*

Celastrus L.

Sp. Pl. 1: 196. 1753

Celastrus paniculatus Willd., Sp. Pl. ed, 1: 1125. 1798; Hook.f., Fl. Brit. India 1: 617. 1875; Gamble, Fl. Madras 1: 208. 1918; K.Ramam & P.Venu in P.Daniel, Fl. Kerala 1: 700. 2005.

Climbing shrubs, up to 5 m tall. Branchlets woody, terete, glabrous; bark lenticellate. Leaves simple, alternate; lamina broadly ovate-elliptic, 7–10 × 5–7 cm, abruptly acuminate at apex, rounded at base, serrate at margins, glabrous on both sides, coriaceous; petioles erect, *c.* 0.6 cm long, glabrous, grooved, slightly pulvinate. Stipules absent. Flowers in terminal panicles, non-fragrant; peduncles 3–5 cm long, woody, stiff; pedicels *c.* 0.6 cm long, narrow, slender, thread-like. Bracts absent. Sepals campanulate; lobes 5, orbicular, *c.* 1 × 1 mm, rounded at apex, entire at margins, glabrous, ciliate. Petals 5, ovate, *c.* 2 × 1 mm, rounded-acute at apex, entire at margins, glabrous, membranous. Stamens 5; filaments *c.* 3 mm long, erect, slender, glabrous. Ovary superior, globose; styles *c.* 2 mm long, erect, glabrous; stigma rounded, sticky. Capsules loculicidal, yellow. Seeds 3, aril reddish.

Distribution: The native range of this species is Indian Subcontinent to S. China and Indo-China (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: September-July.

Specimen examined: Karadikkavala, 09.07.1993, *Jomy Augustine* 12045 (CALI).

Elaeodendron Jacq.

Icon. Pl. Rar. 1: 5, t. 48 1782.

Elaeodendron paniculatum Wight & Arn., Prodr. Fl. Ind. Orient. 1: 157. 1834; *Cassine paniculata* (Wight & Arn.) Lobr.-Callen Adansonia, n.s., 15: 220 1975; K.Ramam. & P. Venu in P. Daniel (ed.), Fl. Kerala 1: 699. 2005; Gamble, Fl. Madras 212. 1918; *Elaeodendron glaucum* sensu Lawson in Hook. f.,Fl. Brit. India 1: 623. 1875, *p.p.*, non Pers. 1805.

Trees, up to 20 m tall. Branchlets woody, terete, glabrous; bark smooth. Leaves simple, decussate; lamina elliptic, 3.5–5.5 × 1.5–2.5 cm, acuminate at apex, acute at base, slightly crenate at margins, glabrous on both sides, coriaceous;

petioles 5–10 mm long, slender, glabrous, grooved above. Stipules ovate, c. 2 × 1 mm, acute at apex, entire at margins, glabrous on both sides, scaly, caducous. Flowers in axillary stout dichasial corymbose cymes, non-fragrant; peduncles 2.5–4 cm long, slender, glabrous; pedicels *c.* 0.5 cm long, glabrous, narrow. Bracts ovate, *c.* 2 × 1 mm, acute at apex, rounded at base, entire at margins, glabrous on both sides. Calyx 5-lobed; lobes unequal, orbicular, *c.* 1 × 1 mm, rounded at apex, entire at margins, glabrous. Petals 5, obovate, *c.* 3 × 1.5 mm, rounded at apex, narrow at base, entire at margins, glabrous, membranous. Stamens 5, inserted into the margin of disc; filaments *c.* 3 mm long, slender, recurved; disc thick, fleshy. Ovary immersed in the disc; styles *c.* 2 mm long, erect, glabrous; stigma capitate. Drupes globose, apiculate. Seed 1, erect.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Shola and evergreen forests; *Fl. & Ft.*: September-June.

Specimens examined: Kottamala palam, 10.05.1994, *Jomy Augustine* 13734 (CALI); Vallakkadavu, 03.06.1995, *N. Sasidharan* 15440 (KFRI).

Euonymus L.

Sp. Pl. 1: 197. 1753, *nom. cons.*

Key to the species

1. Cymes more than 3-flowered; petals not fimbriate……..……2
1. Cymes 1–3-flowered; petals fimbriate……*E. indicus*
2. Leaves entire ……..……..…… *E. crenulatus*
2. Leaves serrate-crenate……3
3. Leaves lanceolate, prominently serrate……*E. serratifolius*
3. Leaves elliptic, crenate-serrate…… *E. laxiflorus*

Euonymus crenulatus Wall. ex Wight & Arn. Prodr. Fl. Ind. Orient. 1: 161 1834; Hook.f., Fl. Brit. India 1: 608. 1875; Gamble, Fl. Madras 1: 230. 1918; K.Ramam. & P.Venu in P.Daniel (ed.), Fl. Kerala 1: 703. 2005.

Large shrubs, up to 6 m tall. Branchlets woody, terete, glabrous; bark grey, smooth. Leaves simple, decussate; lamina elliptic-lanceolate, 4–10 × 1.5–5 cm, acute at apex and base, entire and recurved at margins, glabrous on both sides,

coriaceous; petioles 0.2–0.6 cm long, slender, glabrous. Stipules absent. Flowers in axillary 5-flowered dichasial cymes, non-fragrant, reddish; peduncles 2–4 cm long, slender, glabrous; pedicels 0.5–0.8 mm long, slender, glabrous. Bracts absent. Calyx campanulate, deeply 5-lobed; lobes ovate, *c.* 3 × 3 mm, rounded at apex, entire at margins, glabrous. Petals 5, free, orbicular, *c.* 5 × 5 mm, rounded at apex, entire at margins, glabrous, fleshy. Stamens 5, attached on the disc; filaments *c.* 2 mm long, stout, glabrous. Ovary sunk in the disc; styles 2 mm long, erect, stout; stigma blunt. Capsules turbinate, drooping. Seeds solitary in each cell; aril small, orange-red.



Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Evergreen forests; *Fl. & Ft.*: August-March.

Specimens examined: Munnar, 29.11.1979, *Nambiar* 1113 (KFRI); way to Umayamala, 30.08.2019, *Vishnu Mohan* & *Santhosh Nampy* 170273 (CALI).

Euonymus indicus B.Heyne ex Wall. in W.Roxburgh, Fl. Ind. 2: 409. 1824; Hook.f., Fl. Brit. India 1: 608. 1875; Gamble, Fl. Madras 1: 202. 1918; K.Ramam. & P.Venu in P.Daniel (ed.), Fl. Kerala 1: 704. 2005.

Large shrubs up to 5 m tall. Branchlets woody, terete, glabrous; bark brownish black, smooth. Leaves simple, opposite; lamina elliptic-lanceolate, 3–5 × 1.5–2.5 cm, acuminate at apex and base, entire at margins, glabrous on both sides, coriaceous; petioles 0.2–0.6 cm long, slender, glabrous, grooved. Stipules absent. Flowers in axillary dichasial 1–3-flowered cymes, non-fragrant; peduncles erect, 0.3–0.8 cm long, slender, glabrous; pedicels 0.5–1 cm long, slender, narrow, glabrous. Bracts absent. Calyx campanulate, deeply 5-lobed; lobes ovate, *c.* 3 × 3 mm, acute at apex, entire at margins, glabrous, thick. Petals 5, orbicular, *c.* 5 × 5 mm, rounded at apex, entire at margins, glabrous, thick, fimbriate. Stamens 5; filaments *c.* 3 mm long, erect, stout. Ovary ovate;

styles 3 mm long, stout, glabrous; stigma globose, sticky. Capsules turbinate. Seeds ovate.

Distribution: The native range of this species is Tropical Asia (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: September-May.

Specimens examined: Anakuthivangal, 08.10.1993, *Jomy Augustine* 12753 (CALI); Kulamavu, 04.10.1983, *C.N. Mohanan* 79994 (MH).

Euonymus laxiflorus Champ. ex Benth., Hooker's J. Bot. Kew Gard. Misc. 3: 333. 1851.

Euonymus paniculatus Wight ex M.A.Lawson in J.D.Hooker, Fl. Brit. India 1(3): 609. 1875; Gamble, Fl. Madras 203. 1918; K.Ramam. & P.Venu in P.Daniel (ed.), Fl. Kerala 1: 705. 2005.

Large shrubs, up to 4 m tall. Branchlets woody, terete, glabrous; bark blackish brown, smooth. Leaves simple, decussate; lamina elliptic, 5–8 × 2–4 cm, acuminate at apex, acute at base, crenate-serrate margins, smooth at base, coriaceous; petioles 0.5–0.9 cm long, glabrous, grooved, pulvinate. Stipules absent. Flowers in 7-flowered axillary cymes, non-fragrant; peduncles 2–3 cm long, erect, slender, narrow, glabrous; pedicels *c.* 1 cm long, very narrow, glabrous. Bracts absent. Sepals entire, orbicular, *c.* 3 × 2 mm, rounded at apex, entire at margins, glabrous, thick. Petals entire, orbicular, *c.* 6 × 3 mm, acute-rounded at apex, entire at margins, glabrous. Stamens 5; filaments *c.* 3 mm long, erect; stigma sticky. Ovary sunken in the disc, glabrous; styles 3 mm long, erect, glabrous; stigma globose. Capsules 5-seeded, orange-yellow. Seeds ovate; aril white.

Distribution: The native range of this species is S. India, S. China, Taiwan and Indo-China (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: September-May.

Specimen examined: Uppermanalar, 15.04.1994, *Jomy Augustine* 13704 (CALI).

Euonymus serratifolius Bedd., Fl. Sylv. S. India:64. 1871; Hook.f., Fl. Brit. India 1: 609. 1875; Gamble, Fl. Madras 203. 1918; K.Ramam. & P.Venu in P.Daniel (ed.), Fl. Kerala 1: 705. 2005.

Shrubs up to 5 m tall. Branchlets woody, terete, glabrous; bark grey, smooth. Leaves simple decussate; lamina lanceolate, 4–7 × 2.5–4 cm, acuminate with sharp tip at apex, attenuate at base, serrate at margins, entire towards base, glabrous on both sides, coriaceous; petioles 0.5–0.9 cm long, glabrous, grooved at middle. Stipules absent. Flowers non-fragrant, on axillary 5-flowered fascicles; peduncles *c.* 4 cm long, slender, glabrous; pedicels *c.* 1 cm long, slender, glabrous. Bracts absent. Calyx campanulate; lobes 5, ovate, *c.* 3 × 1.5 mm, acute at apex, entire at margins, glabrous. Petals 5, free, ovate, 6–8 × 3-4 mm, rounded at apex, entire at margins, glabrous, membranous. Stamens 5; filaments 3–5 mm long, erect, stout, glabrous. Ovary sunken in the disc, glabrous; styles 3 mm long, erect, glabrous; stigma capitate. Capsules obcordate, deep red. Seeds reddish-brown, smooth.

Distribution: The native range of this species is SW. India and China (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: September-May.

Specimen examined: Deviar, 07.08.1993, *Jomy Augustine* 12022 (CALI).

Lophopetalum Wight ex Arn.

Ann. Nat. Hist. 3(16): 150. 1839

Lophopetalum wightianum Arn., Ann. Nat. Hist. 3: 151. 1839; Hook.f., Fl. Brit. India 1: 615. 1875; Gamble, Fl. Madras 205. 1918; K.Ramam. & P.Venu in P.Daniel (ed.), Fl. Kerala 1: 709. 2005.

Evergreen trees, up to 30 m tall. Branchlets woody, terete, glabrous; bark brownish black, smooth. Leaves simple, opposite or sub-opposite; lamina elliptic-ovate, 5.5–12 × 2–4.5 cm, acute-rounded at apex, rounded at base, entire at margins, coriaceous, glabrous on both sides; petioles 1–2 cm long, glabrous, stout, grooved above. Stipules absent. Flowers pinkish in lax axillary or terminal dichasial cymes, non-fragrant; peduncles 3–5 cm long, slender, glabrous; pedicels *c.* 1 cm long, slender, glabrous. Bracts absent. Calyx campanulate; lobes 4 or5, obtuse, *c.* 3 × 4 mm, truncate at apex, entire at margins, glabrous. Petals 4 or 5 orbicular, *c.* 5 × 4 mm, rounded at apex, entire at margins, glabrous; disc large, flat, 5-lobed. Stamens 5, inserted on the disc; filaments *c.* 4 mm long, erect, slender. Ovary small, sunken in the disc; styles

2 mm long, erect, glabrous; stigma capitate. Capsules 3-angled, trigonous. Seeds thin, surrounded by a long linear wing, arillate.

Distribution: The native range of this species is Indian Subcontinent to W. Malesia (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: December-July.

Specimens examined: Pooyamkutty, 16.12.1988, *P. Bhargavan* 89969 (MH); Vallakkadavu, 04.02.1994, *Jomy Augustine* 13432 (CALI).

Microtropis E.Mey.

Comm. Pl. Afr. Austr. 65. 1835.

Key to the species

1. Flowers in axillary or extra axillary peduncled cymes ..... *M. microcarpa* var. *densiflora*

1. Flowers sessile, clustered at the axil of leaves.....2

2. Leaves emarginate at apex ..... *M. ramiflora*

2. Leaves more or less acuminate or acute at apex.....3

3. Flowers fragrant; capsules 15−20 mm long.....*M. stocksii*

3. Flowers non-fragrant; capsules 6−10 mm long..... *M. wallichiana*

Microtropis microcarpa var. **densiflora** (Wight) Merr. & F.L.Freeman, Proc. Amer. Acad. Arts 73: 287 1940. *Microtropis densiflora* Wight, Icon. Pl. Ind. Orient. 1052; Hook.f., Fl. Brit. India 1: 614. 1875; Gamble, Fl. Madras 1: 207. 1918.

Shrubs or small trees, up to 5 m tall. Branchlets woody, terete, glabrous; bark brown, smooth. Leaves simple, opposite; lamina elliptic, *c.* 7.5 × 2.5 cm. obtuse at apex, acute at base, entire at margins, glabrous on both sides, coriaceous, shining above; petioles 0.5–1 cm long, glabrous, slightly pulvinate. Stipules absent. Flowers in axillary peduncled cymes, non-fragrant; peduncles 0.3–0.6 cm long, stout, glabrous; pedicels 0.3 cm long, stout, glabrous. Bracts absent. Sepals 5, free, ovate, *c.* 1.5 × 1 mm, acute at apex, entire at margins, glabrous, thick. Petals 5, connate at base; lobes orbicular-elliptic, *c.* 2 × 1.5 mm, acute at apex, entire at margins, glabrous, fleshy. Stamens 5; filaments *c.* 3 mm long, erect, fleshy, glabrous. Ovary free, ovoid or conical; styles *c.* 2 mm long, erect,

glabrous; stigma capitate, sticky. Capsules narrowly oblong, 1-celled, 2-valved, acute at both ends.

Distribution: The native range of this variety is SW. India (POWO, 2023); *Habitat:* Shola forests; *Fl. & Ft.*: October-April.

Specimen examined: Way to Meesappulimala, 06.05.2019, *Vishnu Mohan & Santhosh Nampy* 159152 (CALI).

Microtropis ramiflora Wight, Icon. Pl. Ind. Orient. 3: t. 977. 1845; Hook.f., Fl. Brit. India 1: 613. 1875; Gamble, Fl. Madras 1: 207. 1918; K.Ramam. & P.Venu in P.Daniel (ed.), Fl. Kerala 1: 714. 2005.



Evergreen trees up to 15 m tall. Branchlets woody, terete, glabrous; bark brown, smooth. Leaves simple, opposite; lamina elliptic-ovate, 5–13 × 2.5–6.5 cm, rounded or slightly emarginate at apex, round or sub-cordate at base, revolute at margins, glabrous on both sides, leathery, shining above; petioles 0.3–1 cm long, glabrous, erect, stout, grooved. Stipules absent. Flowers in axillary condensed clusters, non-fragrant sessile; peduncles 0.2–0.4 cm long, stout, glabrous. Bracts absent. Sepals 5, free, ovate-sub-orbicular, unequal, 1–2 × 1 mm, rounded at apex, laciniate at margins, imbricate, glabrous, thick. Petals 5, joined at base with the disc, ovate-orbicular, *c.* 2 × 1.5 mm, rounded-acute at apex, entire at margins, glabrous. Stamens 5; filaments *c.* 2 mm long, erect, fleshy, glabrous. Ovary seated on the disc, glabrous; styles 3 mm long, glabrous. Capsules cylindric, woody. Seed one.

Distribution: The native range of this species is SW. India, Sri Lanka and N. Sumatra (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: March-November.

Specimen examined: Devikolam, 20.11.1965, *B.V. Shetty* 26578 (MH); Eravikulam, 18.10.1989, *P. Bhargavan* 91815 (MH); way to Meesapulimala-shola forest, 06.05.2019, *Vishnu Mohan* & *Santhosh Nampy* 159152 (CALI).

Microtropis stocksii Gamble, Bull. Misc. Inform. Kew 1916(5): 132 1916. Gamble, Fl. Madras 1: 206. 1918; K.Ramam. & P.Venu in P.Daniel (ed.), Fl. Kerala 1: 714. 2005.



Small trees, up to 10 m tall. branchlets woody, terete, glabrous; bark brown, smooth. Leaves simple, opposite; lamina elliptic, 7–10 × 3–5 cm, obtusely acuminate at apex, acuminate at base, entire at margins, glabrous on both sides, coriaceous; petioles 0.8 cm long, glabrous, grooved above. Stipules absent. Flowers in sessile axillary clusters, fragrant; pedicels *c.* 0.15 cm long, slender, glabrous. Bracts absent. Sepals 5, free, unequal, ovate, 1.5–2 × 2 mm, rounded at apex, entire at margins, glabrous. Petals 5, connate at base, ovate, *c.* 2 × 1 mm, obtuse at apex, entire at margins, glabrous, membranous. Stamens 5; filaments *c.* 3 mm long, erect, fleshy; disc annular. Ovary bilocular, glabrous; styles *c.* 2 mm long, glabrous; stigma capitate, sticky. Capsules oblong, 15−20 × *c.* 8 mm, brown. Seed 1, erect; aril red.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* December-July.

Specimens examined: Edamalakkudi, 17.03.2019, *Vishnu Mohan & Santhosh Nampy* 168973; Manaloda, 14.02.1994, *Jomy Augustine* 13357; Vellimala, 11.12.1993, *Jomy Augustine* 12945 (CALI).

Microtropis wallichiana Wight ex Thwaites, Enum. Pl. Zeyl. 71. 1858; Hook.f., Fl. Brit. India 1: 613. 1875; Gamble, Fl. Madras 206. 1918; K.Ramam. & P.Venu in P.Daniel (ed.), Fl. Kerala 1: 715. 2005.

Small trees, up to 15 m high. Stems woody, terete, glabrous; branchlets yellowish, youngest darker. Leaves simple, decussate, exstipulate; lamina ovate, 5–10.5 × 1.5–3 cm, acute at apex and base, entire at margins, glabrous on both sides, coriaceous; petioles 0.7–1 cm long, slender, grooved above, glabrous. Stipules absent. Flowers in axillary fascicles, non-fragrant, sessile; peduncles *c.* 2 mm long, glabrous. Bracts absent. Sepals 5, ovate, *c.* 2 × 1 mm, acute at apex, entire at margins, glabrous, thick. Petals 5, slightly connate at base, obovate-oblong, *c.* 3 × 1.5 mm, acute-rounded at apex, entire at margins, glabrous, fleshy. Stamens 5, inserted on the upper edge of the disc; filaments *c.* 3 mm long, erect, slender, glabrous; disc annular, slightly lobed. Ovary ovoid, seated on the disc, glabrous; styles *c.* 2 mm long, erect, slender, glabrous; stigma 4-lobed. Capsules ovoid, 6−10 × 3−4 mm, 2-valved. Seeds oblong.

Distribution: The native range of this species is Sri Lanka, N. Sumatra and N. Borneo (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* December-September.

Specimens examined: Eravamangalar, 15.05.1995, *Jomy Augustine* 15252; Kannadippara, 17.09.2018, *Vishnu Mohan & Santhosh Nampy* 161950 (CALI); Thannikkudy, 15.12.1981, *C.N. Mohanan* 72819 (MH).

Pleurostylia Wight & Arn.

Prodr. Fl. Ind. Orient. 1: 157. 1834.

Pleurostylia opposita (Wall.) Alston H.Trimen, Handb. Fl. Ceylon 6: 48 1931; K.Ramam. & P.Venu in P.Daniel (ed), Fl. Kerala 1: 715. 2005.

Pleurostylia wightii Wight & Arn., Prodr. 157.1834; Hook.f., Fl. Brit. India 1:617.1875; Gamble, Fl. Madras 211(152). 1918.

Small trees up to 8 m tall. Branchlets woody, terete, glabrous; bark pale brown, smooth. Leaves simple, opposite; lamina elliptic-oblanceolate, 3–7 × 2.5–4 cm, acute at apex, acuminate at base, entire at margins, glabrous on both sides, coriaceous; petioles 0.3–0.7 cm long, glabrous, stout, grooved above. Stipules absent. Flowers in sessile axillary cymes; non-fragrant; pedicels 0.3–0.4 cm long, slender, glabrous. Bracts absent. Sepals 5, free, ovate, *c.* 1.5 × 1.4 mm, rounded at apex, entire at margins, glabrous. Petals 5, free, oblong, *c.* 2.5 × 2 mm, acute-rounded at apex, entire at margins, glabrous, membranous.

Stamens 5; filaments *c.* 3 mm long, erect, slender, fleshy, glabrous. Ovary 1-celled, glabrous; styles *c.* 3 mm long, erect, glabrous; stigma peltate, sticky. Drupes obliquely obovate, white, smooth. Seeds ovate.

Distribution: The native range of this species is E. Mozambique, W. Indian Ocean, Hainan, Tropical Asia to New Caledonia and N. & SE. Queensland (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: May-December.

Specimens examined: Naduthottam, 15.07.1993, *Jomy Augustine* 12141; Nallathanni Kallar, 16.09.2018, *Vishnu Mohan* & *Santhosh Nampy* 161939; Vellimala, 20.05.1994, *Jomy Augustine* 13800 (CALI).

Parnassia L.

Sp. Pl. 1: 273. 1753.

Parnassia mysorensis B.Heyne ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 35 1834. Hook.f., Fl. Brit. India 2: 402. 1878; Gamble, Fl. Madras 448. 1919.



Acaulescent herbs, up to 20 cm tall. Leaves simple, radical; lamina orbicular-reniform, 0.9–2.4 × 0.75–1.5 cm, acute at apex, cordate at base, entire at margins, glabrous on both sides, non-coriaceous; petioles 4–5 cm long, slender, glabrous. Stipules absent. Flowers solitary on scape; non-fragrant; pedicels 10–20 cm long, slender, glabrous. Bracts cordate, 3–7 × 3–6 mm, acute-rounded at apex, entire at margins, glabrous on both sides, membranous. Calyx campanulate; lobes ovate, *c.* 3 × 2 mm, acuminate at apex, entire at margins, glabrous. Petals 5, free, white, broadly ovate, 4–5 × 2–3 mm, rounded at apex, wavy at margins, glabrous, membranous. Stamens 5; filaments *c.* 1 mm long, erect, slender, glabrous; staminodes 5, alternating with stamens. Ovary ovoid, glabrous; styles *c.* 3 mm long, erect, slender,

glabrous; stigma trifid, sticky. Capsules ovoid, 5-valved, glabrous. Seeds minute, many.

Distribution: The native range of this species is Sikkim to S. Central China and N. Thailand (POWO, 2023); *Habitat*: Moist localities in grasslands and scrub jungles; *Fl. & Ft.*: September-December.

Specimen examined: Meesappulimala, 15.09.2021, *Vishnu Mohan* 184567 (CALI).

Salacia L.

Mant. Pl. 2: 159. 1771.

Key to the species

1. Flowers in cymes……2

1. Flowers in axillary fascicles ……*S. malabarica*

2. Flowers usually 3; seeds 8……*S. oblonga*

2. Flowers more than 3; seeds 3……*S. fruticosa*

Salacia fruticosa Wall. ex M.A.Lawson in J.D.Hooker, Fl. Brit. India 1: 628. 1875; Gamble, Fl. Madras 215. 1918.

Shrubby climbers. Branchlets woody, terete; young shoots puberulous; bark brownish, lenticellate. Leaves simple, opposite; lamina elliptic-ovate, 4–7 × 2–4 cm, obtusely acuminate at apex, rounded at base, entire at margins, glabrous on both sides, coriaceous; petioles *c.* 0.5 cm long, glabrous, grooved. Stipules absent. Flowers in axillary cymes, non-fragrant; peduncles 0.6–1.6 cm long, slender, glabrous; pedicels 0.3–0.5 cm long, slender, glabrous. Bracts absent. Calyx fused at base, 5-lobed; lobes orbicular, 3 × 2 mm, rounded at apex, minutely ciliate, glabrous. Petals 5, orbicular, 3 × 2 mm, rounded at apex and base, entire at margins, glabrous, thick. Disc fleshy. Stamens 3, inserted on the inner margin of disc; filaments *c.* 2 mm long, broad, curved. Ovary globose, minute, partially sunk in the disc; styles *c.* 2 mm long, erect, glabrous; stigma capitate, obscurely 3-lobed. Berries globose, red. Seeds 3.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, also in the sacred groves and plains; *Fl. & Ft.*: February-May.

Specimen examined: Munnar, 12.02.1995, *N. Sasidharan* 14814 (KFRI).

Salacia malabarica Gamble, Bull. Misc. Inform. Kew 1916: 133. 1916; Gamble, Fl. Madras 215. 1918.

Scandent climbing shrubs, up to 10 m tall. Branchlets woody, terete, glabrous; bark brownish, lenticellate. Leaves simple, opposite; lamina elliptic-oblong, 9–12 × 4.5–7 cm, acuminate at apex, rounded at base, entire at margins, glabrous on both sides, coriaceous. Stipules absent. Flowers in axillary fascicles; non-fragrant; peduncles 0.3–0.9 cm long, stout, glabrous; pedicels 2–3 cm long, narrow, glabrous. Bracts absent. Sepals 5, fused at base, orbicular, 2 mm long, rounded at apex, entire at margins, glabrous. Petals 5, ovate, 5–8 × 4 mm, acute at apex, entire at margins, glabrous, thick, greenish yellow. Stamens 5; filaments obscure. Ovary ovate, glabrous; styles 1 mm long, erect, stout, glabrous; stigma sticky. Berries hard, globose. Seed 1.

Distribution: The native range of this species is SW. India and SE. Bangladesh (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: April-September.

Specimen examined: Kottamala, 18.05.1995, *Jomy Augustine s.n.* (KFRI).

Salacia oblonga Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 106. 1834; Hook.f., Fl. Brit. India 1: 628.1875; Gamble, Fl. Madras 215. 1918.

Shrubby climbers. Branchlets woody, terete, rough; bark densely lenticellate. Leaves simple, opposite to sub-opposite; lamina oblong, 16–20 × 6–8 cm, acute or obtuse at apex, acute at base, entire at margins, glabrous on both sides, coriaceous; petioles *c.* 1 cm long, glabrous, pulvinate. Stipules absent. Flowers in axillary cymes, non-fragrant; peduncle obscure, stout, glabrous; pedicels *c.* 0.1 cm long, stout, glabrous. Bracts absent. Sepals 5, orbicular, 3 × 1.5 mm, rounded at apex, acute at base, entire at margins, glabrous, thick. Petals 5, obovate, *c.* 2 × 2.5 mm, rounded at apex and base, entire at margins, glabrous, membranous. Stamens 5; filaments *c.* 3 mm long, erect, stout, glabrous. Ovary ovate, glabrous; styles *c.* 3 mm long, erect, slender, glabrous; stigma sticky. Berry orange-red, smooth. Seeds 8, hard.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Moist and dry deciduous forests; *Fl. & Ft.*: February-May.

Specimen examined: PTR, 16.03.1994, *Jomy Augustine* 13400 (KFRI).

HIPPOCRATEACEAE Lindl.

Intr. Nat. Syst. Bot., ed. 2. 120 1836.

Lianas, shrubs or slender trees, usually glabrous. Leaves opposite or sub-opposite. Stipules inconspicuous, caducous. Inflorescences thyrsoid-paniculate, corymbose, pseudo-cymose, (pseudo-) dichotomously branched or fasciculate. Flowers bisexual. Calyx not covering the petals in bud, sepals 5, equal or unequal, connate at the base, imbricate. Petals 5, free, short-tubular, saucer-like, cushion-like. Stamens 3 (5 in *Cheiloclinium anomalum*), filaments ligulate, often considerably widened toward the base, often recurved, anthers basifixed, extrorsely. Ovary superior, 3-locular (5-locular in *Cheiloclinium anomalum*); stigmas obsolete, or forming a terminal shield, or stigmas 3 (5 in *Cheiloclinium anomalum*), deltoid, entire or emarginate to conspicuously bilobed. Fruits either capsular or drupaceous. Seeds in capsular fruits attached by a basal wing; seeds in drupaceous fruits unwinged, embedded in mucilaginous pulp.

This family includes 150 worldwide (POWO, 2023); single species in the study area.

Pristimera Miers

Trans. Linn. Soc. London 28: 360 1872.

Pristimera arnottiana (Wight) R.H.Archer, Molec. Phylogen. Evol. 59: 328. 2011. *Hippocratea arnottiana* Wight, Ill. Ind. Bot. 1: 133 1831; Hook.f., Fl. Brit. India 1: 624. 1875; Gamble, Fl. Madras 213. 1918. *Loeseneriella arnottiana* (Wight) A.C.Sm. in J. Arnold Arbor. 26: 174. 1945; K.Ramam. & B.D.Naithani in N.P.Singh *et al.*, Fl. India 5: 140. 2000; K.Ramam. & P.Venu in P. Daniel, (ed.), Fl. Kerala 1: 707. 2005.

Climbing shrubs. Branchlets woody, terete, glabrous. Leaves simple, opposite; elliptic-ovate, 8–12 × 4–6 cm, acute-rounded at apex, rounded at base, entire, coarsely coriaceous, glabrous; petioles 5–9 mm, stout, glabrous. Stipules ovate, 4–5 × 2 mm, acute at apex, entire, glabrous, membranous. Flowers on axillary panicles; peduncles 4–9 cm long, slender, glabrous; pedicels 4–5 mm long, stout, glabrous. Sepals 5, orbicular, *c.* 1 × 1.5 mm, rounded at apex, entire, glabrous. Petals 5, obovate, 3–4 × 3–4 mm, rounded at apex, clawed, entire,

glabrous. Stamens 5, inserted on disc; filaments 2–3 mm long, stout. Ovary orbicular, enclosed in the disc; styles *c.* 2 mm long, glabrous; stigma sticky. Samara 3 winged.

Distribution: The native range of this genus is Tropics & Subtropics (POWO, 2023); *Habitat*: Moist and dry deciduous forests; *Fl.* & *Ft.*: February-May.

Specimen examined: Chinnar, 11.04.1995, *K.K. Sajeev* 11979 (KFRI).

RHAMNACEAE Juss.

Gen. Pl. 376. 1789, *nom. cons*.

Trees, shrubs, shrublets or lianas. Leaves alternate or rarely opposite, simple, entire to toothed. Flowers often in axillary cymes or umbels (rarely solitary). Receptacles flattish to obconic or hemispherical. Sepals (4–) 5, valvate. Petals (4–) 5 or absent, usually smaller than the sepals and unguiculate. Stamens (4) 5, antipetalous; filaments free. Disc usually present and well developed. Ovary syncarpous, sessile, free or immersed in the disc, superior, sub-inferior or inferior, 2–4-locular; styles entire or 2–4-lobed. Fruit a drupe or septicidal capsule or schizocarp, sometimes winged.

This family includes 63 genera worldwide (POWO, 2023); three genera and six species in the study area.

Key to the genera

1. Climbing shrubs with tendrils; fruits 3-winged……*Gouania*
1. Erect shrubs or trees; fruits not 3-winged……...2
2. Leaves palmately 3–5-nerved……*Ziziphus*
2. Leaves pinnately nerved……3
3. Fruits winged, samaroid…… *Smythea*
3. Fruits not winged, drupaceous……*Sageretia*

Gouania Jacq.

Select. Stirp. Amer. Hist. 263. 1763.

Gouania microcarpa DC., Prodr. 2: 40. 1825; Hook.f., Fl. Brit. India 1: 643. 1875; Gamble, Fl. Madras 1: 225. 1918; Bhandari & Bhansali in N.P.Singh *et al.*, Fl. India 5: 176. 2000; Sreek. & A.N.Henry in P.Daniel (ed.), Fl. Kerala 1: 725. 2005.

Climbing woody shrubs. Branchlets woody, terete; bark brown; tendrils axillary. Leaves simple, alternate; lamina ovate, 4–10 × 2–5 cm, acuminate at apex, rounded at base, entire, fulvous hairy below, leathery, petioles 0.5–1 cm long, glabrous. Flowers in terminal panicles, non-fragrant; peduncles up to 25 cm long, tomentose; pedicels *c.* 1 cm long, slender. Sepals 5, free, widely ovate, *c.* 1.5 × 1.5 mm, acute at apex, entire, densely hairy out, glabrous within. Petals 5, free, obovate, *c.* 1.5 × 1 mm, curved, concave, truncate at apex, entire, pubescent out, glabrous within. Stamens 5, free; filaments *c.* 1 mm long, glabrous. Ovary 3-celled, hairy; styles *c.* 3 mm long; stigma capitate. Capsules 3-winged, yellowish, septicidal, 3- seeded.

Distribution: The native range of this species is NW. India to Myanmar, Papuasia (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: October-March.

Specimen examined: Sabarimala, 15.02.1993, *Jomy Augustine* 17720 (CALI).

Sageretia Brongn.

Mém. Fam. Rhamn. 52. 1826.

Sageretia hamosa (Wall.) Brongn., Mém. Fam. Rhamn. 53. 1826; Hook.f., Fl. Brit. India 1: 641. 1875; Gamble, Fl. Madras 1: 223. 1918; Bhandari & Bhansali in N.P.Singh *et al.*, Fl. India 5: 200. 2000; Sreek. & A.N.Henry in P.Daniel (ed.), Fl. Kerala 1: 726. 2005. *Ziziphus hamosa* Wall. in Roxb., Fl. Ind. 2: 369. 1824.

Climbing shrubs. Branchlets woody, terete, glabrous; bark brown; spines recurved. Leaves simple, opposite; lamina ovate-oblong, 8–13 × 4–7 cm, bluntly acuminate at apex, rounded at base, serrulate, glabrous; petioles *c.* 1.5 cm long, slender, glabrous. Flowers in axillary panicles; peduncles 5–9 cm long, slender; pedicels 0.3–0.5 cm long, slender. Bracts and bracteoles ovate, 4–5 × *c.* 2 mm, rounded at apex, entire. Sepals 5, connate at base, ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Petals 5, ovate, 1–2 × *c.* 0.5 mm, concave and clawed, rounded at apex, entire, glabrous. Stamens 5, free; filaments 3–4 mm long, slender. Disc annular. Ovary 3-celled, glabrous; styles stout; stigma capitate. Drupes globose, glabrous.

Distribution: The native range of this species is S. China to Tropical Asia (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests; *Fl. & Ft.*: August-December.

Specimen examined: PTR, 19.08.1994, *Jomy Augustine* 13919 (KFRI).

Smythea Seem.

Bonplandia 10(5): 69, t. 9. 1862.

Smythea bombaiensis (Dalzell) Banerjee & P.K.Mukh., Indian Forester 96: 214. 1970; Bhandari & Bhansali in N.P. Singh *et al*., Fl. India 5: 210. 2000. *Ventilago bombaiensis* Dalzell in Hooker's, J. Bot. Kew Gard. Misc. 3: 36. 1851; Hook.f., Fl. Brit. India 1: 631. 1875; Gamble, Fl. Madras 1: 217. 1918; Sreek. & A.N.Henry in P.Daniel (ed.), Fl. Kerala 729. 2005.

Climbing woody shrubs. Branchlets looping, ribbed, glabrous; bark greyish brown. Leaves simple, alternate; lamina elliptic-oblong 4.5–9 × 1.8–3.5 cm, acuminate at apex, acute at base, crenate, glabrous; petioles *c.* 2 mm long, pubescent. Flowers in axillary clusters, non-fragrant; pedicels 0.3–0.5 cm long, slender, sparsely pubescent. Sepals 5, triangular, *c.* 3 × 2 mm, acute at apex, entire, pubescent. Petals 5, obovate, 1–2 × *c.* 1.5 mm, emarginate to 2-lobed at apex, entire, glabrous. Stamens 5; filaments *c.* 3 mm long, erect. Disc cup-shaped. Ovary 2-celled, densely hairy; stigma capitate. Samara 1-seeded, winged; wing flattened, pubescent.

Distribution: The native range of this species is W. India (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl.* & *Ft.*: February-June.

Specimen examined: Puthussery, 08.03.1994, *Jomy Augustine* 13501 (CALI).

Ziziphus Mill.

Gard. Dict. Abr., ed. 4. 1754.

Key to the species

1. Petals 5……2

1. Petals absent……..*Z. rugosa*

2. Flowers in sessile cymes ……..…3

2. Flowers in pedunculate cymes……*Z. horrida*

3. Leaves elliptic, basal 3 nerves prominent and continued to the apex; ……..*Z. glabrata*

3. Leaves obliquely ovate, nerves not prominant…..……..……..*Z. oenoplia*

Ziziphus glabrata B.Heyne ex Roth, Nov. Pl. Sp. 159. 1821; Hook.f., Fl. Brit. India 1: 633. 1875; Bhandari & Bhansali in N.P.Singh *et al.,* Fl. India 5: 229. 2000.

Ziziphus trinervia Roxb., Fl. Ind. 2: 354. 1824, *nom. illeg*.; Gamble, Fl. Madras 1: 220. 1918.

Trees, up to 10 m tall. Branchlets woody, tomentose; bark dark brown. Leaves simple, alternate; lamina elliptic, 1.5–10 × 1.5–5 cm, acute at apex, obtuse at base, crenulate, glabrous, shining above, tomentose on nerves beneath, coriaceous; basal 3 nerves prominent and continued to the apex; petioles 0.3–0.5 cm long, narrow, pubescent, stout. Stipules filiform, cauducous. Flowers in axillary sessile cymes, greenish-yellow, non-fragrant; pedicels 1–2 mm long, pubescent, narrow. Bracts subulate, *c.* 3 × 2 mm, rounded at apex, entire, glabrous. Calyx tube *c.* 2 mm long; lobes 5, triangular, *c.* 4 × 2 mm, acute at apex, entire, pubescent out, glabrous within, deflexed. Petals 5, free, obovate, *c.* 1.5 × 1 mm, rounded at apex, entire, glabrous. Stamens 5; filaments *c.* 2 mm long, glabrous, erect. Disc flat, 10-lobed. Ovary embedded in the disc, 2-celled; styles 2; stigma 2. Drupes globose-obovoid.

Distribution: The native range of this species is Arabian Peninsula, Indian Subcontinent and Nicobar Islands (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl.* & *Ft.:* September-May.

Specimens examined: Anamudishola, 04.04.2017, *Vishnu Mohan & Santhosh Nampy* 152084; Chinnar, 18.05.1999, *Sabitha P.K.* 79196; *Ibid.,* 18.05.1999, *P. Prashy* 79444; *Ibid.,* 18.05.1999, *Resmi T.* 78368; *Ibid.,* 19.05.1999, *Lisha K.* 78638; *Ibid.,* 19.05.1999, *Shamina M.* 78955; *Ibid.,* 19.05.1999, *Thushar K.V.* 79346 (CALI).

Ziziphus horrida Roth, Nov. Pl. Sp. 159. 1821.

Woody shrubs. Branchlets woody, glabrous; thorns paired, one straight, other recurved. Leaves simple, alternate; lamina elliptic, 1.5–5 × 2–4.5 cm, rounded-slightly clefted at apex, sub-cordate at base, entire, glabrous; petioles narrow,

erect, glabrous, *c.* 1 cm long. Flowers in axillary pedunculate cymes, non-fragrant; peduncles 0.05–0.2 cm long, slightly pubescent. Calyx lobes 5, deltoid, *c.* 2 × 1.5 mm, acute at apex, entire, pubescent out, glabrous within. Petals broadly ovate, *c.* 1.5 × 1 mm, rounded at apex, entire, glabrous. Stamens 5; filaments *c.* 1.5 cm long, erect, narrow. Disc flat, 5-lobed. Ovary tricarpellary; styles erect, stigma 3-lobed. Drupes globose.

Distribution: Native range of this species is W. India (POWO, 2023); *Habitat*: Dry deciduous forests**;** *Fl.* & *Ft.:* February-May.

Specimens examined: Chinnar, 19.05.1999, *Sabitha P.K.* 79186; *Ibid.,* 19.05.1999, *P. Prashy* 79465; *Ibid.,* 19.05.1999, *Resmi T.* 78382; *Ibid.,* 19.05.1999, *Lisha K.* 78660; *Ibid.,* 19.05.1999, *Shamina M.* 78965; *Ibid.,* 19.05.1999, *Thushar K.V.* 79360 (CALI).

Ziziphus oenopolia (L.) Mill., Gard. Dict., ed. 8, no. 3. 1768; Hook.f., Fl. Brit. India 1: 634. 1875; Gamble, Fl. Madras 1: 220. 1918; Bhandari & Bhansali in N.P.Singh *et al.*, Fl. India 5: 238. 2000; Sreek. & A.N.Henry in P.Daniel (ed.), Fl. Kerala 1: 734. 2005.



Woody shrubs. Branchlets woody, pubescent when young; spines axillary, stout. Leaves simple, alternate; lamina obliquely ovate, *c.* 5 × 2 cm, acute at apex, cuneate at base, entire, sparsely pubescent above, densely pubescent below; nerves not prominant; petioles 0.3–0.5 cm long, narrow, sparsely pubescent. Flowers in axillary sessile cymes, non-fragrant; peduncles compressed, glabrous; pedicels 0.2–0.5 cm long, glabrous, slender. Calyx lobes 5, triangular, 1.5–2 × *c.* 1.5 mm, acute at apex, entire, hispid out, glabrous within. Petals 5, ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Stamen 5; filaments *c.* 2 mm long. Disc flat, annular. Ovary 2-celled; styles 2, erect, glabrous; stigma 2, sticky. Drupes globose, black.

Distribution: The native range of this species is China (S. Yunnan, Guangxi) to Tropical Asia and N. Australia (POWO, 2023); *Habitat*: Dry deciduous forests**;** *Fl.* & *Ft.:* November-March.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175956 (CALI); Chinnar, 16.11.1994, *K.K. Sajeev* (KFRI).

Ziziphus rugosa Lam., Encycl. 3: 319. 1789; Hook.f., Fl. Brit. India 1: 636. 1875; Gamble, Fl. Madras 1: 221. 1918; Bhandari & Bhansali in N.P.Singh *et al.*, Fl. India 5: 241. 2000; Sreek. & A.N.Henry in P.Daniel (ed.), Fl. Kerala 1: 734. 2005.

Climbing shrubs. Branchlets woody, terete, glabrous; thorns recurved. Leaves simple, alternate; lamina ovate-orbicular, 9–12 × 4–7 cm, acute at apex, cordate at base, crenulate, fulvous-tomentose beneath, coriaceous; petioles *c.* 1 cm long, stout. Flowers in terminal panicles; pedicels 0.4–0.6 cm long, slender, tomentose. Calyx lobes 5, ovate, *c.* 1.5 × 1.5 mm acute at apex, entire, densely tomentose out. Petals absent. Stamens 5; filaments 2–3 mm long, glabrous. Disc flat, 5-lobed, glabrous. Ovary densely tomentose, 2-celled; styles 2, curved. Drupes globose, glabrous.

Distribution: The native range of this species is Indian Subcontinent to China (SW. & S. Yunnan) and Indo-China (POWO, 2023); *Habitat*: Grasslands and deciduous forests, also in the plains; *Fl.* & *Ft.:* November-May.

Specimens examined: Chinnar, 09.05.1996, *K.K. Sajeev* 17395 (KFRI); Meenmutty, 13.12.1982, *C.N. Mohanan* 76044 (MH); Thannikudy, 08.02.2001, *C.N. Nair* 70154 (MH).

VITACEAE Juss.

Gen. Pl. 267. 1789, *nom. cons.*

Woody climbers, sometimes vines, rarely small succulent trees. Tendrils simple, bifurcate to trifurcate or 4–12-branched, rarely tendrils absent. Leaves simple, lobed or unlobed or digitately or pedately compound. Stipules 2 or rarely absent, often caducous. Flowers in panicles, corymbs, or rarely spikes. Calyx with 4 or 5(–7) small teeth or lobes or a continuous ring. Petals valvate, 4 or 5(–7), free or basally connate, or distally connate forming a calyptra.

Stamens 4 or 5(–7), antepetalous. Ovary superior; stigma discoid or capitate, rarely 4-lobed. Fruit a berry, 1–4-seeded.

The family includes 18 accepted genera (POWO 2023), six genera and fourteen species in the study area

Key to the genera

1. Shrubs or small trees……*Leea*
1. Climbers……2
2. Flowers 5-merous……3
2. Flowers 4-merous……4
3. Inflorescence tendril bearing……*Ampelocissus*
3. Inflorescence not tendril bearing……*Parthenociccus*
4. Flowers unisexual; stigma 4-lobed……*Tetrastigma*
4. Flowers bisexual; stigma simple 2-fid……5
5. Inflorescence leaf opposed……*Cissus*
5. Inflorescence axillary……*Cayratia*

Ampelocissus Planch.

Vigne Amér. Vitic. Eur. 8: 372. 1884, *nom. cons*.

Ampelocissus tomentosa (Roth) Planch., Vigne Amér. Vitic. Eur. 8: 375. 1884; Gamble, Fl. Madras 1: 230. 1918; B.V.Shetty & P.Singh in P.Daniel (ed.), Fl. Kerala 1: 740. 2005.

Climbing shrubs. Branchlets woody, terete, glaucous, woolly. Leaves simple, alternate; lamina 3–5-lobed, broadly ovate, *c.* 15–20 × 15–20 cm, lobes acuminate at apex, cordate at base, serrate, densely floccose and woolly beneath; petioles 6–10 cm long, slender, floccose. Flowers in many flowered dichotomous umbelled cymes, tendril bearing; peduncles up to 7 cm long, slender, tomentose. Tendrils branched, slender. Calyx campanulate; lobes 5, triangular, *c.* 1 × 1 mm, acute, entire, woolly. Petals 5, oblong, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Disc prominent, restricted to the lower part. Stamens 5; filaments *c.* 2 mm long. Ovary conical; stigma sessile. Berries globose; Seeded 1−4.

Distribution: The native range of this species is India to Myanmar (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests; *Fl.* & *Ft.*: July–November.

Specimens examined: Chinnar, 17.11.1995, *K.K. Sajeev* 15912 (KFRI).

Cayratia Juss.

Dict. Sci. Nat., ed. 2. 10: 103. 1818, *nom. cons.*

Cayratia pedata (Lam.) Juss. ex Gagnep., Notul. Syst. 1: 346. 1911; Gamble, Fl. Madras 1: 236. 1915; B.V.Shetty & P.Singh in P.Daniel (ed.), Fl. Kerala 1: 744. 2005. *Cissus pedata* Lam., Encycl. 1: 31. 1783.



Climbing herbs. Branchlets quadrangular, twining, minutely hispid. Leaves pedately 5–9-foliolate; leaflets ovate, 3–15 × 2–5 cm, acuminate at apex, oblique at base, serrate, sparsely hispid; rachis *c.* 9 cm long, slender; petiolules 1–3.5 cm long, hispid. Flowers non-f ragrant, greenish yellow, axillary cyme; peduncles *c.* 3 cm long, narrow, hispid; pedicels *c.* 0.2 cm long, stout, glabrous. Calyx saucer-shaped; lobes 5, *c.* 2 × 1 mm, rounded at apex, entire, pubescent out, glabrous within. Petals 5, ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous; disc a fleshy rim, 4-lobed. Stamens 5; filaments *c.* 3 mm long, glabrous. Styles *c.* 3 mm long, slender, glabrous; stigma slightly expanded, sticky. Berries 2–4-lobed, rusty tomentose. Seeds rugose.

Distribution: The native range of this species is India to China (Yunnan, Guangxi) and Jawa (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests, also in sacred groves in the plains; *Fl.* & *Ft.*: January-July.

Specimens examined: Anamudishola National Park, 25.01.2018, *Vishnu Mohan & Santhosh Nampy* 158247; Mankulam, 10.06.2018, *Vishnu Mohan & Santhosh Nampy* 159309; Santhanpara, 06.01.2017, *Vishnu*

Mohan & Santhosh Nampy 151629; Upper Manalar, 10.05.1994, *Jomy Augustine* 13721; Vellimala, 15.04.1997, *Jomy Augustine* 17957 (CALI).

Cissus L.

Sp. Pl. 1: 117. 1753.

Key to the species

1. Plants succulents; tendrils simple……*C. quadrangularis*
1. Plants non succulents; tendrils forked……..……2
2. Leaves blotched with white above and purple beneath……*C. discolor*
2. Leaves not blotched above and green beneath……..……3
3. Seeds with angled facets……*C. latifolia*
3. Seeds smooth……..……..……4
4. Erect shrubs; leaves sub-orbicular……*C. arnotiana*
4. Climbing shrubs; leaves ovate……....*C. heyneana*

Cissus arnottiana B.V.Shetty & Par.Singh, Kew Bull. 44: 473. 1989; B.V.Shetty & P.Singh in P.Daniel Fl. Kerala 1: 750. 2005.

Erect shrubs, up to 5 m tall. Branchlets terete, woody, glabrous, glaucous. Leaves simple, alternate; lamina widely sub-orbicular, 9–12 × 8–10 cm, acute at apex, cordate at base, dentate, glandular, membranous; petioles 3–6 cm long. Stipules ovate, *c.* 5 × 3 mm, acute at apex, entire, caducous. Tendrils forked, wiry, glabrous. Flowers in axillary, leaf opposed cymes; peduncles 3–5 cm long, slender, puberulous. Bracts ovate, *c.* 5 × 3 mm, acute, entire, glabrous. Calyx campanulate; lobes 5, ovate, *c.* 1.5 × 1 mm, acute at apex, entire, glabrous. Petals 5, ovate, *c.* 3 × 2 mm, acute, entire, hooded. Stamens 5; filaments *c.* 2 mm long, slender, glabrous. Disc prominent, 4-lobed. Ovary embedded; styles *c.* 1 mm long, stout. Berries sub-globose. Seeds ovate, smooth.

Distribution: The native range of this species is India and Sri Lanka (POWO, 2023); *Habitat*: Near water courses; *Fl.* & *Ft.*: April-June.

Specimens examined: Chinnar, 10.05.1995, *K.K. Sajeev* 15653 (KFRI).

Cissus discolor Blume, Cat. Gew. Buitenzorg 39. 1823; Gamble, Fl. Madras 1: 235. 1918; *Vitis discolor* Dalzell, Hooker's J. Bot. Kew Gard. Misc. 2: 39.

1850; Hook.f., Fl. Brit. India 1: 648. 1875; B.V.Shetty & P.Singh in P.Daniel (ed.), Fl. Kerala 1: 750. 2005.



Climbing shrubs. Branchlets non woody, quadrangular, reddish, glabrous. Leaves simple, alternate; lamina narrowly cordate, 4–10 × 2.5–5 cm, acuminate at apex, cordate at base, serrate, glabrous, blotched with white above, purple beneath; petioles 1.5–3 cm long, glabrous. Tendrils axillary, forked, glabrous. Flowers in axillary cymes, non-fragrant; peduncles 1.5–4 cm long, narrow, erect, glabrous; pedicels 0.5–0.8 cm long, narrow, glabrous. Calyx connate; lobes 5, triangular, 1–1.5 × *c.* 1 mm, acute at apex, entire, sparsely hairy below, green. Petals 5, connate at base; lobes elliptic, 1.5–2 × *c.* 2 mm, acute at apex, entire, reddish. Anthers 5; filaments erect, fleshy, glabrous; disc pubescent. Ovary ovoid; styles *c.* 3 mm long, straight, glabrous; stigma sticky. Berries obovoid, smooth.

Distribution: The native range of this species is Central China to tropical Asia (POWO, 2023); *Habitat*: Semi-evergreen forest; *Fl.* & *Ft.*: July-January.

Specimens examined: Anakkulam, 18.09.2018, *Vishnu Mohan & Santhosh Nampy* 161977; Thommankutthu, 30.11.2019, *Vishnu Mohan & Santhosh Nampy* 164651; Vallakkadavu, 13.08.1994, *Jomy Augustine* 14082; Vellimala, 10.11.1996, *Jomy Augustine* 16903 (CALI).

Cissus heyneana Steud., Nomencl. Bot., ed. 2, 1: 372. 1841; Gamble, Fl. Madras 1: 234. 1918; B.V.Shetty & P.Singh in P.Daniel (ed.), Fl. Kerala 1: 752. 2005.

Climbing shrubs. Branchlets woody, terete, glaucous. Leaves simple, alternate; lamina ovate, 7–9 × 6–7 cm, acuminate at apex, cordate at base, crenate, glabrous; petioles 1–2 cm long, slender, glabrous. Tendrils forked,

glabrous. Flowers in axillary cymes; peduncles 5–8 cm long, slender, thinly hairy; pedicels 0.2–0.3 cm long, stout, glabrous. Calyx tube *c.* 1 mm long; lobes 4, ovate, *c.* 2 × 1 mm, acute, entire, glabrous. Petals 4, ovate, *c.* 2.5 × 1.5 mm, acute, entire, glabrous. Stamens 4; filaments *c.* 2 mm long, slender, glabrous. Disc 4-lobed. Ovary orbicular; stigma 1.5 mm long; stigma capitate. Berries obovoid, white, smooth. Seeds obovoid, smooth.

Distribution: The native range of this species is SW. India, Sri Lanka, Assam to Indo-China (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests, also in the plains; *Fl.* & *Ft.*: April-June.

Specimen examined: PTR, 28.04.1994, *Jomy Augustine* 1564 (KFRI).

Cissus latifolia Lam., Encyl. 1: 30. 1783; Hook.f., Fl. Brit. India 1: 645. 1875; B.V.Shetty & P.Singh in P.Daniel (ed.), Fl. Kerala 1: 752. 2005.

Cissus glauca sensu Gamble, Fl. Madras 234. 1918.

Large climbing shrubs. Branchlets glaucous, terete. Leaves simple, alternate; lamina cordate, 10–15 × 5–11 cm, acuminate at apex, cordate at base, serrulate, glabrous; petioles 2–4 cm long, erect, glabrous, terete. Tendrils forked, axillary, glabrous. Flowers leaf-opposed cymes, non-fragrant, green; peduncles 3–7 cm long, glabrous; pedicels 0.4–0.8 cm long, glabrous. Calyx fused; lobes 4, *c.* 3 × 2 mm, glabrous. Petals 4, elliptic, *c.* 1.5 × 1 mm, acute-rounded at apex, entire, glabrous, green. Stamens 4; filaments erect, fleshy, *c.* 2 mm long. Disc 4-lobed, adnate to ovary, yellow. Ovary tomentose; stigma truncate; stigma sticky. Berries ovoid, purplish. Seed 1, angled facets.

Distribution: The native range of this species is W. India and Sri Lanka (POWO, 2023); *Habitat*: Semi-evergreen forests, also in the plains *Fl.* & *Ft.*: June-September.

Specimen examined: Sabarimala, 08.06.1995, *Jomy Augustine* 15461 (CALI).

Cissus quadrangularis L., Mant. Pl. 39. 1767; Gamble, Fl. Madras 1: 233. 1915; B.V.Shetty & P.Singh in P.Daniel (ed.), Fl. Kerala 1: 753. 2005. *Vitis quadrangularis* (L.) Wall. ex Wight, Cat. Ind. Pl. 26. 1833; Hook.f., Fl. Brit. India 1:645. 1875.

Succulent glabrous deciduous shrubs. Stems quadrangular, ridged at angles, constricted at nodes. Leaves simple, alternate; lamina sub-orbicular-cordate, 3–6 × 2–5 cm, acute-rounded at apex, cordate at base, slightly serrate, glabrous; petioles 2–4 cm long, straight, terete, glabrous. Tendrils simple, axillary. Flowers leaf-opposed, in umbellate cymes; peduncles 2–3 cm long, stout, erect, glabrous; pedicels 0.4–0.5 cm long, glabrous, erect. Calyx-tube obscurely 4-lobed; lobes acute, *c.* 1 mm long, acute at apex, entire, glabrous. Petals 4, ovate, *c.* 2 × 1.5 mm, acute at apex, entire, glabrous, yellow. Stamens 4; filaments *c.* 2 mm long, erect, fleshy, glabrous. Ovary 2-celled; styles erect; stigma sticky. Berries sub-globose. Seeds smooth.

Distribution: The native range of this species is Tropical & S. Africa, Madagascar, Arabian Peninsula, Indian Subcontinent to Myanmar (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl.* & *Ft.*: June-January.

Specimen examined: Chinnar, 09.02.2021, *Vishnu Mohan* & *Santhosh Nampy* 188856 (CALI).

Leea D.Royen

In Linn., Mant. Pl. 17, 124. 1767, *nom. cons*.

Key to the species

1. Flowers red…… *L. guineensis*

1. Flowers greenish white……..……..2

2. Anthers free…… ……..…*L. asiatica*

2. Anthers syngenecious……..……*L. indica*

Leea asiatica (L.) Ridsdale in K.S.Manilal, Bot. Hist. Hort. Malabaricus 189. 1980; B.D.Naithani in N.P.Singh *et al.,* Fl. India 5: 330. 2000; Arisdason *et al*. in P.Daniel (ed.), Fl. Kerala 1: 765. 2005. *Phytolacca asiatica* L., Sp. Pl. 1: 474. 1753; Hook.f., Fl. Brit. India 1: 665. 1875; Gamble, Fl. Madras 1: 240. 1918.

Shrubs, up to 3 m tall. Branchlets woody, terete, villous. Leaves pinnate, alternate; leaflets ovate-oblong 10–19 × 4–7 cm, acuminate-caudate at apex, rounded at base, serrate, chartaceous to membranous, sparsely hairy above, densely hairy beneath; rachis 7–20 cm long, angled, pubescent; petioles 1–6

cm long, glabrous, grooved above. Stipule ovate, *c.* 0.5 × 0.3 cm, narrowly winged. Flowers in sub-terminal corymbs, greenish white; peduncles 1–4 cm long; pedicels *c.* 0.3 cm long, stout, glabrous. Bracts ovate-linear, *c.* 6 × 3 mm, sub-persistent, glabrous; bracteoles lanceolate, *c.* 3 × 2 mm, acute at apex, entire. Calyx ovate, *c.* 2 × 3 mm, acute at apex, entire, pubescent out. Corolla 5-lobed; lobes subulate, 2.5–3 × 1–1.5 mm, acute at apex, entire. Staminal tube 1.5–2.5 mm long; lobes deeply 2-fid. Stamens free; filaments *c.* 2 mm long. Ovary globose-sub-globose; styles *c.* 2 mm long; stigma capitate. Berries globose-depressed.



Distribution: The native range of this species is Indian Subcontinent to China (Yunnan) and Indo-China (POWO, 2023); *Habitat*: Moist deciduous and evergreen forests; *Fl.* & *Ft.*: March-November.

Specimen examined: Mangaladevi, 23.06.2018, *Vishnu Mohan* & *Santhosh Nampy* 173348 (CALI).

Leea guineensis G.Don, Gen. Hist. 1: 712. 1831; B.D.Naithani in N.P.Singh *et al.*, Fl. India 5: 336. 2000; Arisdason *et al.* in P.Daniel (ed.), Fl. Kerala 1: 766. 2005.

Leea wrightii C.B.Clarke, J. Bot. 19: 105. 1881; Gamble, Fl. Madras 1: 239. 1918.

Shrubs, up to 5 m tall. Branchlets woody, terete, glabrous-sparsely pubescent. Leaves bipinnate; leaflets 5–17, elliptic-lanceolate, 8–15 × 3–6 cm, caudate-acuminate at apex, rounded-truncate at base, serrate, glabrous above,



sparsely pubescent beneath, coriaceous; rachis 20–40 cm long, slender; petiolule 0.5–0.7 cm long. Stipules obovate, *c.* 4 × 2 cm, acuminate at apex, entire. Flowers in axillary cymes; peduncles 6–10 cm long; pedicels 0.2–0.3 cm long, stout, glabrous. Calyx campanulate, 5, ovate, 2–3 × *c.* 1.5 mm, acute at apex, entire, glabrous. Corolla tube fused with staminal tube, shortly notched at apex, 2–3 mm long. Ovary 4–8-loculed; styles 1–2 mm long. Berries globose, 6-lobed. Seeds 3-gonous.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft.*: May-August.

Specimens examined: Mankulam, 06.07.2021, *Vishnu Mohan & Santhosh Nampy* 175643 (CALI); PTR, 12.08.1993, *Jomy Augustine* 12236 (KFRI).

Leea indica (Burm.f.) Merr., Philipp. J. Sci. 14(2): 245. 1919; B.D.Naithani in N.P.Singh *et al.,* Fl. India 5: 337. 2000; Arisdason *et al*. in P.Daniel (ed.), Fl. Kerala 1: 767. 2005. *Leea sambucina* Willd., Sp. Pl. ed., 4. 1: 1177. 1798, *nom. superfl.*; Hook.f., Fl. Brit. India 1: 666. 1875; Gamble, Fl. Madras 1: 240. 1918. *Staphylea indica* Burm.f. in Fl. Indica: 75 1768.



Erect shrubs. Branchlets woody, terete, warted below. Leaves 2–3-pinnate, glabrous; leaflets elliptic-lanceolate, 5–32 × 3–8 cm, acuminate at apex, rounded at base, irregularly serrate; petioles 10–23 cm long; petiolules *c.* 5 cm long, glabrous. Stipules broadly obovate, 2.5–4.5 × 2–3.5 cm, rounded at apex, entire, glabrous, sub-coriaceous. Flowers in leaf opposed compound dichasial cymes, greenish white; peduncles 1–2 cm long, brown tomentose; pedicels 0.1–0.2 mm long, pubescent. Bracts elliptic-lanceolate, 3–4 × 2.5–3 mm, acute at apex, entire, glabrous. Calyx tube

urceolate; lobes 5, triangular, *c.* 3 × 1 mm, acute at apex, entire, glabrous. Corolla tube *c.* 4 mm long; lobes 5, *c.* 1.5 × 2.5 mm, cucullate at apex, entire, glabrous. Stamens 5; staminal tube 0.5–0.8 mm long; anthers syngenecious. Ovary globose; styles 1−2 mm long; stigma expanded slightly. Berries globose. Seeds 3-gonous

Distribution: The native range of this species is Laccadive Islands, S. India and Sri Lanka (POWO, 2023); *Habitat*: Degraded semi-evergreen and evergreen forests, also in the plains; *Fl.* & *Ft.*: March-August.

Specimens examined: Way to Kannadippara, 06.08.2018, *Vishnu Mohan & Santhosh Nampy* 159283; Painavu, 04.04.2018, *Vishnu Mohan & Santhosh Nampy* 158475; Kuttikkanam, 28.04.2018, *Vishnu Mohan & Santhosh Nampy* 159223 (CALI).

Parthenocissus Planch.

Monogr. Phan. 5(2): 447. 1887, *nom. cons.*

Parthenocissus semicordata Planch. in A.DC. & C.DC., Monogr. Phan. 5: 451. 1887; B.V.Shetty & P.Singh in P.Daniel (ed.), Fl. Kerala 1: 759. 2005. *Vitis himalayana* var. *semicordata* (Wall.) M.A.Lawson in Hook.f., Fl. Brit. India 1: 656. 1875.

Parthenocissus neilgherriensis (Wight) Planch. *sensu*; Gamble, Fl. Madras 231 1918.

Large climbers. Stems woody, terete, lenticellate. Leaves 3-foliolate; leaflets ovate, 5–8 × 3–5 cm, acuminate at apex, rounded-oblique at base, serrate, coriaceous; rachis 5–10 cm long, glabrous; petiolules 0.5–1 cm long, slightly grooved above. Flowers in axillary-terminal cymes, non-fragrant; peduncles *c.* 10 cm long, glabrous; pedicels 0.3–0.6 cm long, glabrous. Calyx cupular, 5-lobed; lobes triangular, acute at apex, entire, glabrous. Petals oblong, *c.* 4 × 2 mm, rounded at apex, entire, glabrous. Stamens 5; filaments *c.* 3 mm long, straight, glabrous. Disc obscure. Ovary obovoid, truncate, 2-celled; styles short; stigma capitate. Berries ovoid; seed one.

Distribution: The native range of this species is NW. India (Morni Hills), Nepal to Central China and W. Malesia (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft.*: August-January.

Specimen examined: Pachakkanam, 08.08.1993, *Jomy Augustine* 12311 (CALI).

Tetrastigma Planch.

Monogr. Phan. 5(2): 423. 1887.

Key to the species

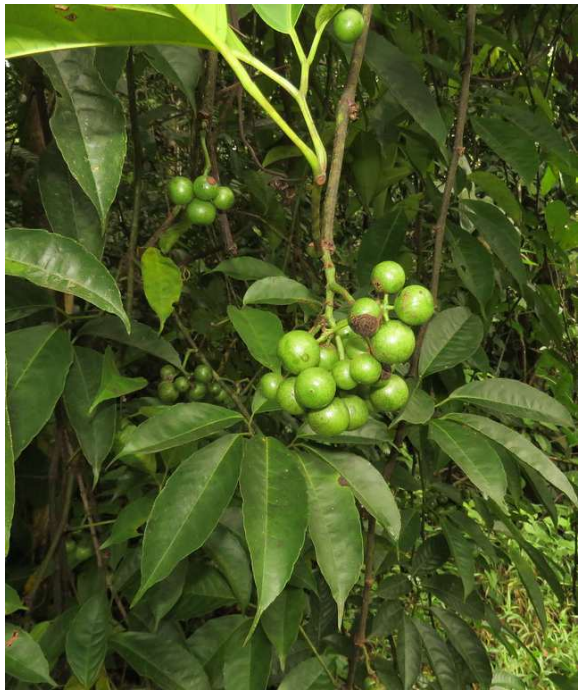
1. Branches sulcate……*T. sulcatum*

1. Branches terete……2

2. Leaflets revolute; styles distinct……*T. nilagiricum*

2. Leaves not revolute; styles obscure ……*T. leucostaphylum*

Tetrastigma leucostaphylum (Dennst.) Alston, Taxon 26: 539. 1977; B.V.Shetty & P.Singh in P.Daniel (ed.), Fl. Kerala 1: 761. 2005. *Tetrastigma muricatum* Gamble, Fl. Madras 1: 229. 1918, *nom. superfl.* *Cissus leucostaphyla* Dennst. in Schlüssel, Hortus Malab. 17, 33. 1818.



Scandent shrubs. Branchlets woody, terete, strongly lenticulate. Leaves 3–5-foliolate; leaflets oblong-lanceolate, 4–8 × 2–4 cm, acute at apex, cuneate at base, serrate, glabrous, coriaceous, not revolute; petioles 5–8 cm long, warty-lenticulate, base swollen; petiolules 0.5–1 cm long, glabrous. Tendril woody, simple, terete. Flowers in short axillary cymes, non-fragrant; peduncles 3–4 cm long. Calyx campanulate,;lobes 4, triangular, *c.* 1 × 0.5 mm, acute at apex, ciliate. Petals 4, slightly connate at base, ovate, 1–1.5 × *c.* 1 mm, acute at apex, entire, glabrous. Stamens 4; filaments *c.* 4 mm

long, glabrous. Disc lobed. Ovary sub-globose; stigma sessile, lobed. Berries sub-globose, creamy white; seeds 2−4.

Distribution: Native range of this species is Indian Subcontinent to W. Malesia (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and shola forests, also in sacred groves; *Fl.* & *Ft.*: February-December.

Specimens examined: Kanketty, 20.12.2019, *Vishnu Mohan* & *Santhosh Nampy* 164809; Koyiman shola, 18.02.2021, *Vishnu Mohan* & *Santhosh Nampy* 199760 (CALI).

Tetrastigma nilagiricum (Miq.) B.V.Shetty, Kew Bull. 44: 477. 1989; B.V.Shetty & P.Singh in P.Daniel (ed.), Fl. Kerala 1: 762. 2005. *Cissus nilagirica* Miq., Linnaea 26: 221 1853.

Scandent shrubs. Branches woody, terete, muricate. Leaves 3–5-foliolate; leaflets elliptic, 6–10 × 3–6 cm, acuminate at apex, rounded at base, serrate and revolute, glabrous; petiolules *c.* 0.5–1 cm long; petioles 2–5 cm long. Tendrils simple, stout. Flowers in axillary umbellate cymes; peduncles 1–2 cm long, pubescent; pedicels 0.3–0.4 cm long, stout. Calyx campanulate;, lobes 4, ovate, acute, entire, glabrous. Disc thick, covering lower half of ovary. Stamens 4; filaments *c.* 3 mm long, glabrous. Ovary urceolate; styles *c.* 2 mm long; stigma capitate. Berries globose. seeds oblong-obovoid.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Shola forests; *Fl.* & *Ft.*: December-March.

Specimen examined: Lockhert gap, 23.01.1964, *K.M. Sebastine* 18408 (MH).

Tetrastigma sulcatum (M.A.Lawson) Gamble, Fl. Madras 1: 229. 1918; B.V.Shetty & P.Singh in P.Daniel (ed.), Fl. Kerala 1: 762. 2005. *Vitis sulcata* M.A.Lawson in Hook.f., Fl. Brit. India 1: 661. 1875.

Small climbers. Branchlets sulcate, woody, tuberculate, lenticulate. Leaves 3–5-foliolate; leaflets ovate-elliptic, 7–13 × 3–6 cm, acuminate at apex, rounded at base, crenate, glabrous, coriaceous; petiolules 0.5–0.7 cm long, glabrous, grooved above; petioles lenticulate, erect, stout. Flowers in axillary cymes, non-fragrant; peduncles 1–2 cm long, dichotomous, glabrous; pedicels stout, woody, lenticulate. Sepals ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous.

Petals 5, free, ovate, *c.* 3 × 1.5 mm, acute at apex, entire, glabrous. Stamens 5; filaments *c.* 3 mm long, erect, fleshy, glabrous. Disc lobed. Ovary ovoid; styles *c.* 2 mm long, erect; stigma sticky. Berries glabrous; seeds four.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen and moist deciduous forests; *Fl.* & *Ft.*: November-June.

Specimen examined: Vallakkadavu, 08.06.1995, *Jomy Augustine* 15435 (CALI).

STAPHYLEACEAE Martinov

Tekhno-Bot. Slovar 598. 1820, *nom. cons.*

Deciduous or evergreen trees or shrubs. Leaves opposite, odd-pinnately compound, or trifoliolate, rarely simple, stipulate or exstipulate; leaflets with petiolules, less commonly sub-sessile, pinnately veined. Flowers bisexual to rarely unisexual, pinkish to white, pendent or erect, actinomorphic and hypogynous, arranged in panicles or racemes. Sepals 5, often petaloid, caducous or persistent, imbricate. Petals 5, free or connate at base, imbricate, rarely valvate, as equal as sepals. Stamens 5; filaments free or inserted on corolla tube, alternating with corolla lobes; anthers dehiscing by longitudinal slits. Disc annular to barely discernible. Ovary superior; carpels 2 or 3(or 4), free or weakly united, lobed with as many locules as carpels; styles free or slightly united; ovules 1 to several, arranged in 2 rows. Fruit an inflated capsule or follicle or berrylike drupe. Seeds globose to ovoid; arillode present or absent.

The family includes three genera and 43 species (POWO, 2023); two species in the study area.

Key to the genera

1. Stipules absent; fruit an indehiscent berry like drupe…….. *Turpinia*
1. Stipules present, caducous; fruit a follicle or a capsule……*Staphylea*

Staphylea L.

Sp. Pl. 270. 1753.

Staphylea cochinchinensis (Lour.) Byng & Christenh., Global Fl. 4: 133. 2018. *Turpinia cochinchinensis* (Lour.) Merr., J. Arnold Arbor. 19: 43. 1938;

P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 415. 2000; W.Arisdason & P.Daniel in P.Daniel (ed.), Fl. Kerala 1: 788. 2005. *Triceros cochinchinensis* Lour., Fl. Cochinch. 184. 1790.

Turpinia nepalensis Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 156. 1834; Gamble, Fl. Madras 241. 1918.

Evergreen trees, up to 18 m high. Branchlets woody, terete, glabrous; bark thin, brown. Leaves imparipinnate, opposite; leaflets 3–9, opposite; lamina elliptic-oblong, 4–15 × 2.5–6 cm, acuminate at apex, acute at base, crenate-serrate, coriaceous, glabrous; petiolule 5–28 mm long, slender, grooved above; rachis 30–80 mm, stout, swollen at base, glabrous. Stipules triangular, 3–6 × *c.* 2 mm, acuminate at apex, entire, glabrous, cauducous. Flowers bisexual, in terminal or axillary panicles; peduncles 5–10 cm long, slender; pedicels 3–5 mm long, stout. Sepals 5, ovate, obtuse, *c.* 1.5 × 1 mm, acuminate at apex, ciliolulate. Petals 5, ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Stamens 5; filaments glabrous. Disc raised, 5-lobed. Ovary sessile, 3-lobed; styles 1–2 mm long, glabrous; stigma capitate. Berries globose, 1-3-lobed. Seeds angular, dark brown; hilum large.

Distribution: The native range of this species is Nepal to S. China and Indo-China (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft.*: March-October.

Specimen examined: PTR, 13.04.1994, *Jomy Augustine* 13564 (KFRI).

Turpinia Vent.

Choix Pl.: t. 31 1807, *nom. cons.*

Turpinia malabarica Gamble, Bull. Misc. Inform. Kew 1916: 135. 1916; Gamble, Fl. Madras 241. 1918; P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 416. 2000; W.Arisdason & P. Daniel in P.Daniel (ed.), Fl. Kerala 1: 789. 2005.

Trees, up to 20 m tall. Branchlets woody, terete, glabrous; bark greyish-brown. Leaves imparipinnate, opposite; leaflets 3–7, opposite, elliptic-obovate, 5–12 × 1.5–5 cm, acuminate at apex, acute at base, serrate, glabrous, coriaceous; petiolule 5–7 mm long, stout; rachis 19–25 cm long, stout, swollen at base, glabrous. Flowers bisexual, in axillary and terminal panicles with opposite branches; peduncles *c.* 10 cm long, slender, glabrous; pedicels 5–7 mm long,

stout, glabrous. Sepals 5, ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous, ciliate. Petals 5, ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Stamens 5; filaments shortly villous. Disc erect, crenate. Ovary sessile, superior, 3-lobed; stigma sticky. Berries sub-globose, not lobed, glabrous. Seeds companulate.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft.*: November-April.

Specimen examined: PTR, 12.11.1995, *Jomy Augustine* 12021 (KFRI).

SAPINDACEAE Juss.

Gen. Pl. 246. 1789, *nom. cons.*

Trees, shrubs or climbers. Leaves alternate, simple, 1-foliolate, 3-foliolate, paripinnate, imparipinnate or bipinnate. Inflorescences usually racemoid or paniculate terminal or axillary or culinary thyrse. Flowers usually spuriously polygamo-dioecious. Sepals usually 4 or 5. Petals 0–5. Disc usually extra-staminal, sometimes unilateral (absent in *Dodonaea*). Stamens usually 5–12. Ovary of 2–8 carpels, completely connate or only at the base. Fruit capsular or fleshy and indehiscent.

The family includes 143 accepted genera (POWO, 2023); nine genera and 12 species in the study area.

Key to the genera

1. Leaves simple; fruits winged……*Dodonaea*
1. Leaves ternate, or pinnately compound; fruits not winged……2
2. Herbaceous climbers……*Cardiospermum*
2. Trees or shrubs……3
3. Fruits smooth or wrinkled when dry……4
3. Fruits warty; tubercled or spiny……8
4. Seeds arillate……5
4. Seeds exarillate……7
5. Petals absent……*Schleichera*
5. Petals 4 or 5……6
6. Leaves 3-foliate……*Allophyllus*
6. Leaves paripinnate……*Harpulia*

7. Flowers actinomorphic……*Sapindus*

7. Flowers zygomorphic……*Lepisanthes*

8. Petals 4; fruits drupaceous……*Otonephelium*

8. Petals 5 or 5; fruits schizocarpic ……*Dimocarpus*

Allophylus L.

Sp. Pl. 348. 1753.

Key to the species

1. Thyrus branched……*A. concanicus*

1. Thyrus unbranched……2

2. Leaves tomentose beneath; thyrsus smaller than leaves……*A. serratus*

2. Leaves glabrous beneath; thyrsus longer than leaves……*A. cobbe*

Allophylus cobbe (L.) Forsyth f., Bot. Nomencl. 226. 1794; Hook.f., Fl. Brit. India 1: 673. 1875; P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 346. 2000; P.Singh & Vajr. in P.Daniel (ed.), (ed.) Fl. Kerala 1: 771. 2005. *Rhus cobbe* L., Sp. Pl. 267. 1753.

Allophylus rheedei (Wight) Radlk. *sensu* Gamble, Fl. Madras 246. 1918;

Large shrubs, up to 8 m tall. Branchlets woody, terete, pubescent. Leaves trifoliolate, alternate; leaflets elliptic-ovate, 10–12 × 5–7 cm, acute at apex, cuneate at base, serrate towards distal half, tomentose; petiolule 0.3–0.4 cm long, stout, glabrous; rachis 8–11 cm long, slender, pulvinate. Bracts lanceolate, *c.* 1.5 × 1 mm, acuminate at apex, entire. Flowers in axillary thyrses; peduncles unbranched, 12–16 cm long, slender. Sepals 4, ovate, *c.* 1 × 0.5 mm, acute at apex, entire, sparsely pubescent. Petals 4, unequal, ovate-orbicular, *c.* 1.5 × 1 mm, acute at apex, entire. Stamens 4; filaments *c.* 2 mm long, glabrous. Ovary ovate; styles *c.* 1 mm long; stigma sticky. Berries globose.

Distribution: The native range of this species is India to Philippines (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests, also in sacred groves; *Fl. & Ft.*: April-November.

Specimens examined: Meenmutty, 21.04.1982, *Vatsavaya* 71277 (MH); Thekkady, 06.04.1995, *Jomy Augustine* 14918 (KFRI).

Allophylus concanicus Radlk., Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München 20: 230. 1890; Gamble, Fl. Madras 1: 246. 1918; P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 348. 2000.

Shrubs, up to 6 m tall. Branchlets terete, brownish, lenticulate. Leaves trifoliate, alternate; leaflets ovate, 10–13 × 5–6 cm, acuminate at apex, acute at base, entire-crenate, pubescent; petiolule 0.3–0.5 cm long, stout; rachis 4–6 cm long, slender, hispid. Flowers in axillary racemes; peduncles 6–9 cm long, slender, pubescent; pedicels 0.2–0.3 cm long, stout, pubescent. Sepals 5, orbicular, *c.* 2 × 1 mm, acute at apex, ciliate, pubescent. Petals 5, ovate, *c.* 5 × 3 mm, acute at apex, entire, densely white hairy within. Stamens 5; filaments 2–3 mm long, hairy. Disc lobes 4, globular. Ovary ovoid; styles *c.* 2 mm long, slender; stigma sticky. Berries sub-globose, glabrous.

Distribution: The native range of this species is SW. India. (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: December-April.

Specimens examined: Chinnar, 30.04.1996, *K.K. Sajeev* 17483 (KFRI); Thannikudy, 15.12.1981, *C.N. Mohanan* 72818 (MH).

Allophylus serratus (Roxb.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 44: 185. 1876; Gamble, Fl. Madras 1: 246. 1918; P.C.Pant in N.P. Singh *et al.,* Fl. India 5: 349. 2000. *Ornitrophe serrata* Roxb., Pl. Coromandel 1: 44. 1796.

Shrubs, up to 5 m tall. Branchlets woody, terete, glabrous. Leaves trifoliate, alternate; leaflets ovate, 10–15 × 5–9 cm, acuminate at apex, attenuate at base, serrate, pubescent; petiolules 0.3–0.7 cm long; rachis 8–10 cm long, slender, glabrous. Flowers in axillary racemes; pedicels *c.* 0.3 cm long, jointed; peduncles 4–7 cm long, slender, pubescent. Sepals 5, orbicular, *c.* 1.5 × 1 mm, rounded at apex, entire, glabrous. Petals 5, spathulate, 2–3 × *c.* 1 mm, rounded at apex, entire, glabrous. Stamens 5; filaments *c.* 3 mm long, slender, glabrous. Disc orbicular, lobed. Ovary ovate; styles 2–3 mm long; stigma sticky. Drupes globose, puberulous.

Distribution: The native range of this species is India to Indo-China (POWO, 2023); *Habitat*: Moist deciduous and evergreen forests; *Fl. & Ft.*: July-January.

Specimen examined: Chinnar, 31.01.1996, *K.K. Sajeev* 15959 (KFRI).

Cardiospermum L.

Sp. Pl. 1: 366. 1753.

Key to the species

1. Leaflets pubescent; capsule not winged ……..……*C. corindum*

1. Leaflets glabrescent; capsule winged……..……*C. helicacabum*

Cardiospermum corindum L., Sp. Pl., ed. 2. 1: 526. 1762.

Cardiospermum canescens Wall., Pl. Asiat. Rar. 1: 14. t. 14. 1829; Hook.f., Fl. Brit. India 1: 670. 1875; Gamble, Fl. Madras 1: 245. 1918; P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 355. 2000; P.Singh & Vajr. in P.Daniel (ed.), Fl. Kerala 1: 773. 2005.



Climbing herbs. Stems grooved, pubescent, narrow, wiry, slender. Leaves compound, alternate; leaflets lobed, terminal larger, 1–3.5 × 8–2.5 cm, acuminate-mucronate at apex, acute at base, serrulate, sparsely hairy above, pubescent below; petioles erect, 3–4 cm long, narrow, pubescent; petiolules 1.5–2 cm long, pubescent. Flowers white, in axillary racemes; peduncles 4–6 cm long, slender, glabrous; pedicels 0.4–0.6 cm long, slender, glabrous. Sepals 2 + 2, outer ovate, *c.* 1 × 0.5 mm, acute at a pex, entire, glabrous; inner obovate, *c.* 2.5 × 1.5 mm, rounded at apex, entire, glabrous. Petals 2 + 2, oblong-obovate, 2–3 × 1–1.5 mm, rounded at apex, entire, glabrous. Stamens 8; filaments sub-equal, pilose, erect, *c.* 3 mm long. Styles *c.* 2 mm long; stigmas 3-lobed, sticky. Capsules inflated, not winged, tomentose. Seeds black.

Distribution: The native range of this species is S. U.S.A. to N. Argentina, Tropical & S. Africa, Uttarakhand to S. Central China and Sri Lanka,

Marianas (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: Throughout the year.

Specimens examined: Chinnar, 27.01.2018, *Vishnu Mohan* & *Santhosh Nampy* 158352; *Ibid.,* 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175930; *Ibid.,* 18.05.1999, *Shamina M.* 78944; *Ibid.,* 18.05.1999, *Satheesh George* 79228; *Ibid.,* 19.02.1998, *Sijimol P.S.* 59694; *Ibid.,* 14.02.2001, *Deepa K.A.* 73775 (CALI).

Cardiospermum halicacabum L., Sp. Pl. 1: 366. 1753; Hook.f., Fl. Brit. India 1: 670. 1875; Gamble, Fl. Madras 1: 244. 1918; P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 356. 2000; P.Singh & Vajr. in P.Daniel (ed.), Fl. Kerala 1: 774. 2005.



Climbing herbs. Stems terete, grooved, glabrous. Leaves alternate; leaflets dissected, ovate, terminal leaflet larger, 1–4 × 0.5–1.5 cm, acute at apex, acute at base, deeply serrate, glabrous. Flowers white, in axillary racemes; peduncles 4–10 cm long, glabrous, narrow, erect; basal branches with tendrils; pedicels 0.1–0.2 cm long, glabrous. Sepals 2 + 2; outer smaller, obovate, 1–2.5 × 0.5–2 mm, rounded at apex, entire, glabrous. Petals 2 + 2; basal larger, 2–3.5 × 1.5–2.5 mm, rounded at apex, entire, glabrous. Stamens 8; filaments erect, *c.* 4 mm long, densely pilose. Ovary 3-celled, oblong, pubescent; styles reduced; stigmas 3-lobed, sticky. Capsules 3-lobed, winged at angles, pubescent.

Distribution: The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat*: Moist deciduous forests, also in scrub jungles; *Fl. & Ft.*: July-March.

Specimens examined: Painavu, 05.08.2017, *Vishnu Mohan & Santhosh Nampy* 154186; Pambla dam, 08.03.2017, *Vishnu Mohan* & *Santhosh Nampy* 152016 (CALI).

Dimocarpus Lour.

Fl. Cochinch. 1: 233. 1790.

Dimocarpus longan Lour., Fl. Cochinch. 233. 1790; P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 358. 2000; P.Singh & Vajr. in P.Daniel (ed.), Fl. Kerala 1: 776. 2005

Large trees, up to 10 m tall. Stems woody, terete; bark greyish smooth, lenticellate; branchlets brownish, pubescent. Leaves paripinnate, alternate; leaflets 8–20, alternate, lanceolate, 10–20 × 2.5–5 cm, acute at apex and base, entire, glabrous above, glaucous beneath, coriaceous; petioles *c.* 0.5 cm long, stiff, glabrous, grooved at middle; rachis 12–15 cm long, stout, swollen at base, glabrous. Flowers in terminal and axillary panicles or racemes. Calyx copular, tomentose; lobes 5, ovate, *c.* 3 × 2 mm, acute at apex, entire, pubescent out, glabrous within. Petals 5 oblong, *c.* 4 × 2 mm, rounded at apex, entire, glabrous, pilose at base, deflexed. Stamens 8, inserted within the disc; filaments slender, *c.* 4 mm long, hairy. Ovary ovoid, 2-lobed, pubescent, 2-celled; styles simple; stigmas bifid. Schizocarp globose, reddish-brown. Seed 1, black, covered by fleshy aril.

Distribution: The native range of this species is Indian Subcontinent to S. China and NW. Peninsula Malaysia (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: March-August.

Specimen examined: Mankulam, 09.06.2018, *Vishnu Mohan* & *Santhosh Nampy* 159291 (CALI).

Dodonaea Mill.

Gard. Dict. Abr., ed. 4. 1: 450. 1754.

Dodonaea viscosa Jacq., Enum. Syst. Pl. 19. 1760; Hook.f., Fl. Brit. India 1: 697. 1875; Gamble, Fl. Madras 1: 253. 1918; P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 361. 2000; P.Singh & Vajr. in P.Daniel (ed.), Fl. Kerala 1: 777. 2005.

Shrubs, up to 4 m tall. Stems woody, terete, young parts scurfy puberulous. Leaves simple, alternate, oblanceolate, 3–8 × 0.8–1.5 cm, acuminate at apex, abruptly tapering towards base, entire, glabrous, coriaceous; petioles 0.4–0.9 cm long, glabrous. Flowers greenish yellow in panicled cymes; pedicles 5–8 cm long, slender, glabrous. Sepals 5, free, lanceolate, *c.* 2 × 1 mm, acuminate at

apex, entire, glabrous. Stamens 8; filaments less than 1 mm, stout; anthers incurved. Ovary ellipsoid, 3-loculed; styles *c.* 6 mm long; stigma 3-lobed. Capsules compressed-globose, 3-winged. Seeds 1 or 2 per locule, black, lens like.



Distribution: The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat*: Shola, evergreen and dry deciduous forests; *Fl. & Ft.*: January-June.

Specimens examined: Mannavan shola, 25.02.2003, *Reena M.B.* 89070; Pius Nagar, 22.06.2018, *Vishnu Mohan* & *Santhosh Nampy* 159331 (CALI).

Harpullia Roxb.
Fl. Ind. 2: 441. 1824.

Harpullia arborea (Blanco) Radlk., Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München 16: 404. 1886; P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 365. 2000; P.Singh & Vajr. in P.Daniel (ed.), Fl. Kerala 1: 779. 2005. *Ptelea arborea* Blanco, Fl. Filip. 63. 1837.

Harpullia imbricata (Blume) Thwaites, Enum. Pl. Zeyl. 56. 1858; Gamble, Fl. Madras 1: 253. 1918.

Trees, up to 15 m tall. Branchlets woody, terete, fulvous tomentose; bark pale grey, lenticels horizontal. Leaves paripinnate, alternate; leaflets 8–12, sub-opposite, elliptic-lanceolate, 5–15 × 2.5–8 cm, acuminate at apex, oblique at base, entire, glabrous, membranous; petiolules 0.4–0.5 cm long, stout, glabrous; rachis 10–27 cm long, slender, pubescent, swollen at base. Flowers polygamodioecious, in axillary or sub-terminal drooping panicles; peduncles 7–15 cm long, slender, glabrous; pedicels 0.4–0.6 cm long, slender, glabrous. Bisexual flowers: Sepals 5, free, ovate, 3–5 × 2–3 mm, rounded at apex, entire,

glabrous. Petals 5, long clawed, oblong, 5–8 × 3–4 mm, rounded at apex, entire, glabrous. Disc small, 5-lobed. Stamens 5–8, inserted within the disc; filaments 5–6 mm long, slender. Ovary ovoid, 2-celled; styles elongate; stigma linear. Male and female flowers as same as bisexual flowers. Capsules 2-lobed, loculicidally 2-valved. Seeds 2, ellipsoid, black, shining; aril orange.

Distribution: The native range of this species is Tropical Asia to SW. Pacific (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests; *Fl. & Ft.*: January-April.

Specimen examined: Kulamavu, 02.06.1982, *C.N. Mohanan* 74143 (MH).

Lepisanthes Blume

Bijdr. Fl. Ned. Ind. 237. 1825.

Lepisanthes tetraphylla (Vahl) Radlk., Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München 8: 276. 1878; Gamble, Fl. Madras 1: 247. 1918; P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 372. 2000; P.Singh & Vajr. in P.Daniel (ed.), Fl. Kerala 1: 781. 2005. *Sapindus tetraphyllus* Vahl, Symb. Bot. 3: 54. 1794.

Evergreen trees, up to 15 m tall. Branchlets woody, terete, corky; bark reddish-brown, peels off in irregular thin scale, rough. Leaves paripinnate, alternate; leaflets 4–8, sub-opposite, elliptic-oblong, 6–22 × 2–6 cm, obtuse at apex, acute at apex, entire, glabrous, coriaceous; petiolule 0.3–0.5 cm long, stout, glabrous; rachis 1.5–20 cm long, slender, glabrous, swollen at base. Flowers polygamodioecious, creamy yellow, crowed in axillary or terminal panicles; branches fulvous-tomentose. Bisexual flowers: Sepals 5; outer 2 smaller, ovate, 3–6 × 2–3 mm, rounded at apex, entire, hairy out, glabrous within. Petals 5, obovate, 5–6 × *c.* 3 mm, sub-equal, obtuse at apex, entire, 2-fid, fimbriate, clawed, callose at base, scales attached to claw. Disc thick, 4–5-lobed. Stamens 8; filaments free, pilose. Ovary globose, eccentric, trigonous, 3-celled; styles simple; stigma oblique. Male and female flowers as same as bisexual flowers. Drupes sub-globose, tomentose, apiculate. Seed one, oblong, exarillate.

Distribution: The native range of this species is S. China to Tropical Asia (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests, also in the sacred groves; *Fl. & Ft.*: December-August.

Specimens examined: Chinnar, 18.03.1995, *K.K. Sajeev* 15536 (KFRI); Puliyanmala, 14.12.1982, *C.N. Mohanan* 76143 (MH).

Otonephelium Radlk.

Sitzungsber. Math.-Phys. Cl. Königl. Bayer. Akad. Wiss. München 20: 288. 1890.

Otonephelium stipulaceum (Bedd.) Radlk., H.G.A.Engler & K.A.E.Prantl, Nat. Pflanzenfam. 3(5): 329. 1895; Gamble, Fl. Madras 1; 252. 1918; P.C.Pant in N.P.Singh *et al.*, Fl. India 5: 378. 2000; P.Singh & Vajr. in P.Daniel (ed.), Fl. Kerala 1: 783. 2005. *Nephelium stipulaceum* Bedd., Madras J. Lit. Sci. 3, 1: 39. 1864.

Trees, up to 18 m tall. Branchlets woody, terete; bark pale brown, smooth, peels off in irregular thick scales. Leaves paripinnate, alternate; leaflets 4–8, opposite, elliptic-obovate, 2.5–15 × 1–8 cm, acuminate at apex, oblique at base, entire, glabrous above, glaucous beneath, coriaceous; petiolules 0.3–0.5 cm long, stout, glabrous; rachis 3–18 cm, slender, glabrous. Flowers polygamodioecious, in axillary and terminal panicles; peduncles 5–9 cm long, slender. Bisexual flowers: calyx copular; lobes 6, ovate, villous within. Petals 0. Disc annular, fleshy, lobed. Stamens 8; filaments unequal, slender, inserted within the disc. Ovary 2–4-lobed, pubescent; styles terminal 3-fid. Male flowers and female flowers as same as bisexual flowers. Drupes oblong or ovoid, covered with soft prickles. Seeds 1 or 2, brown, smooth.

Distribution: The native range of this species is SW. and S. India (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: February-July.

Specimen examined: PTR, 30.04.1994, *Jomy Augustine* 13690 (KFRI).

Sapindus Tourn. ex L.

Sp. Pl. 367. 1753.

Sapindus emarginatus Vahl, Symb. Bot. 3: 54. 1794; Gamble, Fl. Madras 1: 250. 1918; P.C.Pant in N.P.Singh *et al*., Fl. India 5: 381. 2000; P.Singh & Vajr. in P.Daniel (ed.), Fl. Kerala 1: 784. 2005.

Trees, up to 10 m tall. Branchlets woody, tomentose; bark dark-brown, rough. Leaves paripinnate, alternate; leaflets 4–6, sub-opposite; lamina oblong-obovate, 3–15 × 1.5–5.5 cm, obtuse at apex, cuneate at base, entire, glabrescent above, softly tomentose beneath; petiolules 0.2–0.3 cm long, stout, tomentose; rachis 2.5–10 cm long, stout, tomentose, swollen at base. Flowers polygamodioecious, in terminal and axillary panicles. Bisexual flowers: Sepals 5, 2-seriate, ovate-orbicular, 3–4 × *c*. 2 mm, acute at apex, entire, ciliate. Petals 5, obovate, *c*. 2.5 × 2 mm, acute at apex, clawed, glabrous. Disc annular, 5-lobed, strigose. Stamens 8, inserted within the disc; filaments *c*. 3 mm long, unequal, pilose. Ovary trigonous; styles terminal; stigma 3-lobed. Male and female flowers as same as bisexual flowers. Drupes smooth and slightly pubescent when young. Seeds black, globose, smooth.

Distribution: The native range of this species is India, Sri Lanka and Andaman Islands (POWO, 2023); *Habitat*: Dry deciduous forests and margins of grasslands; *Fl. & Ft*.: November-March.

Specimen examined: Thekkady, 26.11.1995, *Jomy Augustine* 16961 (KFRI).

Schleichera Willd.

Sp. Pl. ed. 4, 4: 1096. 1806.

Schleichera oleosa (Lour.) Oken, Allg. Naturgesch. 3(2): 1341. 1841; P.C.Pant in N.P.Singh *et al*., Fl. India 5: 384. 2000; P.Singh & Vajr. in P.Daniel (ed.), Fl. Kerala 1: 786. 2005. *Pistacia oleosa* Lour., Fl. Cochinch. 615. 1790.

Schleichera trijuga Willd., Sp. Pl. ed. 4, 4: 1096. 1806; Hook.f., Fl. Brit. India 1: 681. 1875; Gamble, Fl. Madras 1: 248. 1918.

Deciduous trees, up to 20 m tall. Branchlets woody, terete; bark grey, smooth, brittle. Leaves paripinnate, alternate; leaflets 4–6, opposite or sub-opposite, elliptic-oblong, 5–15 × 2–4.5 cm, acute at apex, oblique at base, entire, coriaceous, glabrous; petiolules 4–5 mm long, stout, glabrous; rachis 5–10 cm, stout, glabrous, swollen at base. Flowers polygamodioecious, in axillary spicate panicles; peduncles 4–10 cm long, slender. Bisexual flowers: Sepals campanulate, lobes 5, acute, glabrous. Petals 0. Stamens 8, inserted within the disc; filaments *c.* 1.5 mm long, pilose. Ovary ovate; styles 2–3 mm long, slender; stigma sticky. Male and female flowers as same as bisexual flowers. Drupes sub-crustaceous, pointed. Seed 1 or 2, enclosed in a pulpy aril.

Distribution: The native range of this species is Indian Subcontinent to Indo-China, Central and S. Malesia (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests, also in the plains; *Fl. & Ft.*: March-August.

Specimens examined: Chinnar, 23.08.1995, *K.K. Sajeeev* 15778 (KFRI); Kulamavu, 01.06.1982, *C.N. Mohanan* 74125 (MH).

SABIACEAE Blume

Mus. Bot. 1: 368. 1851, *nom. cons.*

Trees, stipules absent. Leaves alternate, simple or imparipinnate, sometimes heteromorphic; petioles bases sub-woody, petiolules often with pulvini. Inflorescences terminal or axillary panicles. Flowers crowded and nearly sessile, actinomorphic or zygomorphic, hermaphrodite, relatively small. Sepals (4–)5. Petals (4–)5. Androecium with 5 stamens (2 fertile, 3 staminoidal), connective swollen, anther theca unilocellate. Gynoecium with superior ovary, carpels (2)3, apices distinct or united to form a common styles; locules (2)3; placentation axile, ovules usually 2 per carpel, unitegmic. Fruit a drupe with a crustaceous endocarp. Seed 1 per fruit, endosperm usually reduced.

The family consist of three genera and 43 species in the world (POWO, 2023); one genus and one species in the study area.

Meliosma Blume

Cat. Gew. Buitenzorg: 10. 1823.

Meliosma simplicifolia (Roxb.) Walp., Repert. Bot. Syst. 1: 423. 1842; Hook.f., Fl. Brit. India 2: 5. 1876; Gamble, Fl. Madras 256 (182). 1918; N.P.Balakr. in P.Daniel, Fl. Kerala 1: 794. 2005; *Millingtonia simplicifolia* Roxb., Pl. Coromandel 3: 50. 1820.



Trees, up to 15 m tall. Stems woody, terete; bark greyish-yellow, smooth; branchlets glabrescent. Leaves simple, alternate, obovate-oblong, 12–15 × 4–9 cm, acuminate at apex, attenuate at base, entire at margins, glabrous on both sides except the abaxial nerves, coriaceous; petioles 1–2 cm long, puberulent, stout, grooved above. Stipules absent. Flowers non-fragrant, yellowish-white, crowded in lax panicles; peduncles 2–5 cm long, slender, pubescent; pedicels *c.* 0.5 mm long, slender, pubescent. Bracts absent. Sepals 5, free, ovate-elliptic, 1–1.3 × *c.* 0.5 mm, acute at apex, ciliate at margins, pubescent out, glabrous within. Petals 5, orbicular, *c.* 2 × 1 mm, acute-rounded at apex, entire at margins, sparsely pubescent out, glabrous within, yellow-pink. Stamens 5; filaments *c.* 3 mm long, erect, slender, glabrous. Ovary superior, glabrous; styles *c.* 3 mm, erect, slender, glabrous; stigma globose, sticky. Drupes globose.

Distribution: The native range of this species is Indian Subcontinent to China (W. Yunnan) and Indo-China, N.Sumatera and W. Jawa (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: December-July.

Specimens examined: Chinnar, 03.07.1996 *K.K. Sajeev* 17414 (KFRI); Kuttikkanam, 28.04.2018, *Vishnu Mohan & Santhosh Nampy* 159225; Lakkam, 24.01.2018, *Vishnu Mohan & Santhosh Nampy* 158194; Mankulam, 09.06.2018, *Vishnu Mohan & Santhosh Nampy* 159293; near Mankulam range office, 21.12.2019, *Vishnu Mohan & Santhosh Nampy*

164847; Painavu, 04.04.2018, *Vishnu Mohan & Santhosh Nampy* 158438; Peerumedu, 13.04.1960, *K. Subramaniyam* 10225 (MH); Thannikkudy, 11.03.1995, *Jomy Augustine* 14840 (MH); way to Mannavan shola, 08.01.2004, *Sreenivas V.K.* 96523 (CALI).

ANACARDIACEAE R.Br.

Narr. Exped. Zaire 431.1818. *nom. cons.*

Tree or shrubs. Leaves alternate, extipulate, simple or compound. Inflorescence various. Flowers small regular, unisexual, polygamous or bisexual. Calyx 3–5-partite. Petals 3–5, alternate with sepals, free, rarely 0. Disc flat, cup-shaped or annular, entire or lobed. Stamens as many as the petals, rarely more. Filaments subulate. Anthers 2-celled. Ovary superior, 2–6-celled, rudimentary or 2–3-fid in male. Styles 1–4, or stigma sessile. Fruits usually a 1–5-celled, 1–5-seeded drupe. Seeds exalbuminous.

The family includes 79 genera worldwide (POWO, 2023); eight genera and 11 species in the study area.

Key to the genera

1. Leaves compound……2
1. Leaves simple……..……..3
2. Petals ovate, 3 mm long; stamens inserted outside the disc……. *Spondias*
2. Petals oblong, 4 mm long; stamens inserted below the disc…….*Solenocarpus*
3. Leaves with petiolar appendages…….…….. *Holigarna*
3. Leaves without petiolar appendages……..…..4
4. Fruits seated on fleshy hypocarp…….. *Semicarpus*
4. Fruits not as above ……..……5
5. Leaves obovate, rounded at apex; leaf, pedicels, and fruit pubescent ……*Buchanania*
5. Leaves elliptic-lanceolate, acute-acuminate at apex; glabrous.… *Nothopegia*

Buchanania Spreng.

First published in J. Bot. (Schrader) 1800(2): 234. 1801

Buchanania lanzan Spreng., J. Bot. (Schrader) 1800(2): 234. 1801; Hook.f., Fl. Brit. India 2: 23. 1876; Gamble, Fl. Madras 1: 258. 1918; D.Chandra & S.K.Mukh. in N.P.Singh *et al.* (ed.), Fl. India 5: 443. 2000; V.Chandras. in

P.Daniel, Fl. Kerala 1: 800. 2005. *Buchanania latifolia* Roxb., Hort. Bengal. 32.1814. & Fl. Ind. (Carey) 2: 385. 1832.

Trees, up to 10 m tall. Branchlets woody, terete, pubescent. Leaves simple, alternate; lamina broadly oblong-elliptic, 10–20 × 5–12 cm, rounded at apex, acute at base, entire, glabrous above and densely tomentose beneath; petioles 5–8 mm long, stout, densely pubescent. Flowers in terminal and axillary panicles, non-fragrant; peduncles branched, pubescent, terete; pedicels very compressed. Calyx persistent, fused at base, lobes 5; acute at apex, entire, densely pubescent out, glabrous within. Petals 5, oblong, *c.* 2 × 1 mm, rounded at apex, entire, glabrous, reflexed. Stamens 10, inserted at the base of fleshy disc; filaments *c.* 2 mm long, narrow, erect. Ovary ovate; styles erect, *c.* 2 mm long; stigma sticky. Drupes ovate-elliptic.

Distribution: The native range of this species is Indian Subcontinent to China (S. Yunnan) and Indo-China (POWO, 2023); *Habitat*: Moist deciduous, dry deciduous and semi-evergreen forests; *Fl. & Ft.*: October-April.

Specimens examined: Kavalappara, 10.12.1994, *Jomy Augustine* 14547 (CALI); Mangaladevi, 10.10.1976, *K. Vivekananthan* 48653 (MH).

Holigarna Buch.-Ham. ex Roxb.

Pl. Coromandel 3(4): 79. 1820, *nom. cons.*

Key to the species

1. Leaves tomentose……..……..……..……..*H. grahamii*

1. Leaves glabrous……..……..……..…….. *H. ferruginea*

Holigarna ferruginea Marchand, Rév. Anacardiac. 171. 1869; Hook.f., Fl. Brit. India 2: 37. 1876; Gamble, Fl. Madras 1: 268. 1918; D.Chandra & S.K.Mukh. in N.P.Singh *et al.* (ed.), Fl. India 5: 459. 2000; V.Chandras. in P.Daniel (ed.), Fl. Kerala 1: 804. 2005.

Evergreen trees, up to 15 m tall. Branchlets woody, terete; bark grey, lenticellate. Leaves simple, alternate; lamina obovate, 4–12 × 1–5 cm, rounded

at apex, attenuate at base, entire, glabrous, coriaceous; petioles 1–2 cm long, erect, glabrous; appendages 2, linear, caducous. Flowers in terminal racemes, polygamodioecious; peduncles 4–8 cm long, erect, slender, glabrous; pedicels compressed, glabrous. Bisexual flowers: Calyx cupular, shortly 5-toothed; lobes ovate, *c.* 1 mm long, acute at apex, entire, glabrous. Petals 5, free, orbicular, *c.* 2 × 2 mm, rounded at apex and base, entire, densely villous inside. Stamens 5, inserted on disc; filaments subulate, *c.* 2 mm long, erect, glabrous. Ovary inferior; styles short; stigma capitate. Male and female flowers as same as bisexual flowers. Drupes obovoid, rusty without hairs.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen Forests; *Fl & Ft.:* March-May.

Specimen examined: Vallakkadavu, Periyar Tiger Reserve, 16.03.1999, *Jomy Augustine* 13477 (CALI).

Holigarna grahamii (Wight) Kurz J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 41: 305 1872; Hook.f., Fl. Brit. India 2: 37. 1876; Gamble, Fl. Madras 1: 268. 1918; D.Chandra & S.K.Mukh. in N.P. Singh *et al.* (ed.), Fl. India 5: 460. 2000; V.Chandras. in P.Daniel (ed.), Fl. Kerala 1: 805. 2005. *Semecarpus grahamii* Wight, Icon. Pl. Ind. Orient. t. 235. 1839.

Large evergreen trees, up to 17 m tall. Branchlets woody, terete; bark greyish brown, pubescent, lenticellate. Leaves simple, alternate, clustered at the tips; lamina oblanceolate, 15–25 × 7–12 cm, truncate-rounded at apex, attenuate at base, entire, densely brown tomentose, coriaceous; petioles *c.* 1 cm long, erect, pubescent; appendages 1 or 2 pairs, linear, pubescent. Flowers in terminal panicles, polygamodioecious; peduncles 20–35 cm long, slender, golden pubescent; pedicels 1–2 mm long, stout, pubescent. Bracts cordate, *c.* 10 × 6 cm, acute at apex, entire, densely pubescent. Bisexual flowers: Calyx campanulate, 5-lobed; lobes ovate, *c.* 3 × 1.5 mm, acute at apex, entire, pubescent out, glabrous within. Petals 5, free, ovate, *c.* 3 × 1.5 mm, acute-rounded at apex, entire, glabrous. Stamens 5, inserted outside of the disc; filaments erect, *c.* 2 mm. Ovary orbicular, 1-celled; stigma capitate. Male and female flowers as same as bisexual flowers. Drupes ovoid, reddish-purple.

Distribution: The native range of this species is W. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl & Ft.*: October-March.

Specimen examined: Vallakkavu, Periyar Tiger Reserve, 16.09.1994, *Jomy Augustine* 14181 (CALI).

Nothopegia Blume

Mus. Bot. 1(13): 203. 1850.

Key to the species

1. Lamina elliptic; drupes oblong…….. *N. beddomei*

1. Lamina oblong; drupes ovoid …….. *N. heyneana*

Nothopegia beddomei Gamble, Fl. Madras 1: 265. 1918; D.Chandra & S.K.Mukh. in N.P.Singh *et al.* (ed.), Fl. India 5: 473. 2000; V.Chandras. in P.Daniel (ed.), Fl. Kerala 1: 811. 2005.

Small trees, up to 10 m tall. Branchlets woody terete, glabrous. Leaves simple, alternate; lamina elliptic-lanceolate, 7–15 × 1.5–3 cm, acuminate at apex, acute at base, entire, glabrous, coriaceous; petioles erect, 5–15 mm long, glabrous, slender. Flowers in axillary racemes, polygamodioceous; peduncles *c.* 2 cm long, slender, glabrous; pedicels *c.* 5 mm long, slender, glabrous. Bisexual flowers: Calyx campanulate at base; lobes 4, ovate, *c.* 2 × 1 mm, acute at apex, entire, sparsely pubescent out, persistent. Petals 4, oblong, 3–5 × 1.5–2 mm, rounded at apex, entire, glabrous. Stamens 4; filaments *c.* 2 mm long; disc annular, 4-lobed. Ovary ovoid, superior, 1-celled, stigma capitate. Male and female flowers as same as bisexual flowers. Drupes oblong, fleshy.

Distribution: The native range of this species is SW. India, Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests and semi-evergreen forests; *Fl. & Ft.*: January-June.

Specimen examined: Pamba, 12.01.1996, *Jomy Augustine* 17160 (CALI).

Nothopegia heyneana (Hook.f.) Gamble Fl. Madras: 265 1918; D.Chandra & S.K.Mukh. in N.P.Singh *et al.* (ed.), Fl. India 5: 476. 2000; V.Chandras. in P.Daniel (ed.), Fl. Kerala 1: 812. 2005. *Nothopegia colebrookeana* (Wight) Blume var. *heyneana* Hook.f., Fl. Brit. India 2: 40. 1876.

Shrubs-small trees up to 10 m tall. Branchlets woody, terete, grey, slender. Leaves simple, alternate; lamina elliptic, 6–12 × 2.5–4.5 cm, acuminate at

apex, acute at base, entire, glabrous, leathery; petioles *c.* 1 cm long, slender, glabrous, slightly grooved above. Flowers in axillary racemes, polygamodioecious; peduncles 3–6 cm long, erect, glabrous; pedicels *c.* 5 mm long, brownish pubescent. Bisexual flowers: Sepals 4, triangular, *c.* 1.5 × 2 mm, acute at apex, entire, sparsely pubescent out, glabrous within. Petals 4, free, ovate, 4–5 × 1.5 mm, acute at apex, entire, glabrous. Stamens 4; filaments erect, *c.* 1 mm long. Ovary conical; stigma capitate. Male and female flowers as same as bisexual flowers. Drupes ovoid, fleshy.

Distribution: The native range of this species is S. India (POWO, 2023);

Habitat: Deciduous forests; *Fl. & Ft.*: March-December.

Specimens examined: Kumarikulam, 12.12.1993, *Jomy Augustine* 13012; Kunnar, Periyar Tiger Reserve, 15.03.1994, *Jomy Augustine* 13462; Vallakkadavu, Periyar Tiger Reserve 16.06.1995, *Jomy Augustine* 13095; Thannikkudy, 11.12.1993, *Jomy Augustine* 13029; (CALI).

Semecarpus L.f.

Suppl. Pl. 25: 182. 1782.

Key to the species

1. Leaves obovate-oblong, acute at base, obtuse at apex….. *S. travancoricus*

1. Leaves oblanceolate, auriculate at base, acuminate at apex..*S. auriculatus*

Semecarpus auriculatus Bedd., Fl. Sylv. S. India 2: t. 232. 1872; Hook.f., Fl. Brit. India 2: 32. 1876; Gamble, Fl. Madras 1: 267. 1918; D.Chandra & S.K.Mukh. in N.P.Singh *et al.* (ed.), Fl. India 5: 502. 2000; V.Chandras. in P.Daniel (ed.), Fl. Kerala 1: 816. 2005.

Trees, up to 25 m tall. Branchlets woody, terete, glabrous. Leaves simple, alternate, clustered at apex; lamina oblanceolate, 10–20 × 2.5–6 cm, acute at apex, auriculate at base, entire, glabrous, coriaceous; petioles *c.* 2 mm long, stout, glabrous. Flowers small, polygamodioecious. Bisexual flowers: Calyx cupular; lobes 5, deciduous, ovate, *c.* 2 mm long, acute-rounded at apex, entire, glabrous. Petals 5, ovate, *c.* 3 × 1 mm, acute-rounded at apex, entire, glabrous. Stamens 5, inserted outside the disc; filaments filiform, glabrous. Ovary superior, glabrous, 1-celled; styles 3. Male and female flowers as same as bisexual flowers. Drupes fleshy, obliquely ovoid. Seed pendulous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: November-March.

Specimen examined: Mukkuzhi, Periyar Tiger Reserve, 10.12.1996, *Jomy Augustine* 17059 (CALI).

Semecarpus travancoricus Bedd., Fl. Sylv. S. India 2: t. 232. 1872; Hook.f., Fl. Brit. India 2: 31. 1876; Gamble, Fl. Madras 1: 267. 1918; D.Chandra & S.K.Mukh. in N.P.Singh *et al.* (ed.), Fl. India 5: 504. 2000; V.Chandras. in P.Daniel (ed.), Fl. Kerala 1: 817. 2005.

Trees, up to 20 m tall. Stems woody, terete; bark greyish-brown, smooth, glabrous. Leaves simple, alternate, clustered at the tips; lamina obovate-oblong, 10–40 × 6–16 cm, acute at apex, obtuse at base, recurved at margins, glabrous, coriaceous; petioles 3–4 cm, stout, glabrous, grooved above. Stipules absent. Flowers in axillary and terminal glabrous panicles, polygamodioecious; peduncles 25–40 cm long, terete, glabrous; pedicels *c.* 5 mm, terete, glabrous. Bisexual flowers: Calyx campanulate at base; lobes 5, ovate, *c.* 2 × 1 mm, acute at apex, entire, deciduous. Petals 5, ovate, *c.* 4 × 2 mm, rounded at apex, entire, glabrous. Stamens 5, inserted below the disc; disc annular; filaments filiform. Male and female flowers as same as bisexual flowers. Ovary superior, glabrous; styles 3. Drupes fleshy, obliquely oblong. Seeds pendulous.

Distribution: The native range of this species is India and Bangladesh (POWO, 2023); *Habitat*: Semi-evergreen forests; *Fl. & Ft.:* November-March.

Specimens examined: Arjunankotta, 16.02.1994, *Jomy Augustine* 13375; Vallakkadavu, Periyar Tiger Reserve, 11.11.1993, *Jomy Augustine* 12729 (CALI).

Solenocarpus Wight & Arn.

Prodr. Fl. Ind. Orient. 1: 171. 1834.

Solenocarpus indicus Wight & Arn., Prodr. Fl. Ind. Orient. 1: 171. 1834; Hook.f., Fl. Brit. India 2: 27. 1876; Gamble, Fl. Madras 1: 262. 1918; D.Chandra & S.K. Mukh. in N.P.Singh *et al.* (ed.), Fl. India 5: 505. 2000.

Spondias indica (Wight & Arn.) Airy Shaw & Forman, Kew Bull. 21(1): 17 1967; V.Chandras. in P.Daniel (ed.), Fl. Kerala 1: 818. 2005.

Small trees up to 8 m tall. Branchlets woody, terete glabrous, lenticellate. Leaves pinnately compound, alternate; leaflets 12, opposite, ovate-lanceolate, 2.5–6 × 1.5–2 cm, acuminate at apex, rounded-acuminate at base, serrate, glabrous, coriaceous; petiolules *c.* 1 mm long, stout, glabrous; rachis 20–40 cm long, slender, glabrous. Flowers in axillary or terminal panicles; peduncles 8–18 cm long, glabrous; pedicels *c.* 3 mm long, glabrous. Calyx campanulate at base, 5-lobed; lobes ovate, *c.* 1 × 2 mm, acute at apex, entire, glabrous. Petals 5, free, ovate, *c.* 3 × 1 mm, rounded at apex, entire, glabrous. Stamens 10, inserted outside the disc; filaments *c.* 4 mm long, glabrous. Ovary sessile, unilocular; styles erect, glabrous; stigma sticky. Drupes obovoid, smooth.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests, sometimes among rock formations; *Fl. & Ft.:* May-March.

Specimens examined: Attathodu, Periyar Tiger Reserve, 16.11.1993, *Jomy Augustine* 12750 (CALI); Meenmutty, 10.06.1983, *A.G. Pandurangan* 76684 (MH).

Spondias L.

Sp. Pl. 1: 371. 1753.

Spondias pinnata (L.f.) Kurz, Prelim. Rep. Forest Pegu, App. A: 44. 1875; D.Chandra & S.K.Mukh. in N.P.Singh *et al.* (ed.), Fl. India 5: 507. 2000; V.Chandras. in P.Daniel (ed.), Fl. Kerala 1: 819. 2005. *Spondias mangifera* Willd., Sp. Pl. 2(1): 751. 1799; Hook.f., Fl. Brit. India 2: 42. 1876; Gamble, Fl. Madras 1: 261. 1918.

Deciduous trees, up to 25 m tall. Branchlets woody, terete, smooth. Leaves imparipinnate, alternate, clustered at the apex; leaflets 7–21, opposite, elliptic-oblong, 4–8 × 2–3 cm, acuminate at apex, rounded at base, entire, glabrous; petiolules 2–8 mm long, slender, glabrous; rachis 25–35 cm long, slender, glabrous, swollen at base. Flowers in terminal spreading panicles, polygamodioecious; peduncles 20–40 cm long, branching, glabrous, terete; pedicels 5–9 mm long, stout . Calyx lobes 5, ovate, *c.* 2 × 1 mm, acute at apex,

entire, glabrous, deciduous. Petals 5, oblong, *c.* 4 × 2 mm, rounded at apex, entire, glabrous. Stamens 10, inserted below the disc; disc thick, annular; filaments slender. Ovary ovoid or sub-globose, superior, immersed in the disc; styles 5; stigma spreading. Male and female flowers as same as bisexual flowers. Drupes yellow. Seeds 1–3.

Distribution: The native range of this species is Indian Subcontinent to China (S. Yunnan, S. Guangxi) and Malesia (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests, also in the plains; *Fl. & Ft.:* May-March.

Specimens examined: Painavu, 18.02.1983, *C.N. Mohanan* 76225 (MH); Vallakkadavu, Periyar Tiger Reserve, 16.03.1994, *Jomy Augustine* 13439 (CALI).

CONNARACEAE R.Br.

Narr. Exped. Zaire 431. 1818, *nom. cons.*

Erect trees or shrubs. Leaves alternate, compound, imparipinnate or 1–3-foliolate; stipules absent. Flowers hermaphrodite, actinomorphic or slightly zygomorphic. Calyx imbricate or valvate. Petals 5, free or sometimes slightly connate. Stamens hypogynous to perigynous, often declinate, 5 or 10; disc absent or narrow. Fruit often splitting down one side exposing the seed. Seeds usually 1, with or without endosperm, often arillate.

The family consists of 246 species under 12 genera (POWO, 2023), one species in the study area.

Connarus L.

Sp. Pl. 2: 675. 1753.

Connarus sclerocarpus G.Schellenb. Candollea 2: 98. 1925; N.P.Balakr. in P.Daniel, Fl. Kerala 1: 826. 2005.

Large woody, climbers. Branchlets woody, terete; bark brownish, pubescent. Leaves alternate, pinnate; leaflets elliptic-ovate, 6–8 × 2–3.5 cm, acute at base and apex, entire at margins, glabrous, coriaceous; petiolules 0.5–0.6 cm long, grooved above, glabrous, slender; petioles 10–20 cm long, glabrous, terete, swollen at base. Flowers in terminal-axillary panicles, non-fragrant; peduncles erect, terete, densely tomentose, branching; pedicels *c.* 3 mm long, tomentose,

stout, erect. Sepals elliptic-ovate, 3–4 × 1.5–2 mm, acute at apex, entire at margins, densely tomentose outside, glabrous inside, smooth. Petals ovate-oblanceolate, 6–7 × 3–5 mm, rounded at apex, obtuse at base, densely hairy below, membranous. Stamens 10; filaments *c.* 6 mm, erect, narrow, glabrous. Ovary globose, glabrous; styles *c.* 5 mm long, erect, slender, densely tomentose; stigma capitate, sticky. Folicle obovoid.

Distribution: Native range is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: September-April.

Specimen examined: Anakuthivayar, Periyar Tiger Reserve, 16.03.1996, *Jomy Augustine* 17748 (CALI).

LEGUMINOSAE Juss.

Gen. Pl. 345.1789.

Herbs (rarely aquatic), shrubs, vines, lianas (often with tendrils and/or hooks), and trees; stipules present (although often falling early), sometimes large and leaf-like, sometimes modified into spines. Leaves usually alternate, simple, unifoliate, 3-foliate, pari- or imparipinnate or bipinnately compound, pinnae with one to numerous pairs of leaflets; petioles with a basal pulvinus (when unifoliate then with an apical one as well). Inflorescences axillary or terminal racemes, spikes, panicles, heads or solitary flowers. Flowers usually zygomorphic, usually actinomorphic in subfamily Mimosoideae, and sometimes actinomorphic in Caesalpinioideae and Papilionoideae, usually hermaphrodite, rarely unisexual. Sepals (4-)5, free or fused. Petals 4 or 5, sometimes absent or 1–3, varying in size and shape. Androecium usually of 9 or 10 stamens, sometimes reduced to 1, 3, 4, 5 or 6, and sometimes of 50–100+ (part of subfamily Mimosoideae), filaments partly fused into a tube or free; anthers dehisce by short to long longitudinal slits, or sometimes by apical pores; nectary(ies) often present around the ovary; carpel 1 (rarely many); locule 1 (rarely 2), the ovules 2-many. Fruits usually one- to many-seeded legume, dehiscent or indehiscent, dry or fleshy, inflated or compressed, sometimes winged (samaroid) or breaking into one-seeded articles (lomentaceous), rarely a drupe, sometimes a craspedium. Seeds sometimes

with more or less elaborate aril, usually with a hard seed coat; endosperm little or absent; embryo large, the cotyledons conspicuous.

This family includes 794 genera (POWO, 2023); 113 species under 54 genera in the study area.

Key to the subfamilies

1. Corollas usually easily seen, of separate petals except 2 petals (= keel) fused along the margin in many; stamens 1–10, usually not exserted beyond the petals (except in *Caesalpinia*)……..……2

1. Corollas usually sympetalous and so small as to be ± inevident; stamens 5–numerous, their filaments exserted beyond the petals and often showy……..…… Mimosoideae

2. Corollas of 5 distinct petals, these not differentiated into a larger standard (=banner), wings, and keel; stamens externally visible and free from one another, not enclosed by a keel ……..……Caesalpinioideae

2. Corollas of 3 separate petals (larger standard, 2 wings) and 2 petals fused to form a keel (corollas rarely of only 1 petal); stamens usually enclosed by keel and usually not externally visible, their filaments usually fused or free in a few species ……Faboideae

subfamily **Faboideae**

Leaves once compound with 3–many leaflets (simple or apparently so in species of Baptisia and *Crotalaria*), odd- or even-pinnate, or palmate; stipules various; sepals united (barely so in *Indigofera*); petals 5 (except in Amorpha and sometimes *Eysenhardtia*) and very unequal: uppermost petal (= standard) usually largest, two lateral (= wings) smaller and separate, two lowest (= keel) smaller and united except at base; stamens 5–10; filaments separate or united.

Key to the genera

1. Anthers distinctly dimorphic……..……2

1. Anthers uniform……..……..……..6

2. Plants erect …….……3

2. Plants climbing…….……..5

3. Leaves 1, 3, 5 or 7-foliolate…….…….……4

3. Leaves 2–4-foliolate……*Zornia*

4. Stamens in a closed tube……..*Cytisus*

4. Stamens in sheath open on upper side……..……..*Crotalaria*

5. Small slender climbing herbs; stamens alternately aborted; styles persistent, hook like …… ……..……*Teramnus*

5. Large climbers, usually woody or lianas; stamens and styles not as above……*Mucuna*

6. Leaves pinnate; flowers in pseudoracemes or axillary fascicles…….*Abrus*

6. Leaves not pinnate; flowers not in pseudoracemes, or axillary fascicles…..7

7. Anthers apiculate……..……*Indigofera*

7. Anthers not appendaged ……8

8. Fruits transversely jointed……..…9

8. Fruits not jointed……..……...18

9. Calyx glumaceous, striate with strong nerves proliferating from base… ……...*Alysicarpus*

9. Calyx not glumaceous, not striate……10

10. Fruits persistently folded up within calyx……..……*Uvaria*

10. Fruits not folded……11

11. Fruits distinctly jointed, usually indehiscent……..……..12

11. Fruits not jointed, dehiscent……...*Pseudarthria*

12. Petioles more or less broadly winged…….. *Tadehagi*

12. Petioles not winged……..13

13. Flower always solitary on each node of rachis…… *Leptodesmia*

13. Flowers paired or fascicled clusters on each node of rachis……14

14. Bracts foliaceous and persistent……..……*Phyllodium*

14. Bracts not foliaceous and caducous……..……15

15. Calyx 5-lobed……..16

15. Calyx 4-lobed……..17

16. Herbs with erect stems…….. *Desmodiastrum*

16. Shrubs or herbs with prostrate or tillering stems……. *Grona*

17. Lower suture of pods deeply lobed……..…… *Pleurolobus*

17. Lower suture of pods shallowly constricted…….. *Sohmaea*

18. Styles straight or curved away from standard……*Rothia*

18. Styles curved towards standard……..…..19

19. Interstaminal disc present; stipules absent……20

19. Interstaminal disc absent; stipules present……35

20. Leaves 1 to many foliolate, if 3-foliolate lateral leaflets asymmetrical…21

20. Leaves (-1) 3-foliolate, lateral leaflets symmetrical……..22

21. Lateral nerves numerous (more than 30 pairs); stipels absent…*Tephrosia*

21. Lateral nerves less than 15 pairs; stipels present……*Derris*

22. Leaflets and calyx generally with yellowish gland dots……...23

22. Leaflets and calyx eglandular……25

23. Ovules 3 or more; arils often prominent……...*Cajanus*

23. Ovules 2(3); arils usually inconspicuous……24

24. Leaves sub-digitate or rarely 1-foliolate……*Flemingia*

24. Leaves pinnately compound……...*Rhynchosia*

25. Styles expanded towards tip……...26

25. Styles not expanded towards tip ……...28

26. Seeds 4, mottled; styles flattened……..*Lablab*

26. Seeds more than 6, not mottled; styles terete ……27

27. Stigmas lateral……*Vigna*

27. Stigmas terminal……*Dolichos*

28. Flowers resupinate……..*Centrosema*

28. Flowers not resupinate……29

29. Petals usually unequal in length……...30

29. Petals equal in length……...32

30. Standard petal the largest petal……..*Erythrina*

30. Keel petal the large petal……31

31. Flowers yellow to scarlet, more than 15 mm length……...*Butea*

31. Flowers purple, rose or white, less than 10 mm length…….*Spatholobus*

32. Claws of wings and keel shorter than blade; calyx lobes distinct..*Pueraria*

32. Claws of wings and keel longer than blade; calyx lobes united……34

33. Leafless when flowering; pods with long grey silky bristly hairs...*Pueraria*

33. Leafy when flowering; pods glabrescent to appressed pilose…*Neustanthus*

34. Calyx lobes truncate; flowers yellow……*Dumasia*

34. Calyx lobes evident; flowers usually red, never yellow……*Shuteria*

35. Fruits jointed unless geocarpic……..36

35. Fruits not jointed, not buried in hypanthium……37

36. Flowers solitary……*Aeschynomene*

36. Flowers in fascicles……*Smithia*

37. Ovules 1–4; fruits indehiscent……38

37. Ovules numerous; fruit dehiscent……..39

38. Wing petals broadly expanded, bright yellow, crimped…….*Pterocarpus*

38. Wing petals not much broader than keel, cream-white, not crimped……

……..*Dalbergia*

39. Flowers in axillary racemes or strictly leaf opposed or in axillary clusters.

……..40

39. Flowers in terminal panicles……...*Aganope*

40. Bractoles present; fruits partitioned……*Sesbania*

40. Bractoles absent; fruits not partitioned……..*Gliricidia*

Abrus Adans.

Fam. Pl. 2: 327. 1763.

Abrus melanospermus Hassk., Cat. Hort. Bot. Bogor. Alt. 282. 1844. *Abrus pulchellus* f. melanospermus (Hassk.) Backer in Schoolfl. Java: 354 1911, *nom. Illeg.*; Hook.f., Fl. Brit. India 2: 175. 1876; Gamble, Fl. Madras 1: 350. 1918; E.Vajr.& K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 6. 2016.

Glabrous climbers. Stems twining. Leaves paripinnate, alternate; leaflets opposite, elliptic, 2–3 × 1–1.5 cm, rounded at apex and base, entire, glabrous, terminal leaflets larger; petioles up to 14 cm long, glabrous, slender; petiolules narrow, *c.* 0.1 cm, pubescent. Stipules lanceolate, *c.* 2 × 1 mm, acute at apex, entire, sparsely pubescent out, deflexed. Flowers in axillary racemes; peduncles erect. 3–5 cm long, glabrous. Calyx campanulate, lobes obscure, sparsely pubescent out. Petals papilionaceous; standard petals obovate, *c.* 6 × 4 mm, slightly clefted at apex, entire, glabrous; wing petals falcate, *c.* 5 × 2 mm, entire, glabrous, clawed; keel petals oblong, *c.* 4 × 3 mm, boat-shaped, glabrous. Stamens monadelphous. Ovary densely hairy. Pods oblong.

Distribution: The native range of this subspecies is Tropical & Subtropical Asia to SW. Pacific (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests, also in the plains; *Fl* & *Ft.*: October-March. *Specimen examined*: Kuruthode, 09.10.1996, *Jomy Augustine* 16915 (CALI).

Aeschynomene L.

Sp. Pl. 2: 713. 1753

Aeschynomene indica L., Sp. Pl. 2: 713. 1753; Hook.f., Fl. Brit. India 2: 151. 1876; Gamble, Fl. Madras 1: 313. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 8. 2016.

Erect annual herbs. Stems glabrous, longitudinally, grooved. Leaves pinnate, alternate; leaflets 15–30 pairs, sub-sessile, elliptic-oblong, 0.25–0.7 × 0.1–0.2 cm, apiculate at apex, oblique at base, obtuse at apex, entire, glabrous; petioles 3–5 cm long, pulvinate at base, glabrous; petiolules very reduced. Stipules lanceolate, 5–10 × 3–6 mm, acuminate at apex, entire, glabrous. Flowers

solitary, axillary; pedicels 0.3–0.5 cm long, glabrous, slender. Bracts ovate, *c.* 3 × 1 mm, acuminate at apex, entire; bracteoles ovate, *c.* 2 × 1 mm, acuminate at apex, entire, glabrous. Calyx deeply 2-lipped, *c.* 4 × 2 mm, glabrous. Corolla exserted, pale yellow; standard petals orbicular, *c.* 5 × 3 mm, rounded-acute at apex, entire, red-striped; wing petals obovate, *c.* 4 × 2 mm, rounded at apex, entire, glabrous; keel petals oblong, *c.* 7 × 3 mm, entire. Staminal sheath *c.* 4 mm long. Ovary elliptic; styles *c.* 3 mm long. Pods linear, compressed, straight or curved. Seeds reniform, dark brown.

Distribution: Native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Moist deciduous forests and waterlogged areas in the plains; *Fl.* & *Ft.*: August-December.

Specimen examined: Pambavalley-PTR, 08.12.1996, *Jomy Augustine* 16981 (CALI).

Aganope Miq.

Fl. Ned. Ind. 1(1): 151. 1855.

Aganope thyrsiflora (Benth.) Polhill, Kew Bull. 25: 268. 1971; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 9. 2016. *Millettia thyrsiflora* Benth. in F.A.W.Miquel, Pl. Jungh. 249. 1852.

Derris eualata Bedd., Icon. Pl. Ind. Orient. 1: 42. 1874; Gamble, Fl. Madras 1: 388. 1918.

Derris platyptera Baker in Hook.f., Fl. Brit. India 2: 245. 1878.

Large woody climbing shrubs. Stems terete, smooth. Leaves pinnately compound, alternate; leaflets 7–9, elliptic-ovate, 4–10 × 2.5–4 cm, acuminate at apex, rounded at base, entire, glabrous. Flowers in axillary and terminal large panicle of racemes; peduncles 10–20 cm long, slender, densely pubescent; pedicels 0.5–1 cm long, slender, densely pubescent. Calyx campanulate, lobes obscure, entire, densely pubescent without. Corolla white, 5-7 mm long; standard petals orbicular, 5–7 × *c.* 3 mm, rounded-acute at apex, entire; wing petals obovate, *c.* 6 × 2 mm, rounded at apex, entire, glabrous; keel petals oblong, *c.* 7 × 3 mm, entire. Staminal sheath 5–6 mm long, united half-way. Ovary 5–6 mm long, laterally compressed, densely hairy, winged. Seeds 1–3, compressed.

Distribution: The native range of this species is India to S. China and New Guinea (POWO, 2023); *Habitat*: Semi-evergreen forests, also in the plains; *Fl.* & *Ft.*: February-August.

Specimen examined: Calvary mount, 21.02.1983, *C.N. Mohanan* 77907 (MH).

Alysicarpus Neck. ex Desv.

J. Bot. Agric. 1(2): 120. 1813, *nom. cons.*

Key to the species

1. Joints of pod moniliform……*A. bupleurifolius*

1. Joints of pod cylindric ……*A. heterophyllus*

Alysicarpus bupleurifolius (L.) DC., Prodr. 2: 352. 1825; Hook.f., Fl. Brit. India 2: 158. 1876; Gamble, Fl. Madras 1: 338. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 11. 2016. *Hedysarum bupleurifolium* L., Sp. Pl. 745. 1753.

Perennial herbs, up to 40 cm tall. Stems erect or diffuse, branched, glabrous. Leaves simple, alternate; lamia elliptic-lanceolate, 3–4 × 0.5–1 cm, acute at apex, rounded at base, entire, sparsely pubescent below, glabrous above; petioles stout, *c.* 0.2 cm long, glabrous. Stipules lanceolate, *c.* 0.3 × 0.1 cm, acuminate at apex, entire, glabrous. Flowers in terminal racemes; peduncles 3–5 cm long, narrow, slender; pedicels 3−5 mm long. Bracts ovate, *c.* 5 × 3 mm, rounded at apex, entire, glabrous. Calyx lobes lanceolate, *c.* 2 mm long, acuminate at apex, entire, glumaceous, nerves perfoliating from base. Corolla pale yellow with red; standard petals obovate, *c.* 5 × 3 mm, rounded at apex, entire, glabrous; wing petals elliptic, *c.* 5 mm long, rounded at apex, glabrous; keel petals falcate. Staminal sheath *c.* 3 mm long. Pods brown at maturity, 3–6-jointed, moniliform, glabrous.

Distribution: The native range of this species is China (SW. Guangxi, S. Yunnan) to Queensland (POWO, 2023); *Habitat*: Grasslands; *Fl.* & *Ft.*: August-January.

Specimens examined: Chinnar, 02.10.1996, *K.K. Sajeev* 17434 (KFRI); Nagaram para, 05.09.2017, *Vishnu Mohan & Santhosh Nampy* 176114 (CALI).

Alysicarpus heterophyllus (Baker) Jafri & Ali, Biologia (Lahore) 12: 33. 1966; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 12. 2016. *Alysicarpus vaginalis* (L.) DC. var. *heterophyllus* Baker in Hook.f., Fl. Brit. India 2: 158. 1876.

Prostrate creeping herbs. Stems slender, erect, glabrous. Leaves simple, alternate; lamina elliptic-oblong, 2.5–4 × 0.5–0.8 cm, acute at apex, rounded at base, entire, hispid below, glabrous above; petioles stout, *c.* 0.2 cm long, glabrous. Stipules lanceolate, *c.* 0.4 × 0.2 cm, acuminate at apex, entire, glabrous, membraneous, straw-colored. Flowers in terminal racemes; peduncles 2–5 cm long, glabrous; pedicels *c.* 0.2 cm long, stout, glabrous. Bracts ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Calyx campanulate; lobes lanceolate *c.* 3 × 1 mm, acuminate at apex, entire, glabrous, strongly ciliate at apex, glumaceous, nerves perfoliating from base. Petals cream-maroon colored; standard petals widely elliptic, *c.* 4 × 2 mm, rounded at apex, entire, glabrous; wing petals falcate. Staminal sheath *c.* 3 mm long. Ovary linear; styles *c.* 2 mm, glabrous; stigmas globose. Pods cylindric.

Distribution: The native range of this species is E. Arabian Peninsula and Indian Subcontinent (POWO, 2023); *Habitat***:** Grasslands; *Fl.* & *Ft.***:** October-January.

Specimens examined: Kattappana, 04.08.2018, *Vishnu Mohan & Santhosh Nampy* 176418; Mangaladevi, 11.08.1993, *Jomy Augustine* 12686 (CALI)

Butea Roxb. ex Willd.

Sp. Pl. ed., 4. 3: 917. 1802, *nom. cons.*

Butea monosperma (Lam.) Kuntze, Revis. Gen. Pl. 1: 202. 1891; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 16. 2016; Sunil, Fl. Pl. Diver. Ernakulam Dist. 122. 2016. *Erythrina monosperma* Lam., Encycl. 1: 391. 1785. *Butea frondosa* Koenig ex Roxb., Asiat. Res. 3: 369. 1792 & Pl. Coromandel 1(1): 21. 1795; Hook.f., Fl. Brit. India 2: 194. 1876; Gamble, Fl. Madras 1: 357. 1918.

Trees, up to 10 m tall. Bark greyish black. Leaves trifoliate, alternate; leaflets unequal, thickly leathery, rough; terminal leaflet broadly obovate, 8–12 × 7–

11 cm, rounded at apex, broadly cuneate at base; lateral leaflets narrowly ovate, 7–11 × 6–10 cm, obtuse at apex, rounded at base; petioles *c.* 10 cm, glabrous; petiolules *c.* 0.8 cm, robust. Stipels subulate, *c.* 1.5 × 1 mm, ovate, acute at apex, entire. Flowers in terminal or axillary panicles; peduncles up to *c.* 5 cm long, woody; pedicels 0.5–1 cm long, pubescent. Calyx campanulate; lobes small, ovate, *c.* 4 × 3 mm, densely silvery gray on both surfaces. Corolla yellow-scaret; standard petal narrowly ovate, recurved, 4–4.5 × *c.* 2.5 cm, acute at apex, entire, pubescent out, glabrous within; wing petals narrowly falcate, *c.* 40 × 20 mm, acuminate at apex, entire, pubescent out, glabrous within; keel petals broadly falcate, 50–55 × *c.* 30 mm, densely silvery grey velutinous. Anthers oblong. Ovary densely velutinous. Legumes adpressed silvery grey puberulent. Seeds reddish brown, broadly reniform.

Distribution: The native range of this species is Indian Subcontinent to China (SW. Guangxi, Yunnan) and Indo-China (POWO, 2023); *Habitat*: Dry and moist deciduous forests, also grown in the plains; *Fl.* & *Ft.*: March-July.

Specimen examined: Chottuppara, 25.07.2017, *Vishnu Mohan & Santhosh Nampy* 176324 (CALI).

Cajanus Adans.

Fam. Pl. 2: 326, 529. 1763, *nom. cons.*

Key to the species

1. Erect shrubs……*C. lineatus*

1. Climbers……..……2

2. Leaves densly brown tomentose……*C. rugosus*

2. Leaves sparsely pubescent……..……*C. scarabaeoides*

Cajanus lineatus (Wight & Arn.) Maesen, Agric. Univ. Wageningen Pap. 85(4): 143. 1986; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 20. 2016. *Atylosia lineata* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 258. 1834; Hook.f., Fl. Brit. India 2: 213. 1876; Gamble, Fl. Madras 1: 368. 1918.



Erect shrubs, up to 1 m tall. Stems terete, silky tomentose. Leaves 3-foliate, alternate; leaflets lanceolate-elliptic, 3–4 × *c.* 1.5 cm, mucronate at apex, acute at base, entire, grey tomentose below, glabrous above; petioles *c.* 1.5 cm long, pulvinate at base, glabrous. Flowers in axillary pairs; peduncles erect, straight, pubescent; pedicels up to 1 cm long, glabrous. Bracts ovate, *c.* 4 × 2 mm, acute at apex, entire, pubescent out, glabrous within. Calyx campanulate; lobes deltoid, *c.* 5 × 3 mm, acuminate at apex, entire, pubescent out, glabrous within. Petals yellow; standard petal obovate, *c.* 15 × 8 mm, acute at apex, entire, glabrous; wing petals elliptic, *c.* 13 × 4 mm, rounded at apex, entire, glabrous; keel petal cymbiform. Ovary densely villous; styles *c.* 4 mm; stigmas sticky, capitate. Pods densely hairy. Seeds 3.

Distribution: The native range of this species is W. & SW. India, Sri Lanka, E. Myanmar (POWO, 2023); *Habitat*: Grasslands; *Fl.* & *Ft.*: June-January.

Specimens examined: Kuttikkanam, 21.01.1998, *P. Bragvavan* 22902 (MH); way to Anamudi, 10.12.2019, *Vishnu Mohan & Santhosh Nampy* 164676; Munnar, 08.01.1989, *Beena.T.Cheriyan* 2716 (CALI).

Cajanus rugosus (Wight & Arn.) Maesen, Agric. Univ. Wageningen Pap. 85(4): 179. 1985; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 21. 2016. *Atylosia rugosa* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 257. 1834; Hook.f., Fl. Brit. India 2: 215. 1876; Gamble, Fl. Madras 1: 369. 1918.

Climbing shrubs. Stems ridged, terete, thin, tomentose. Leaves 3-foliate, alternate; leaflets obovate, 2–3.5 × *c.* 3 cm, rounded at apex, acute at base, entire, densly brown tomentose; petioles 3–4 cm long, slender. Flowers in terminal to axillary racemes; peduncles 5–8 cm long, thin, wiry; pedicels *c.* 0.5

cm long, glabrous. Calyx campanulate; lobes ovate, *c.* 7 × 3 mm, acute at apex, entire, densely hairy out, glabrous within. Petals yellow; standard petals obovate, *c.* 10 × 8 mm, retuse at apex, auricled at base, entire; wing petals elliptic, *c.* 8 × 3 mm, rounded at apex, entire, glabrous; keel petals falcate, *c.* 9 × 4 mm. Staminal sheath *c.* 10 mm long. Ovary spindle shaped; styles *c.* 4 mm long; stigmas capitate. Pods elliptic, flattened, hispid.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Grasslands; *Fl.* & *Ft.*: November-January.

Specimens examined: Choondal, Mathikettan Shola National Park, 21.11.2014, *Syam Radh S.* 143566; *Ibid*., 04.01.2017, *Vishnu Mohan & Santhosh Nampy* 151480; way to Karimutty, 29.12.2017, *Vishnu Mohan & Santhosh Nampy* 158018 (CALI).

Cajanus scarabaeoides (L.) Thouars in F.Cuvier, Dict. Sci. Nat. ed., 2. 6: 167. 1816; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 22. 2016. *Dolichos scarabaeoides* L., Sp. Pl. 726. 1753. *Atylosia scarabaeoides* (L.) Benth. in Miquel, Pl. Jungh. 242. 1852; Hook.f., Fl. Brit. India 2: 215. 1876; Gamble, Fl. Madras 1: 369. 1918.

Climbing shrubs. Stems slender, terete, pubescent. Leaves pinnately 3-foliate; leaflets obovate-elliptic to obovate, 0.8–4 × 0.6–1.5 cm, obtuse at apex, acute at base, entire, sparsely pubescent; petioles 1–2 cm long, pulvinate at base, glabrous; petiolules extremely short. Stipules ovate, *c.* 3 × 1 mm, acute at apex, hairy, usually deciduous. Flowers in axillary racemes; peduncles 0.5–1 cm long, villous; pedicels *c.* 0.3 cm long glabrous. Calyx campanulate, 5-lobed; lobes linear-lanceolate, *c.* 3 × 1.5 mm, acuminate at apex, entire. Petals yellow; standard petals obovate, *c.* 1 × 0.7 cm, acute-rounded at apex, entire, glabrous, clawed at base; wing petals narrowly elliptic, *c.* 9 × 3 mm, slightly curved, base auriculate; keel petals curved at apex, densely very pale brown villous. Staminal sheath *c.* 7 mm long. Ovules linear; styles *c.* 4 mm long; stigmas capitate. Pods oblong, leathery, densely villous.

Distribution: The native range of this species is Comoros, W. Madagascar, India to S. China and N. Australia (POWO, 2023); *Habitat***:** Moist deciduous forests, also in the plains; *Fl.* & *Ft.*: May-January.

Specimen examined: Neriyamangalam, 27.06.2018, *Vishnu Mohan & Santhosh Nampy* 176527 (CALI).

Centrosema (DC.) Benth.

Commentat. Legum. Gen. 53. 1837, *nom. cons.*

Centrosema molle Mart. ex Benth., Commentat. Legum. Gen. 55; 1837; E.Vajr. & K.A.A. Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 28. 2016.



Climbing shrubs. Stems wiry, terete, glabrous. Leaves alternate, 3-foliate; leaflets ovate, 3–6 × 2–4 cm, acute at apex, rounded at base, entire, sparsely pubescent; petioles 3–6 cm long, pulvinate at base, glabrous; petiolules *c.* 0.2 cm long, glabrous. Stipules persistent, ovate-lanceolate, *c.* 0.3 × 0.1 cm, acute at apex, entire, sticky. Flowers in axillary racemes. Peduncles *c.* 3 cm long, glabrous; pedicels *c.* 0.3 cm long, glabrous. Bracts connate, ovate-lanceolate, *c.* 4 × 2 mm, acute at apex, deciduous, sticky; bracteoles ovate *c.* 3 × 2 mm, acute at apex, sticky. Calyx campanulate, 2-lobed, tomentose. Petals lavender-white. Standard petals rounded-ovate, 15–20 × 12–16 mm, rounded at apex, entire, glabrous; wing petals falcate, *c.* 15 × 6 mm, rounded at apex, glabrous; keel petals falcate. Staminal sheath *c.* 15 mm long. Styles basally pubescent. Pods linear, compressed.

Distribution: The native range of this species is S. Mexico to Tropical America (POWO, 2023); *Habitat*: Forest plantations and deciduous forests, also in the plains; *Fl.* & *Ft.*: June-December.

Specimens examined: Kattadikkadavu, 24.07.2017, *Vishnu Mohan & Santhosh Nampy* 176325 (CALI); Yhannikkudy, 17.09.1993, *Jomy Augustine* 12401 (KFRI).

Crotalaria L.

Sp. Pl. 2: 714. 1753.

Key to the species

1. Leaves simple ……..……..……2
1. Leaves compound……...……23
2. Stipules decurrent as persistent wing to the branchlets……..3
2. Stipules not as above……...…4
3. Plants undershrubs; pods < 2.5 cm long……...……...*C. scabrella*
3. Plants shrubs; pods > 4 cm long……....*C. wightiana*
4. Racemes lateral, leaf opposed; flowers a few……...5
4. Racemes terminal; flowers many……...……9
5. Pods ovoid, much inflated……..……*C. kurisumalayana*
5. Pods oblong-orbicular, not much inflated……..……..6
6. Pods glabrous……..……..……*C. humifusa*
6. Pods hairy……....7
7. Stems 3–4-angled……..*C. triquetra*
7. Stems terete……..……8
8. Leaves orbicular-ovate, margin revolute; peduncles wiry……*C. fysonii*
8. Leaves elliptic, margin entire; peduncles sturdy……..*C. evolvuloides*
9. Plants glabrous throughout……..*C. peduncularis*
9. Plants variously hairy……10
10. Pods hairy……11
10. Pods glabrous……..16
11. Inflorescence a panicle……..*C. candicans*
11. Inflorescence a simple raceme……..……12
12. Stipules large, semi-lunar, transverse……...…13
12. Stipules small, linear-subulate, not transverse……...16
12. Corolla pale violet-white; branchtets angular……14
12. Corolla yellow, branchlets not angular……15
13. Leaves rhomboid, margin undulate; 10–15 seeds per pod……*C. verrucosa*
13. Leaves ovate-elliptic, margin entire……...*C. heyneana*
14. Standard petal silky pubescent out…….. *C. semperflorens*

14. Standard petal glabrous out ……..*C. walkeri*
15. Stems sulcate; pods white silky tomentose……*C. juncea*
15. Stems terete; pods dark brown velvety……...*C. obtecta*
16. Pods shorter or slightly exceeding the calyx……..…17
16. Pods 2 or many times longer than calyx……..……...20
17. Pods included or very slightly exerted from the calyx……..18
17. Pods much exerted from the calyx……19
18. Inflorescence umbels or heads……..……*C. nana*
18. Inflorescence lax racemes……..……*C. calycina*
19. Stipule present……..……*C. mysorensis*
19. Stipule absent……...….*C. albida*
20. Leaves glabrous above……..……21
20. Leaves sparsely pubescent-sericeous above……....*C. salicifolia*
21. Stems sulcate, puberulous……..……22
21. Stems terete, rustly tomentose……...*C. beddomiana*
22. Stipules and Bracts minute; pods oblong……*C. retusa*
22. Stipules and Bracts prominent; pods clavate……..*C. spectabilis*
23. Leaves 3-foliate……24
23. Leaves 5–7-foliate……..*C. grahamiana*
24. Pods oblong, many seeded……25
24. Pods globose-sub-globose, 1 or 2-seeded……..…*C. medicaginea*
25. Flowers 20–60, arranged closely on peduncles……..…*C. pallida*
25. Flowers 3–15, arranged laxly on peduncles……..……26
26. Seeds 30–40 in a pod, laterally compressed, black……..*C. incana*
26. Seeds 8–12 in a pod, swollen, pale brown……*C.micans*

Crotalaria albida B.Heyne ex Roth, Nov. Pl. Sp. 333. 1821; Hook.f., Fl. Brit. India 2: 71. 1876; Gamble, Fl. Madras 1: 295. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 36. 2016.

Short-lived or perennial, erect to ascending herbs. Stems sometimes branched above base, appressed pubescent to spreading pilose. Leaves simple, sub-sessile; lamina oblanceolate-elliptic, 1–2.5 × 0.4–1.2 cm, obtuse and mucronate at apex, cuneate at base, entire, abaxially strigose, adaxially glabrous; petioles

erect, glabrous. Stipules absent. Flowers in terminal racemes, rarely leaf-opposed; pedicels 0.3–0.5 cm long, sparsely pubescent. Bracts filiform, *c.* 1.5 × 1 mm; bracteoles inserted at base of calyx tube, similar to Bracts. Calyx bilipped, lanceolate, 4–8 × 2–5 mm, entire. Petals pale yellow; standard petals elliptic, 5–8 × 3–6 mm, base with appendages; wing petals oblong, 4–8.5 × 1.5–3 mm, truncate-rounded at apex, entire, glabrous; keel petals rounded, narrowed apically from middle and extended into a twisted beak. Stamens 9+1; staminal sheath 3–7 mm long, glabrous. Ovary sub-sessile, lanceolate; styles geniculate; stigmas capitate. Pods cylindric, *c.* 10 mm long, 6–12-seeded, glabrous.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Grasslands; *Fl.* & *Ft.*: December-February. *Specimens examined*: Koymanchola, 10.02.2021, *Vishnu Mohan & Santhosh Nampy* 188701; Kumarikulam, 16.12.1993, *Jomy Augustine* 13019 (CALI).

Crotalaria beddomeana Thoth. & A.A.Ansari, Bull. Bot. Surv. India 20: 180. 1978; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 39. 2016. *Crotalaria lanata* Bedd., Madras J. Lit. Sci., 2, 19: 178. 1858, *nom. illeg.*; Hook.f., Fl. Brit. India 2: 77. 1876; Gamble, Fl. Madras 1: 297. 1918.

Shrubs. Stems terete, rustly tomentose. Leaves elliptic-oblong, 8–13 × 4–6.5 cm, obtuse–apiculate at apex, obtuse at base, entire, pubescent below, membranous; petioles *c.* 2 cm long, thick. Stipules semi-lunate, *c.* 1 cm long, acuminate at apex, entire, pubescent. Flowers in terminal racemes; peduncles up to 15 cm long; pedicels *c.* 0.1 cm long, glabrous. Bracts ovate, *c.* 1 cm, acuminate at apex, entire, tomentose; bracteoles ovate, *c.* 2.5 × 1 mm. Calyx tube *c.* 4 mm long, villous; lobes *c.* 10 mm long, lanceolate. Petals pale yellow; standard petals obovate, 10–20 × 7.5–10 mm, rounded at apex, entire, glabrous; wing petals elliptic, 9–17 × 3–5 mm, truncate at apex, entire, glabrous; keel petals rounded, narrowed apically from middle and extended. Stamens 9+1; staminal sheath 7–17 mm long, glabrous. Ovary sub-sessile, lanceolate; styles geniculate; stigmas capitate. Pods glabrous, oblong, *c.* 70 × 20 mm. Seeds many, reniform, black, shining.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat***:** Montane scrub jungles; *Fl.* & *Ft.*: December-April.

Specimens examined: Chottuppara, 23.02.2018, *Vishnu Mohan & Santhosh Nampy* 176526; Munnar- Marayoor road, 01.12.1998, *Sibichen M. Thomas* 612 (CALI).

Crotalaria calycina Schrank, Pl. Rar. Hort. Monac. t. 12. 1817; Hook.f., Fl. Brit. India 2: 72. 1876; Gamble, Fl. Madras 1: 295. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 41. 2016.

Herbs, annual or short-lived perennials. Branches terete, densely coarsely pilose. Stipules filiform, lanceolate, *c.* 1 mm long, acuminate at apex, caducous. Leaves simple, sub-sessile; lamina linear-lanceolate, 5–12 × 1–1.5 cm, acute at apex, narrow at base, entire, abaxially densely brownish pilose, adaxially pilose on midvein. Flowers in lax racemes; peduncles 5–8 cm long, pubescent; pedicels 0.2–0.4 cm, thick. Bracts lanceolate, *c.* 20 × 10 mm, acuminate at apex; bracteoles inserted at base of calyx tube, similar to Bracts. Calyx bilipped; lobes lanceolate, 20–30 mm long, parted to base, abaxially brownish pilose. Corolla yellow; standard petals obovate-sub-orbicular, 15–25 × 1–2 mm, rounded-acute at apex, base with 2 appendages, entire, apically pubescent; wing petals narrowly elliptic, 15–25 × 5–10 mm, rounded at apex, entire, glabrous; keel petals with a long straight shortly twisted beak. Stamens 9 + 1; staminal sheath 12–22 mm long, glabrous. Ovary sub-sessile, lanceolate; styles geniculate; stigmas capitate. Pods black when mature, sub-cylindric.

Distribution: The native range of this species is Tropical Africa, Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat*: Grasslands; *Fl.* & *Ft.*: August-March.

Specimens examined: Choondal, MSNP 21.11.2014, *Syam Radh S.* 143570; Irumbupalam, 28.12.2017, *Vishnu Mohan & Santhosh Nampy* 156553; Kumarikulam, 05.03.2021, *Vishnu Mohan & Santhosh Nampy* 186613; Mangaladevi, 10.09.1994, *Jomy Augustine* 14191 (CALI).

Crotalaria candicans Wight & Arn., Prodr. Fl. Ind. Orient. 1: 184. 1834; Gamble, Fl. Madras 1: 298. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 42. 2016. *Crotalaria madurensis sensu* Baker in Hook.f.,

Fl. Brit. India 2: 79. 1876 p.p., non Wight & Arn. 1834.



Shrubs. Stems terete, erect, golden tomentose. Leaves simple, alternate; lamina oblanceolate, 4–6.5 × 1.5–4 cm, obtusely acute at apex, cuneate at base, entire, densely tomentose; petioles 0.2–0.5 cm long, thick, pubescent. Flowers in terminal panicles; peduncles up to 15 cm long; pedicels 10–15 cm long, terete. Bracts and bracteoles orbicular, *c.* 10 × 7.5 mm, rounded at apex, entire, tomentose. Calyx tube *c.* 3 mm long; lobes lanceolate, *c.* 9 × 3 mm, acuminate at apex, tomentose. Petals 5; standard petals orbicular, *c.* 15 × 12 mm, rounded at apex, entire, glabrous; wing petals ovate, *c.* 1 × 0.5 cm, rounded at apex; keel petals *c.* 20 × 10 mm, not twisted. Staminal sheath5–10 mm long. Ovary *c.* 3 mm long, densely tomentose; styles *c.* 1.2 cm long, pubescent. Pods oblong, sessile, golden tomentose Seeds 10–12.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Grasslands; *Fl.* & *Ft.*: November-April.

Specimens examined: Choondal, MSNP, 23.11.2014, *Syam Radh S.* 137868; Eravikulam, 16.12.2018, *Vishnu Mohan & Santhosh Nampy* 176113; Munnar, 20.11.2018, *Vishnu Mohan & Santhosh Nampy* 16770 (CALI).

Crotalaria evolvuloides Wight in Wight & Arn., Prodr. Fl. Ind. Orient. 1: 188. 1834; Hook.f., Fl. Brit. India 2: 68. 1876; Gamble, Fl. Madras 1: 292. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 44. 2016.

Perennial prostrate herbs. Stems much branched, slender, terete, hispid. Leaves simple, alternate; lamina elliptic, 1.5–3 × 1–2 cm, acute-rounded at apex, obtuse and oblique at base, entire, glabrescent above, pubescent beneath; petioles 0.1–0.2 cm long, pubescent. Stipules lanceolate or linear-lanceolate, 1.5–2 × *c.* 1 mm, acuminate at apex, sparingly pubescent, deflexed. Racemes leaf-opposed or terminal racemes; peduncles 4–10 cm long, pubescent, stout; pedicels 0.2–0.4 cm long, stout, pubescent. Bracts ovate-

lanceolate, *c.* 3 × 1 mm, acuminate at apex, entire; bracteoles 2, linear-lanceolate, *c.* 1 × 0.5 mm, acute at apex, entire. Calyx deeply 5-lobed; lobes equal, lanceolate, 4.5–6.0 × *c.* 1 mm, acuminate at apex, entire, villous. Petals yellow; standard petals obovate-oblong, 6–8 × 3–8 mm, rounded at apex, entire, glabrous; wing petals obovate-oblong, 5–7 × 2.0–2.5 mm, truncate at apex, entire, glabrous; keel petals falcate, 6–7.5 × *c.* 5 mm, twisted beak. Staminal sheath *c.* 5 mm long. Ovary oblong, 4–5 mm long, narrowed upward, densely hirsute on one side; styles *c.* 5.5 mm long, villous; stigmas globose. Pods sessile oblong. Seeds reniform, black.

Distribution: The native range of this species is India, Sri Lanka and Indo-China (POWO, 2023); *Habitat*: Moist deciduous forests, often in grassy patches; *Fl.* & *Ft.*: October-February.

Specimens examined: Chinnar, 08.01.1995, *K.K. Sajeev* 11720 (KFRI); Elaveezhapoonchira, 26.10.2020, *Vishnu Mohan & Santhosh Nampy* 170079 (CALI).

Crotalaria fysonii Dunn, Bull. Misc. Inform. Kew 1914: 26. 1914; Gamble, Fl. Madras 1: 292. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 47. 2016.



Perennial prostrate herbs. Stems terete, slightly ridged, softly hirsute. Leaves simple, alternate; lamina orbicular-ovate, 1–3 × 1–2 cm, rounded-retuse at apex, obtuse at base, revelute, ciliate, hirsute; petioles 0.1–0.2 cm long, hirsute. Stipules linear, 1–2 mm long. Flowers in terminal racemes; peduncles 3.5–12 cm long, wiry, hirsute; pedicels 0.4–0.7 cm long, hirsute. Bracts ovate or ovate-lanceolate, 2.5–5 mm long, acute at apex, margins hirsute; bracteoles ovate, 2–3 × *c.* 1 mm, entire, hirsute. Calyx 5-lobed with a short tube; lobes equal, lanceolate, *c.* 10 × 2 mm, acuminate at apex, densely hirsute. Petals

bright yellow; standard petals orbicular, 15–20 × 16–20 mm, acute at apex, entire, often reflexed with a short claw; wing petals oblong, 15–20 × 5–7 mm, obtuse at apex; keel petals falcate, ovate, 10–13 × 7–11 mm, beak narrow, twisted, short, ciliate. Staminal sheath *c.* 8 mm long; anthers dimorphic. Ovary oblong, *c.* 7 mm long; styles *c.* 8 mm long, geniculate; stigmas globose. Pods obovate-oblong, densely hirsute. Seeds reniform.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat***:** Grasslands; *Fl.* & *Ft.*: September-March.

Specimens examined: Adimali to Munnar road, 01.03.2022, *Gayathri. M* 185223; Aduvizhunthankudi, MSNP, 22.11.2014, *Syam Radh S.* 143597; Devikulam, 07.02.2017, *Vishnu Mohan & Santhosh Nampy* 151650; Eravikulam, 29.09.2017, *Vishnu Mohan & Santhosh Nampy* 156317; Kalvari Mount, 06.09.2017, *Vishnu Mohan & Santhosh Nampy* 154360; Pachakkad, Silent Valley, 15.12.2012, *Manudev K.M.* 4372; Ramakalmedu, 07.09.2017, *Vishnu Mohan & Santhosh Nampy* 152940; Silent valley, way to Meesapulimala, 16.12.2012, *Manudev K.M. & Robi* 4389 (CALI).

Crotalaria grahamiana Wight & Arn., Prodr. Fl. Ind. Orient. 1: 194. 1834; Hook.f., Fl. Brit. India 2: 85. 1876; Gamble, Fl. Madras 1: 301. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 48. 2016.



Stout sub-shrubs, up to 1 m tall. Stems terete, villous. Leaves palmately compound, alternate; leaflets 5–7, oblanceolate, 5–8 × 1.5–2.5 cm, rounded at apex, acuminate at base, glabrous above, pubescent below; petioles 5–10 cm long, pubescent. Flowers in terminal racemes; peduncles 10–15 cm long, erect, terete, pubescent; pedicels 0.5–1 cm long, glabrous, terete. Bracts lanceolate, 10–15 × *c.* 2 mm, acuminate at apex, rounded at base, entire, pubescent. Calyx

lobed; lobes equal, ovate, *c.* 3 mm long, acute at apex, entire, glabrous. Petals yellow; standard petals obovate, 15–25 × 20–23 mm, rounded at apex, entire, glabrous; wing petals elliptic, 20–24 × 8–16 mm, truncate-rounded at apex, entire, verrucose; keel petals falcate, densely hairy along margins. Staminal sheath *c.* 20 mm long. Styles *c.* 8 mm long; stigmas capitate. Pods glabrous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Grasslands and montane scrub jungles; *Fl.* & *Ft.*: November-September.

Specimens examined: Anayiragal dam, 05.01.2017, *Vishnu Mohan & Santhosh Nampy* 151548; Choondal, MSNP, 22.11.2014, *Syam Radh S.* 143590Parunthanpara, 29.04.2018, *Vishnu Mohan & Santhosh Nampy* 159240; Ramakalmedu, 07.09.2017, *Vishnu Mohan & Santhosh Nampy* 152964; Vattachola, 05.11.2015, *Syam Radh* S 145101 (CALI).

Crotalaria heyneana Graham ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 187. 1834; Hook.f., Fl. Brit. India 2: 78. 1876; Gamble, Fl. Madras 1: 297. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 49. 2016.

Erect shrubs, up to 1 m tall. Stems angled, villous. Leaves simple, alternate; lamina ovate-elliptic, 6–9 × 4–7 cm, acute at apex, cuneate at base, entire, minutely hairy below, glabrous above; petioles erect, *c.* 0.5 cm long, terete, hispid. Stipules semi-lunar, *c.* 0.7 cm broad, glabrous above, pubescent beneath. Flowers in terminal racemes; peduncles 7–10 cm long, erect, narrow, pubescent; petioles *c.* 0.5 cm long, glabrous. Bracts ovate, *c.* 3 × 2 mm, acute at apex, deflexed. Calyx lobed; lobes ovate, *c.* 8 × 4 mm, acuminate at apex, entire, pubescent. Petals white or bluish white; standard petals orbicular-ovate, 8–12 × 6–8 mm, rounded-acute at apex, entire, glabrous; wing petals elliptic, *c.* 10 × 6 mm, truncate at apex, entire, glabrous; keel petals falcate, glabrous. Staminal sheath *c.* 10 mm long. Styles *c.* 5 mm long; stigmas globose. Pods minutely hispid, clawed.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests, also in the plains; *Fl.* & *Ft.*: June-December.

Specimens examined: Idukki, 08.07.2019, *Vishnu Mohan & Santhosh Nampy* 176082 (CALI); Pooyamkutty, 13.12.1988, *P. Bhargavan* 87498 (MH).

Crotalaria humifusa Graham ex Benth., London J. Bot. 2: 476. 1843; Hook.f., Fl. Brit. India 2: 67. 1876; Gamble, Fl. Madras 1: 292. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 51. 2016.

Perennial prostrate herbs, up to 20 cm tall. Stems terete, densely pubescent. Leaves simple alternate; lamina broadly elliptic-ovate, 1.5–3.5 × 1–2 cm, rounded-acute at apex, entire, silky pilose; petioles 0.2–0.5 cm long, pubescent. Stipules linear, *c.* 0.4 × 0.15 cm, acuminate at apex, entire. Flowers in leaf-opposed racemes; peduncles 3–5 cm long, erect; pedicels up to *c.* 0.4 cm, glabrous, terete. Bracts and bracteoles linear, *c.* 1.5 mm long, glabrous. Calyx deeply lobed; lobes linear-lanceolate, falcate, 2–3.5 mm, attenuate at apex. Petals yellow; standard petals oblong-orbicular, 5.5–6.5 × *c.* 4 mm, rounded at apex, entire; wing petals elliptic, *c.* 5 × 3 mm, rounded at apex; keel petals falcate, with a slightly twisted beak. Staminal sheath *c.* 5 mm long. Ovary cylindric; styles *c.* 3 mm long; stigmas capitate. Pods cylindric-ovoid, glabrous. Seeds very pale brown.

Distribution: The native range of this species is Himalaya to N. Australia (POWO, 2023); *Habitat*: Grasslands and deciduous forests; *Fl.* & *Ft.*: October-May.

Specimen examined: Vallakkadavu, 03.12.1993, *Jomy Augustine* 12726 (CALI).

Crotalaria juncea L., Sp. Pl. 2: 714. 1753; Hook.f., Fl. Brit. India 2: 79. 1876; Gamble, Fl. Madras 1: 297. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 53. 2016.

Erect herbs, up to 50 cm tall. Stems sulcate, terete, ribbed, appressed silky pubescent. Leaves simple; lamina linear-lanceolate, 6–10 × *c.* 0.5 cm, rounded at apex and base, entire, both surfaces pilose; petioles 0.3–0.5 cm, glabrous. Stipules linear, *c.* 2 × 1 mm, acuminate at apex, caducous. Flowers in terminal racemes; peduncles 5–10 cm long, erect, terete; pedicels 0.5–0.8 cm long. Bracts linear, 3–4 × *c.* 2 mm, acuminate at apex; bracteoles inserted at base of

calyx tube, shorter than Bracts, densely pubescent. Calyx lobes lanceolate, curved, pilose, lanceolate, *c.* 6 × 3 mm, acuminate at apex, entire. Corolla yellow; standard petals oblong, 15–25 × 10–14 mm, rounded at apex, entire, base with 2 appendages; wing petals obovate-oblong, 15–17 × 7–9 mm, truncate at apex, entire, glabrous; keel petals falcate, slightly longer than wings, apex with a long slightly incurved twisted beak. Staminal sheath *c.* 20 mm long, thin. Styles *c.* 5 mm long, erect; stigmas capitate, sticky. Pods sub-sessile, white silky tomentose, cylindric.



Distribution: The native range of this species is Afghanistan to Indo-China (POWO, 2023); *Habitat***:** Dry deciduous forests, also grown as green manure in the plains; *Fl.* & *Ft.*: July-February.

Specimens examined: Choondal, Mathikettas Shola National Park, 29.12.2014, *Syam Radh S.* 137921; way to Munnar, 23.01.2018, *Vishnu Mohan & Santhosh Nampy* 158103; Munnar, 08.02.2018, *Vishnu Mohan & Santhosh Nampy* 151665; near Subran shed, Pettimudi, 30.12.2019, *Vishnu Mohan & Santhosh Nampy* 170051 (CALI).

Crotalaria kurisumalayana Sibichen & Nampy, Candollea 62: 106. 2007; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 53. 2016. *Crotalaria multiflora* var. *kurisumalayana* (Sibichen & Nampy) Krishnaraj & N.Mohanan Phytotaxa 44: 60. 2012.

Prostrate herbs. Stems terete, strigose. Leaves simple, alternate; lamina ovate, 2–2.5 × *c.* 2 cm, rounded at apex and base, entire and incurved, glabrous above and puberulous beneath; petioles 0.1–0.2 cm long. Stipules lanceolate, 0.1–0.2 cm long, deflexed. Flowers in terminal and leaf opposed racemes; peduncles 5–10 cm long, terete, pubescent; pedicels *c.* 0.4 cm long, terete. Bracts ovate, *c.* 4 × 2 mm, acute at apex, entire; bracteoles subulate, *c.* 2 × 1

mm, inserted near middle of pedicels. Calyx 5-lobed; lobes lanceolate, *c.* 17 × 5 mm, puberulous out, glabrous in. Petals yellow; standard petals orbicular, 20–25 × 17–20 cm, retuse at apex, entire, glabrous; wing petals obovate, 17–19 × 7–9 mm, rounded at apex, attenuate at base; keel petals falcate, beak twisted. Staminal sheath *c.* 5 mm long, glabrous. Ovary thinly puberulous; styles *c.* 12 mm long, falcate; stigmas narrow. Pods ovoid, much inflated.

Distribution: The native range of this variety is India (Kerala) (POWO, 2023); *Habitat*: Grasslands; *Fl.* & *Ft.*: September-May.

Specimens examined: Mesthirikettu peak, 30.12.2017, *Vishnu Mohan & Santhosh Nampy* 158063 (CALI); Vallakkadavu, 13.01.1983, *K.Vivekananthan* 46648 (MH).

Crotalaria medicaginea Lam., Encycl. 2: 201. 1786; Hook.f., Fl. Brit. India 2: 81. 1876; Gamble, Fl. Madras 1: 299. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 58. 2016.



Erect shrubs, up to 1 m tall. Stems slender, branched, appressed silky pubescent. Leaves 3-foliate, alternate; leaflets oblanceolate, 1.5–3 × 0.5–1 cm, obtuse at apex, cuneate at base, entire, densely silky pubescent below, glabrous above; petioles erect, narrow, slender, 0.5–2 cm, glabrous; petiolules erect, slender, *c.* 1 mm long, glabrous. Stipules filiform, lanceolate, *c.* 0.25 × 0.1 cm, acuminate at apex, entire, glabrous. Flowers in terminal or leaf-opposed racemes; peduncles erect, narrow, *c.* 5 cm long; pedicels slender, *c.* 0.3 cm long. Bracts lanceolate, *c.* 2 × 1 mm, acuminate at apex, entire, glabrous. Calyx campanulate; lobes 5, broadly lanceolate, *c.* 5 mm long, acuminate at apex, entire, glabrous. Corolla yellow; standard petals ovate-oblong, 7–15 × 5–8 mm, rounded at apex, base with 2 appendages, glabrous; wing petals oblong-obovate, 7–15 × 2–4 mm, glabrous; keel petals *c.* 5 mm long, falcate, beak long

and twisted. Ovary sessile; styles *c.* 4 mm long; stigmas capitate. Pods globose-sub-globose, pubescent, 1 or 2-seeded, apex shortly beaked.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. & NE. Australia (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl.* & *Ft.*: August-March.

Specimens examined: Chinnar Wildlife Sanctuary, 14.12.2001, *M.K. Nazeedha* 73647; above Valara waterfalls, 27.12.2017, *Vishnu Mohan & Santhosh Nampy* 156537 (CALI).

Crotalaria micans Link, Enum. Hort. Berol. Alt. 2: 228. 1822; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 59. 2016.



Erect shrublets, up to 2 m tall. Stems terete, thick, densely rusty appressed pubescent. Leaves 3-foliate; leaflets elliptic, 5–6 × 2–3 cm, acuminate at apex and base, entire, glabrous; petioles 3–4 cm long, slender, glabrous; petiolules *c.* 0.2 cm long, narrow. Stipules acicular, very minute, persistent. Flowers in terminal racemes; peduncles up to 10 cm long, terete, pubescent; pedicels *c.* 0.5 cm long, narrow. Bracts linear, 0.7–1 cm long, acuminate at apex, entire, glabrous, caducous; bracteoles linear, *c.* 5 mm long, acuminate at apex, entire, glabrous, caducous. Calyx campanulate, 5-lobed; lobes broadly lanceolate, *c.* 6 × 3 mm, acuminate at apex, densely rusty silky pilose. Petals yellow; standard petals orbicular, 15–20 × 14–16 mm, acute at apex, entire; wings petals oblong, 13–18 × 6–7 mm, truncate-rounded at apex; keel petals falcate, beak slightly incurved. Staminal sheath 15–17 mm long, thin. Styles *c.* 4 mm long; stigmas capitate, sticky. Pods oblong, densely pilose when young, 8−12 seeded, swollen, pale brown.

Distribution: The native range of this species is Mexico to Tropical America (POWO, 2023); *Habitat*: Along roadsides in the high ranges; *Fl.* & *Ft.*: December-May.

Specimens examined: Anayiragal dam, 05.01.2017, *Vishnu Mohan & Santhosh Nampy* 151544; Anchuruli, 07.09.2017, *Vishnu Mohan & Santhosh Nampy* 152908; Udumpanchola - Munnar Road, 25.12.2001, *Sibichen M. Thomas* 676; Vellappara, 05.08.2017, *Vishnu Mohan & Santhosh Nampy* 154167 (CALI).

Crotalaria mysorensis Roth, Nov. Pl. Sp. 338. 1821; Hook.f., Fl. Brit. India 2: 70. 1876; Gamble, Fl. Madras 1: 295. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 61. 2016.

Erect herbs, up to 50 cm tall. Stems terete, densely rusty spreading pilose. Leaves simple, nearly sessile, alternate; lamina lanceolate-broadly lanceolate, 5–7(–8) × 0.5–1.5 cm, both surfaces sparsely pilose, base cuneate, apex obtuse. Stipules broadly lanceolate, 1–3 × 0.3–0.5 cm. Racemes terminal, 6–9-flowered; Bracts lanceolate, 5–8 mm. Pedicels 0.2–0.3 cm. Bracteoles inserted at base of calyx tube, similar to Bracts, 6–10 mm long. Calyx 2-lipped, 0.8–1.5 cm, parted to base. Corolla yellow; standard petals narrowly elliptic, 12–15 × 9–12 mm, basally with 2 appendages, apical half pilose; wing petals lanceolate-oblong, 12–14 × 4–5 mm; keel petals slightly longer than wings, narrowed apically from middle and extended into a long sub-erect twisted beak. Pods broadly oblong, 2–3 × 1.2–1.5 mm, 20–30-seeded.

Distribution: The native range of this species is Indian Subcontinent to China (Guangdong) and NW. Australia (POWO, 2023); *Habitat*: Moist deciduous forests and scrub jungles, mostly in the plains; *Fl.* & *Ft.*: September-December.

Specimen examined: Karimutty, 19.11.2018, *Vishnu Mohan & Santhosh Nampy* 156693 (CALI).

Crotalaria nana Burm.f., Fl. Indica 156. 1768; Hook.f., Fl. Brit. India 2: 71. 1876; Gamble, Fl. Madras 1: 294. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 62. 2016.

Erect or diffuse pubescent herbs, up to 20 cm tall. Stems slender erect, pubescent. Leaves simple, alternate, sub-sessile; lamina elliptic, 1–2 × 0.5–1 cm, rounded at apex, cuneate at base, entire, sparsely villous above and densely villous below; petioles erect, slender, narrow. Stipules minute, lanceolate, acuminate at apex, entire, glabrous. Flowers in terminal or leaf-opposed, umbels or heads; peduncles *c.* 4 cm long, erect, slender; pedicels *c.* 0.5 cm long, glabrous. Bracts ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous; bracteoles minute, filiform. Calyx densely villous, lobed; upper 2 lobes connate near the tip; lower lobes ovate-acute. Petals yellow; standard petals oblong, 4–6 × 2–5 mm, acute at apex, entire, glabrous; wing petals elliptic, 3–5 × 1.5–2 mm, rounded at apex, entire, glabrous; keel petals falcate, *c.* 3 mm long. Staminal sheath *c.* 3 mm long, delicate. Ovary *c.* 1.5 mm long; styles *c.* 2 mm long; stigmas globose. Pods globose-ovoid, black when mature. Seeds 6–12, sub-reniform.

Distribution: Indian Subcontinent to Hainan and Jawa, N. Australia (POWO, 2023); *Habitat*: Grasslands and waste places; *Fl.* & *Ft.*: September-December.

Specimens examined: Choondal, MSNP, 04.11.2015, *Syam Radh S.* 145087; Kudimala–Lakkamkudi, 09.12.2019, *Vishnu Mohan & Santhosh Nampy* 164699; Kulamavu, 07.06.1984, *C.N. Mohanan* 82019; Marayur - Munnar Road, 07.12.2016, *Neethu M.* 193322 (CALI); Painavu, 08.11.1981, *V.S. Ramachandran* 71214 (MH); Vattappara, 30.12.2014, *Syam Radh S.* 137940 (CALI).

Crotalaria obtecta Graham ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 185. 1834; Gamble, Fl. Madras 1: 297. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 64. 2016.

Erect shrubs, up to 2 m tall. Stems terete, pilose, erect, slender. Leaves simple, alternate; lamina ovate 6–7.5 × 2–3.5 cm, obtuse at apex, acute at base, entire and incurved, golden brown hairy below; petioles *c.* 0.5 cm long, slender. Stipules filiform, lanceolate, *c.* 0.3 × 0.1 cm, acuminate at apex, entire. Flowers in terminal racemes; peduncles erect, slender, glabrous; pedicels stout, *c.* 0.3 cm long. Bracts ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous;

bracteoles ovate-lanceolate, *c.* 2 mm long, glabrous. Calyx campanulate, 5-lobed; lobes lanceolate, *c.* 3 mm long, pubescent. Standard petals ovate-obovate, 15–20 × 12–18 mm, rounded at apex, entire, glabrous; wing petals elliptic, 14–18 × 5–6 mm, rounded at apex, entire, clawed; keel petals falcate, glabrous, densely tomentose along margins. Staminal sheath *c.* 2 cm long, delicate. Ovary cylindric; styles *c.* 4 mm long; stigmas globose, sticky. Pods oblong, densely dark brown velvity, hairy.

Distribution: The native range of this species is SW. & S. India (POWO, 2023); *Habitat*: Grasslands; *Fl.* & *Ft.*: December-March.

Specimen examined: Pettimudi, 29.12.2019, *Vishnu Mohan & Santhosh Nampy* 156553 (CALI).

Crotalaria pallida Aiton, Hort. Kew. 3: 20. 1789; Hook.f., Fl. Brit. India 2: 84. 1876; Gamble, Fl. Madras 1: 301. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 65. 2016.



Perennial shrubs. Stems terete, ribbed, pubescent. Leaves 3-foliate; leaflets oblong-elliptic, 4–6 × 1.5–3 cm, acute at apex, rounded at base, entire, delicate, glabrous; petioles 2–4 cm long; petiolules *c.* 0.1 cm long, pulvinate. Stipules acicular, very minute, caducous. Flowers 20–60 in terminal racemes; peduncles 5–20 cm long, erect; pedicels *c.* 0.5 cm, glabrous. Bracts caducous; bracteoles inserted at the base of calyx tube. Calyx campanulate, 5-lobed, densely pubescent; lobes triangular, *c.* 5 mm long, glabrous. Petals yellow; standard petals orbicular, 15–20 × 8–14 mm, acute at apex, base with 2 appendages; wing petals oblong, 14–18 × 6–7 mm, marginally pilose at base; keel petals marginally pilose at base, beak projecting. Staminal sheath delicate, *c.* 1 cm long. Ovary sub-sessile; styles *c.*

4 mm long; stigmas globose. Pods oblong, pilose when young but glabrescent.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Degraded forest areas, also in the plains; *Fl.* & *Ft.*: May-February.

Specimens examined: Way to Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175925; Kanthalloor, 25.02.2003, *N. Divya* 90561; way to Kanthallur from Marayoor, 23.01.2005, *C. Sheena* 110134; Kottamala, 10.05.1995, *Jomy Augustine* 16298; way to Mannavan Shola, 08.01.2004, *K.C. Rakendu* 97143 (CALI).

Crotalaria peduncularis Graham ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 186. 1834; Hook.f., Fl. Brit. India 2: 74. 1876; Gamble, Fl. Madras 1: 293. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 67. 2016.

Erect shrubs, up to 1 m tall. Stems angled, striate, glabrous. Leaves simple, alternate; lamina narrowly elliptic, 8–15 × *c.* 1 cm, rounded at apex, entire, glabrous; petioles *c.* 0.3 cm long, glabrous. Flowers in terminal racemes; peduncles 10–20 cm long, erect, striate; pedicels 0.3 –0.5 cm long, pubescent. Bracts ovate, *c.* 10 × 4 mm, acute at apex, entire. Calyx campanulate; lobes acute, *c.* 3 × 1.5 mm, acuminate at apex, entire, densely villous out, glabrous within. Petals yellow; standard petals 20–25 × 15–20 mm, acute at apex, entire , glabrous; wing petals elliptic, 18–22 × 6–7 mm, truncate at apex, entire, glabrous; keel petals ciliate. Staminal sheath *c.* 20 mm long, thin. Ovary 10–12 mm long; styles *c.* 5 mm long, glabrous; stigmas globose. Pods stalked. Seeds dull yellow, shining.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Moist deciduous forests and savannahs; *Fl.* & *Ft.*: November-January.

Specimen examined: Choondal, MSNP, 04.01.2017, *Vishnu Mohan & Santhosh Nampy* 151506 (CALI).

Crotalaria retusa L., Sp. Pl. 2: 715. 1753; Hook.f., Fl. Brit. India 2: 75. 1876; Gamble, Fl. Madras 1: 293. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 70. 2016.



Erect herbs, up to 1 m tall. Stems terete, erect, branching, pubescent. Leaves simple, alternate; lamina oblong-oblanceolate, 5–8 × 1–3 cm, acute at apex and base, entire, glabrous; petioles *c.* 0.4 cm, glabrous, erect, narrow. Stipules subulate, *c.* 2 × 1 mm, acute at apex, entire. Flowers in terminal racemes; peduncles 5–8 cm long, glabrous, erect; pedicels narrow, erect, glabrous, *c.* 0.5 cm long. Bracts lanceolate, minute, *c.* 2 × 1 mm, acute at apex, entire, glabrous; bracteoles minute. Calyx sparsely pubescent; lobes broadly lanceolate, *c.* 4 × 2 mm, acuminate at apex, entire, pubescent out, glabrous within. Corolla yellow; standard petals sub-orbicular-elliptic, 15–19 × 10–13 mm, acute at apex, entire, glabrous, base with 2 appendages; wing petals oblong, 12–14 × 6–7 mm, rounded at apex, entire, glabrous; keel petals *c.* 1.5 cm long, with an exserted twisted beak. Staminal sheath 8–9 mm long, glabrous. Ovary cylindric; styles *c.* 5 mm long; stigmas globose. Pods oblong, glabrous.

Distribution: The native range of this species is Somalia to Mozambique, W. Indian Ocean, Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat*: All vegetation types, also in the plains; *Fl.* & *Ft.*: February-December.

Specimens examined: Devikolam, 16.06.1963, *K.M. Sebastine* 16526 (MH); Irumbupalam, 28.12.2017, *Vishnu Mohan & Santhosh Nampy* 156565; Kanthalloor, 25.02.2003, *N. Shylaja* 88349; Karimanal, 09.03.2017, *Vishnu Mohan & Santhosh Nampy* 152042 (CALI); Kattappana, 23.08.1977, *K.Vivekananthan* 50505 (MH).

Crotalaria salicifolia B.Heyne ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 182. 1834; Hook.f., Fl. Brit. India 2: 77. 1876; Gamble, Fl. Madras 1: 294. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 71. 2016.

Erect shrubs. Stems terete, slender, villous. Leaves simple, alternate; lamina elliptic, 5–7 × 2–2.5 cm, obtuse at apex, acute at base, entire, sparsely pubescent, sericeous above; petioles *c.* 0.5 mm long, pulvinate, sparsely pubescent-sericeous above. Flowers in terminal racemes; peduncles erect 5–9 cm long, glabrous; pedicels *c.* 0.5 cm long, glabrous. Bracts lanceolate, *c.* 7 × 4 mm, acuminate at apex, entire, glabrous above, hairy below. Calyx campanulate; lobes 5, lanceolate, *c.* 4 × 2 mm, acuminate at apex, entire, glabrous, densely hairy. Petals yellow; standard petals obovate, 26–30 × 18–23 mm, acute-rounded at apex, entire, tomentose along the midrib; wing petals elliptic, 24–27 × 6–8 mm, rounded at apex, entire, glabrous; keel petals densely tomentose along the margins. Staminal sheath 18–20 mm long, delicate. Pods oblong, shortly stalked, glabrous.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Grassy patches in degraded forests; *Fl.* & *Ft.*: October-January.

Specimens examined: Elappara- Kattapana roadside, 26.12.2001, *Sibichen M. Thomas* 670 (CALI); Erattayar, 28.09.1981, *C.N. Mohanan* 72165 (MH); Pachakkanam, 08.10.1993, *Jomy Augustine* 12665 (CALI).

Crotalaria scabrella Wight & Arn., Prodr. Fl. Ind. Orient. 1: 181. 1834; Gamble, Fl. Madras 1: 291. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 72. 2016.



Erect densely branching undershrubs, up to 30 cm high. Stems angled, pubescent, erect. Leaves simple, alternate; lamina obovate, 2–3.5 × 1–2 cm, obtuse-rounded at apex, mucronate, rounded at base, entire, pubescent; petioles stout *c.* 0.2 cm long, pubescent. Stipules decurrent, wing like. Flowers in axillary racemes; peduncles 2–8 cm long, pubescent; pedicels slender, narrow, *c.* 0.7 cm long. Bracts ovate, *c.* 6 × 3 mm, acute at apex, entire,

pubescent; bracteoles lanceolate, *c.* 5 × 2 mm, acuminate at apex, entire, pubescent. Calyx lobes lanceolate, *c.* 5 × 2 mm, acuminate at apex, pubescent. Petals yellow; standard petals obovate, 15–18 × 10–14 mm, rounded at apex, entire, glabrous; wing petals elliptic, 13–16 × 5–7 mm, rounded at apex, entire, glabrous; keel petals *c.* 10 mm long, falcate, glabrous. Staminal sheath 9–10 mm long. Styles *c.* 4 mm long, glabrous; stigmas globose, sticky. Pods oblong, 2−2.5 cm long.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Grassy patches in degraded forests; *Fl.* & *Ft.*: August-March.

Specimens examined: Aduvizhunthankudi, MSNP, 22.11.2014, *Syam Radh S.* 143595; Karimutty, 10.03.2021, *Vishnu Mohan & Santhosh Nampy* 186645; Mangaladevi, 11.08.1993, *Jomy Augustine* 12463; Pachakkad, Silent Valley, 15.12.2012, *Manudev K.M. & Robi* 4367 (CALI).

Crotalaria semperflorens Vent., Descr. Pl. Nouv. t. 17. 1800; Hook.f., Fl. Brit. India 2: 78. 1876; Gamble, Fl. Madras 1: 297. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 73. 2016.

Erect shrubs, up to 1 m tall. Stems stout, straggling, minutely hispid, terete. Leaves simple, alternate; lamina obovate, 1–1.5 × *c.* 0.5−1 cm, obtuse at apex, acute at base, entire, pubescent below, glabrous above; petioles *c.* 1.5 cm long, glabrous, erect. Stipules lunar-shaped, *c.* 1.5 × 1 cm, entire, glabrous above, pubescent below. Flowers in terminal racemes; peduncles 7–15 cm long, glabrous, erect; petioles *c.* 0.5 cm long, glabrous. Bracts lanceolate, *c.* 1 × 0.5 cm, acuminate at apex, entire, glabrous. Calyx lobes lanceolate, *c.* 4 × 2 mm, acuminate at apex, entire, hispid out, glabrous within. Standard petals obovate, 24–30 × 16–20 mm, acute at apex, entire, silky pubescent out; wing petals elliptic 22–27 × 7–9 mm, verrucose; keel petals glabrous. Staminal sheath 18–20 mm long, glabrous. Ovary cilindric; styles *c.* 6 mm long; stigmas globose. Pods obovate, clawed.

Distribution: The native range of this species is SW. India and Malesia (POWO, 2023); *Habitat*: Along shola forest margins; *Fl.* & *Ft.*: November-February.

Specimens examined: Aduvizhunthankudi, MSNP, 22.11.2014, *Syam Radh S.* 137823; Ezhuthupara, Mankulam, 05-12-2018, *Vishnu Mohan & Santhosh Nampy* 168865; Kumarikulam, 16.01.1994, *Jomy Augustine* 13120 (CALI).

Crotalaria spectabilis Roth, Nov. Pl. Sp. 341. 1821; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 75. 2016. *Crotalaria sericea* Retz. in Observ. Bot. 5: 26. 1788, *nom. illeg*; Hook.f., Fl. Brit. India 2: 75. 1876; Gamble, Fl. Madras 1: 293. 1918.

Erect herbs, up to 1 m tall. Stems terete, glabrous. Leaves simple, alternate; lamina oblanceolate 4–7 × *c.* 2 cm, rounded at apex, attenuate at base, entire, glabrous above, pubescent beneath, mucronate; petioles erect, stout, 0.2–0.8 cm, glabrous. Stipules ovate-triangular, *c.* 1 × 0.5 cm, acuminate at apex, entire, glabrous. Flowers in terminal racemes; peduncles 5–10 cm long, glabrous; pedicels *c.* 0.6 cm long, glabrous. Bracts ovate-triangular, *c.* 7 × 3 mm, acute at apex, entire, glabrous; bracteoles linear, *c.* 1 mm long. Calyx 2-lipped, glabrous; lobes broadly lanceolate-triangular, *c.* 4 × 2 mm, acuminate at apex, entire, glabrous within. Corolla pale yellow; standard petals sub-orbicular, 20–22 × 16–19 mm, rounded-acute at apex, entire, glabrous, base with 2 appendages; wing petals obovate, 18–20 × 7–9 mm, rounded at apex, entire, glabrous; keel petals twisted, beak exserted. Staminal sheath *c.* 1.5 cm long. Styles *c.* 8 mm long, glabrous; stigmas capitate. Pods clavate, shortly stipitate, glabrous. Seeds smooth.

Distribution: The native range of this species is Indian Subcontinent to Taiwan (POWO, 2023); *Habitat*: Deciduous forests and shola margins; *Fl.* & *Ft.*: November-January.

Specimens examined: Ezhuthupara, Mankulam, 05.12.2018, *Vishnu Mohan & Santhosh Nampy* 168866; Kannimala wayside, Eravikulam, 24.01.2018, *Vishnu Mohan & Santhosh Nampy* 158149; way to Mamalakkudi, 27.12.2017, *Vishnu Mohan & Santhosh Nampy* 156538;

Munnar, 27.12.2017, *Vishnu Mohan & Santhosh Nampy* 156538; Vattachola, MSNP, 05.11.2015, *Syam Radh S.* 145103 (CALI).

Crotalaria triquetra Dalzell, Hooker's J. Bot. Kew Gard. Misc. 2: 34. 1850; Hook.f., Fl. Brit. India 2: 71. 1876; Gamble, Fl. Madras 1: 296. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 76. 2016.

Annual creeping herbs. Stems 3−4 angled, pubescent, slender. Leaves simple, alternate; lamina elliptic-oblong, 2–3 × *c.* 1 cm, acute at apex, rounded at base, entire, pubescent below; petioles *c.* 0.1 cm long, glabrous. Stipules linear-lanceolate, *c.* 0.3 × 0.1 cm, acuminate at apex, entire, glabrous, caducous. Flowers in terminal or leaf-opposed racemes; peduncles 5–8 cm long, pubescent, slender; pedicels *c.* 0.8 cm long, glabrous, terete. Calyx 2-lipped; lobes triangular-lanceolate *c.* 4 × 2 mm, acuminate at apex, glabrous. Petals pale yellow; standard petals ovate, 15–18 × 10–13 mm, acute at apex, entire, glabrous, base with 2 appendages; wing petals oblong, 12–16 × 5–5.5 mm, rounded at apex, entire, glabrous; keel petals falcate beak straight and twisted. Staminal sheath *c.* 1 cm long. Styles *c.* 5 mm long; stigmas globose. Pods cylindric, 16-seeded, pubescent.

Distribution: The native range of this species is India (POWO, 2023); *Habitat*: Grasslands and moist deciduous forests; *Fl.* & *Ft.*: September-January.

Specimen examined: Chottuppara, 18.12.2021, *Vishnu Mohan & Santhsoh Nampy* 186728 (CALI).

Crotalaria verrucosa L., Sp. Pl. 2: 715. 1753; Baker in Hook.f., Fl. Brit. India 2: 77. 1876; Gamble, Fl. Madras 1: 297. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 77. 2016.

Erect herbs, up to 50 cm tall. Stems 4-angled, glabrescent. Leaves simple, alternate; lamina rhomboid, 3–5 × 2.5–4 cm, rounded-acuminate at apex, acute at base, undulate, thinly membranous, densely pubescent below, glabrous above; petioles 0.3–0.5 cm long, glabrous. Stipules leaf-like, lunar-shaped, 0.4–0.6 × *c.* 0.3 cm, glabrous. Flowers in terminal racemes; peduncles 8–15 cm long, erect, sparsely pubescent; pedicels *c.* 0.6 cm long, glabrous. Bracts linear, *c.* 1 mm long, glabrous. Calyx sub-campanulate, 5-lobed; lobes

lanceolate, *c.* 6 mm long, acuminate at apex, glabrous. Petals white, or often tinged blue; standard petals orbicular-obovate, 18–20 × 12–16 mm, acute at apex, entire, base with 2 appendages; wing petals oblong, 16–18 ×6–7 mm, rounded at apex; keel petals falcate, with a fairly shortly twisted beak. Staminal sheath *c.* 1.5 cm long. Ovary sub-sessile; styles pilose; stigmas capitate. Pods oblong pubescent. Seeds 10−15, nearly smooth to papillose, shiny.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat*: Deciduous forests, also in the plains; *Fl.* & *Ft.*: August-November.

Specimen examined: Chinnar, 18.10.2017, *Vishnu Mohan & Santhosh Nampy* 152173 (CALI).

Crotalaria walkeri Arn., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 18(1): 328. 1840; Gamble, Fl. Madras 1: 297. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 78. 2016.

Crotalaria semperflorens Vent. var. *walkeri* (Arn.) Baker in Hook.f., Fl. Brit. India 2: 78. 1876.

Scandent shrubs, up to 50 cm tall. Stems terete, erect, thinly hairy. Leaves simple, alternate; lamina elliptic, 4–7 × 2–5 cm, acute at apex, apiculate, rounded at base, entire, glabrous above, sparsely pubescent below; petioles *c.* 0.5 cm long, glabrous. Stipules lanceolate, *c.* 0.5 × 0.2 cm, acuminate at apex, entire, glabrous. Flowers in terminal racemes; peduncles 5–10 cm long, erect, pubescent; petioles *c.* 0.5 cm long, glabrous. Bracts ovate-cordate, *c.* 6 × 4 mm, acute at apex, cordate at base, deflexed; bracteoles ovate, *c.* 3 ×1 mm, acute at apex, entire. Flowers yellow; standard petals orbicular, 16–20 × 10–13 mm, slightly clefted at apex, entire, glabrous out; keel petals elliptic, 14–17 × 5–7 mm, rounded at apex, entire, glabrous. Staminal sheath 12–14 mm long. Ovary cylindric; styles *c.* 4 mm long; stigmas rounded. Pods oblong.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Grasslands and openings in evergreen and semi-evergreen forests; *Fl.* & *Ft.*: November-January.

Specimen examined: Munnar, 12.12.2016, *Vishnu Mohan & Santhosh Nampy* 151425 (CALI).

Crotalaria wightiana Graham ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 181. 1834; Gamble, Fl. Madras 1: 291. 1918; V.S.Kumar in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 78. 2016.

Erect shrubs, up to 1.5 m tall. Stems terete, densely hairy. Leaves simple, alternate; lamina ovate-obovate, 5–7 × 3–5 cm, retuse at apex, acute at base, entire, pubescent; petioles *c.* 0.4 cm long, glabrous, stout. Stipules decurrent, broadened into a triangular upper part, 2–4 cm long, pubescent. Flowers in terminal racemes; peduncles *c.* 5 cm long, pubescent; petioles *c.* 1.5 cm long, pubescent. Bracts ovate, *c.* 4 × 2 mm, acute at apex, entire, pubescent out, glabrous within; bracteoles ovate, 6–8 × 3–4 mm, rounded at apex. Calyx lobes lanceolate, unequal, hairy. Standard petals orbicular, 16–20 × 9–14 cm, rounded at apex, thinly pubescent along back; wing petal elliptic, 14–17 × 4–5 mm, rounded at apex, entire, glabrous; keel petals pubescent along margins. Staminal sheath *c.* 1.5 cm long, glabrous. Pods oblong, 4−6 cm long, glabrous.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Along margins of shola forests; *Fl.* & *Ft.*: November-March.

Specimens examined: Kanthalloor, way to Mannavan Shola, 06.02.2007, *Preethi T.P.* 112747; Mathikettan Shola National Park, 04.01.2017, *Vishnu Mohan & Santhosh Nampy* 151487; Munnar, 23.01.2018, *Vishnu Mohan & Santhosh Nampy* 158101; way to Munnar, 23.01.2018, *Vishnu Mohan & Santhsoh Nampy* 158101 (CALI).

Cytisus Desf.

Fl. Atlant. 2: 139. 1798, *nom. cons.*

Cytisus scoparius (L.) Link, Enum. Hort. Berol. Alt. 2: 241. 1823; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 209. 2016. *Spartium scoparium* L., Sp. Pl. 709. 1753.

Erect much branching shrubs. Stems 5-angled, erect, glabrous. Leaves 3-foliate at base, simple above; leaflets elliptic-oblong 1–1.8 × *c.* 0.4 cm, rounded at apex, entire, adpressed-pubescent below, glabrous above, sub-sessile.

Flowers axillary; pedicels *c.* 1 cm long, glabrous. Calyx glabrous, half as long as pedicels; lobes *c.* 5 × 2 mm, acuminate at apex, abaxial lobe 2-toothed. Corolla bright yellow; standard petals orbicular *c.* 20 × 20 mm, rounded-acute at apex, entire, glabrous; wing petals elliptic, *c.* 18 × 10 mm, rounded at apex, glabrous; keel petals *c.* 17 × 10 mm, falcate. Staminal sheath *c.* 10 mm long, glabrous. Ovary *c.* 1 cm long, densely white pubescent with elongate hairs; styles *c.* 20 mm long, curved. Pods black, hairy along sutures.

Distribution: The native range of this species is Europe (POWO, 2023);

Habitat: Forest plantations and degraded forest areas; *Fl.* & *Ft.*: September-January.

Specimen examined: Banther, Pambadum Shola, 21.12.2018, *Vishnu Mohan & Santhosh Nampy* 167877 (CALI).

Dalbergia L.f.

Suppl. Pl. 52: 316. 1782.

Key to the species

1. Climbing shrubs……..……*D. monetaria*

1. Deciduous trees……..……..…2

2. Leaflets emarginated at apex……..……*D. latifolia*

2. Leaflets acute at apex……....*D. sissoides*

Dalbergia latifolia Roxb., Pl. Coromandel 2: 7. t. 113. 1799; Hook.f., Fl. Brit. India 2: 231. 1876; Gamble, Fl. Madras 1: 383. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 87. 2016.

Deciduous trees, up to 20 m tall. Stems woody, terete. Leaves imparipinnate, alternate; stipules lanceolate, *c.* 4 × 2 mm, emarginated at apex, entire, glabrous, deciduous; leaflets alternate, 3–9, estipulate, orbicular, 5–10 × 4–8 cm, obtuse at apex, acute at base, entire, glabrous above, glaucous beneath, coriaceous; petioles 8–20 cm long, pulvinate at base; petiolules up to 1 cm long, stout, grooved above, glabrous. Flowers in short axillary, panicles. Bracts ovate *c.* 3 × 1.5 mm, acute at apex, entire, deciduous. Calyx tube campanulate; lobes 5, sub-equal, obtuse-acute at apex, entire, pubescent out. Petals 5; standard petals obovate, *c.* 6 × 5 mm, acute-rounded at apex, cuneate at base, entire, glabrous, reflexed; wing petals elliptic, *c.* 6 × 3 mm, rounded at apex,

entire, base auricled; keel petals falcate, hastate. Stamens 9, monadelphous; staminal sheath*c.* 4 mm long. Ovary stipitate, *c.* 5 mm long, glabrous; styles incurved, glabrous; stigmas capitate. Pods oblong-lanceolate, tip obtuse. Seeds 1–4, reniform, brown.

Distribution: The native range of this species is Indian Subcontinent, Andaman Islands and Jawa (POWO, 2023); *Habitat* Dry and moist deciduous forests, also in the plains; *Fl.* & *Ft.*: August-December.

Specimen examined: Thekkady, 12.12.2018, *Jomy Augustine* 12561 (CALI).

Dalbergia monetaria L.f., Suppl. Pl. 317. 1782, *nom. cons*. *Dalbergia ovalis* (L.) P.L.R.Moraes & L.P.Queiroz, Phytotaxa 41: 46. 2012.

Dalbergia volubilis (L.) Urb. Repert. Spec. Nov. Regni Veg. 16: 136 1919, *nom. illeg.*; Hook.f., Fl. Brit. India 2: 235. 1876; Gamble, Fl. Madras 1: 384. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 91. 2016.

Climbing shrubs. Stems terete, woody, soft hairy. Leaves imparipinnate, alternate; leaflets 5–11, elliptic, 2–4 × *c.* 1.5 cm, obtuse at apex, rounded at base, entire, glabrous; petioles 7–13 cm long, glabrous, pulvinate at base. Flowers in terminal panicles. Calyx campanulate; lobes ovate, acute, *c.* 5 mm long, acute at apex, entire, hairy above, glabrous below. Corolla pale pink; standard petals orbicular-ovate, *c.* 10 × 8 mm, rounded at apex, reflexed; wing petals elliptic, *c.* 5 × 3 mm, rounded at apex, glabrous; keel petals falcate. Stamens diadelphous; staminal sheath glabrous. Pods elliptic, obtuse at apex, shortly cuspidate, stalked, glabrous. Seed solitary.

Distribution: The native range of this species is S. Mexico to Tropical America (POWO, 2023); *Habitat:* Moist deciduous forests; *Fl.* & *Ft.*: December-June.

Specimen examined: Vallakkadavu, 12.12.2018, *Vishnu Mohan* 134100 (CALI).

Dalbergia sissoides Graham ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 265. 1834; Hook.f., Fl. Brit. India 2: 231. 1870; Gamble, Fl. Madras 1: 383. 1918;

E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 90. 2016.

Deciduous trees, up to 30 m tall. Stems woody, terete; bark grey. Leaves imparipinnate, alternate; lamina 7–11, alternate, elliptic-obovate, 4–6 × 2–4 cm, acute at apex, cuneate at base or acute, entire, membranous; rachis 10–15 cm, slender, pulvinate, glabrous. Stipules lanceolate, *c.* 0.3 × 0.15 cm, acute at apex, caducous. Flowers in loose terminal panicles. Calyx campanulate, glabrous; lobes 5, ovate, 3–4 mm long, acute at apex, glabrous. Corolla white; standard petals ovate-orbicular, 6–8 × 3–4 mm, rounded at apex, cuneate at base, reflexed; wing petals elliptic, 5–6 × 2–3 mm, rounded at apex, entire, glabrous; keel petals falcate. Stamens monadelphous, filaments alternately longer and shorter. Ovary stipitate; styles slender; stigmas capitate. Pods tapering to both ends, oblong, stipitate. Seeds 2–4.

Distribution: The native range of this species is India and Jawa (POWO, 2023); *Habitat:* Moist and dry deciduous forests; *Fl.* & *Ft.*: December-August.

Specimens examined: Chinnar, 17.03.1993, *K.K. Sajeev* 15531 (KFRI); Kumarikulam, 12.12.2018, *Vishnu Mohan & Santhosh Nampy* 148466 (CALI).

Derris Lour.

Fl. Cochinch. 2: 423. 1790.

Derris brevipes (Benth.) Baker in Hook.f., Fl. Brit. India 2: 244. 1878; Gamble, Fl. Madras 1: 388. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 93. 2016. *Derris heyneana* var. *brevipes* Benth. in J. Proc. Linn. Soc., Bot. 4(Suppl.): 110 1860.

Stout climbers. Stems slender, glabrous, terete. Leaves multifoliate; leaflets obovate, 5–8 × 3–5 cm, acuminate at apex, acute at base, entire, glabrous. Flowers in axillary, rusty tomentose panicles. Calyx cupular; lobes acute, *c.* 4 mm long, hispid out, glabrous within. Standard petals obovate, *c.* 10 × 6 mm, rounded-acute at apex, rounded at base, entire, emarginate; wing petals

falcate, *c.* 8 × 3 mm rounded at apex, entire; keel petals falcate, glabrous. Stamens monadelphous; staminal sheath *c.* 7 mm long. Ovary densely hairy; styles *c.* 4 mm long; stigmas capitate. Pods ovate, obtuse at either end, densely dark brown-hispid. Seeds 2.



Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests; *Fl.* & *Ft.*: February-December.

Specimens examined: Chinnar, 16.03.1995, *K.K. Sajeev* 11961 (KFRI); Pambladam, 09.05.2017, *Vishnu Mohan & Santhosh Nampy* 152032 (CALI).

Desmodiastrum (Prain) A.Pramanik & Thoth.

J. Indian Bot. Soc. 65: 374. 1986.

Desmodiastrum parviflorum (Dalzell) H.Ohashi, J. Jap. Bot. 79(2): 116. 2004. *Alysicarpus parviflorus* Dalzell, Hooker's J. Bot. Kew Gard. Misc. 3: 211. 1851; Gamble, Fl. Madras 339. 1918

Desmodium parviflorum (Dalz.) Baker in Hook.f., Fl. Brit. India 2: 172. 1876, non Mart. & Galeotti 1843.

Erect herbs, up to 30 cm high. Stems terete, villous. Leaves trifoliate, alternate; leaflets elliptic, 2–4 × 1–1.5 cm, acute at apex, rounded at base, entire, glabrous above, tomentose below; petioles *c.* 3 cm long, glabrous, pulvinate at base; petiolules *c.* 0.3 cm long, glabrous. Stipules lanceolate, *c.* 0.4 × 0.2 cm, acuminate at apex, entire, glabrous. Flowers in terminal racemes; peduncles up to 4 cm long; pedicels *c.* 0.6 cm long, narrow, glabrous. Calyx campanulate; lobes 5, linear-lanceolate, *c.* 2 mm long, densely hairy. Corolla blue; standard petals obovate, *c.* 5 × 4 mm, acute at apex, entire, glabrous; wing petals elliptic, *c.* 4 × 2 mm, rounded at apex, entire, glabrous; keel petals

falcate. Ovary elliptic; styles *c.* 2 mm long; stigmas capitate. Pods curved, 6-jointed, glabrous.

Distribution: The native range of this species is India, Myanmar and E. Jawa (POWO, 2023); *Habitat:* Moist deciduous forests; *Fl.* & *Ft.*: September-December.

Specimen examined: Vallakkadavu, 23.11.1993, *Jomy Augustine* 12727 (CALI).

Dolichos L.

Sp. Pl. 2: 725. 1753, *nom. cons.*

Dolichos trilobus L., Sp. Pl. 726. 1753; Hook.f., Fl. Brit. India 2: 211. 1876; Gamble, Fl. Madras 1: 366. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 116. 2016.

Climbing herbs. Stems slender, glabrous or sub-glabrous. Leaves pinnately 3-foliate, alternate; leaflets rhombic, 3–5 × 2–4 cm, acuminate at apex, rounded at base, glabrous; petioles erect, straight, *c.* 3 cm long, glabrous, pulvinate at base. Stipules ovate, *c.* 0.3 × 0.1 cm, acuminate at apex, entire; stipels linear, *c.* 0.2 cm long. Flowers in axillary racemes; peduncles *c.* 4 cm long, glabrous, narrow; pedicels *c.* 0.8 cm long, glabrous. Bracts ovate, *c.* 3 × 1.5 mm, acute at apex, entire, glabrous; bracteoles ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Calyx broadly campanulate, lobes ovate, *c.* 3 × 1.5 mm, acute at apex, glabrous. Standard petals orbicular, 8–12 × 7–10 mm, rounded at apex, base with 2 triangular appendages, without auricles, glabrous; wing petals obovate, 8–12 × 5–7 mm, rounded at apex, entire, glabrous; keel petals clawed. Staminal sheath *c.* 8 mm long, glabrous. Ovary sessile; styles *c.* 4 mm long; stigmas terminal, globose. Pods linear-oblong, slightly curved, compressed. Seeds 6.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat:* Grasslands and savannahs; *Fl.* & *Ft.*: September-January.

Specimens examined: Way to Karimutty, 29.12.2017, *Vishnu Mohan & Santhosh Nampy* 158057; Mankulam, 19.12.2018, *Vishnu Mohan & Santhosh Nampy* 176327 (CALI).

Dumasia DC.

Ann. Sci. Nat. 4: 96. 1825.

Dumasia villosa DC., Mém. Légum. 257. 1826; Hook.f., Fl. Brit. India 2: 183. 1876; Gamble, Fl. Madras 1: 351. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 117. 2016.

Twinning herbs. Stems villous, slender. Leaves trifoliate, alternate; leaflets ovate-elliptic, 3.5–5(–9) × 2–3(–5) cm, acute at apex, rounded at base, entire, densely adpressed villous; petioles 3–5(–9.5) cm long, densely hairy, pulvinate at base; petiolules *c.* 0.2 cm long, sparsely hairy. Stipules linear-lanceolate, *c.* 0.3 × 0.2 cm, acute at apex, densely villous. Flowers in axillary racemes; peduncles 8–10 cm long; pedicels 0.5–1 cm long, pubescent. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous; bracteoles ovate *c.* 2 × 1 mm, acute at apex, glabrous. Calyx campanulate, glabrous or sparsely adpressed hairy. Petals yellow; standard petals obovate, *c.* 10 × 6 mm, rounded at apex, entire, glabrous; wing petals oblong-elliptic, clawed, auricles absent; keel petals oblong-elliptic, clawed, auricles absent. Staminal sheath *c.* 8 mm long, glabrous. Ovary hairy; styles *c,* 4 mm long, hairy, compressed; stigmas capitate. Pods oblong, constricted between seeds, densely yellow villous. Seeds 1–4, black or blue

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat:* Margins of evergreen forests; *Fl.* & *Ft.*: August-December.

Specimen examined: Uppupara, 16.11.1993, *Jomy Augustine & Sasidharan* 12716 (CALI).

Erythrina L.

Sp. Pl. 2: 706. 1753.

Erythrina stricta Roxb., Fl. Ind. 3: 251. 1832; Hook.f., Fl. Brit. India 2: 189. 1876; Gamble, Fl. Madras 1: 354. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 119. 2016.

Trees, up to 10 m tall. Stems woody; bark greyish brown. Leaves pinnately 3-foliate, alternate; leaflets broadly rhomboid, 4–15 × 3–20 cm, acute at apex, rounded-acute at apex, entire, glabrous; petioles 12–15 cm long, pulvinate at

base, glabrous; petiolules *c.* 0.2 cm long, glabrous. Stipules ovate, *c.* 0.5 × 0.3 cm, acute at apex, glabrous, deciduous. Flowers in terminal clusters; peduncles thick, 4–8 cm long; pedicels *c.* 1 cm long, glabrous. Calyx spathe-like, undivided. Corolla red; standard petals elliptic-lanceolate, 30–45 × 10–20 mm, acute at apex, entire, glabrous; wing petals sub-obovate, 5.5–6 × 3–3.3 mm, glabrous; keel petals much longer than wings. Ovary hairy, stipitate; styles narrow, glabrous. Pods glabrous.



Distribution: The native range of this species is Indian Subcontinent to China (Yunnan, Guangxi) and Indo-China (POWO, 2023); *Habitat:* Moist deciduous forests; *Fl.* & *Ft.*: January-May.

Specimen examined: Chottupara, 11.03.2018, *Vishnu Mohan & Santhosh Nampy* 176328 (CALI).

Flemingia Roxb. ex W.T.Aiton

Hort. Kew. ed., 2. 4: 349. 1812, *nom. cons.*

Key to the species

1. Leaves 1-foliate……*F. strobilifera*

1. Leaves 3-foliate……*F. macrophylla*

Flemingia macrophylla (Willd.) Merr., Philipp. J. Sci. 5: 130. 1910. *Crotalaria macrophylla* Willd., Sp. Pl. ed., 4. 3: 982. 1802; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 123. 2016.

Flemingia congesta Roxb., Hort. Kew. ed., 2. 4: 349. 1812; Hook.f., Fl. Brit. India 2: 228. 1876; Gamble, Fl. Madras 1: 378. 1918.

Erect shrubs, up to 1 m tall. Stems terete, young parts densely adpressed silky villous. Leaves trifoliate; leaflets papery to thinly papery; terminal leaflet broadly lanceolate-elliptic, 5–10 × 3–5 cm, acuminate at apex, rounded at base, entire, glabrous; lateral leaflets smaller, oblique; petioles 3–6 cm long, narrowly winged, pulvinate at base; petiolules 0.4–0.5 cm long, densely hairy.

Stipules lanceolate 10–20 × *c.* 5 mm, acuminate at apex, villous below. Flowers in axillary racemes; peduncles up to 4 cm long; pedicels *c.* 0.5 cm long, pubescent. Calyx campanulate, lobed; lobes linear-lanceolate, *c.* 2 × 1 mm, villous. Corolla purple, slightly longer than calyx; standard petals oblong, *c.* 4 × 3 mm, acute-rounded at apex, shortly clawed, auriculate; wing petals narrowly elliptic, *c.* 4 × 1.5 mm, slenderly clawed, auricled; keel petals falcate. Staminal sheath glabrous. Ovary elliptic, with very pale brown hairs; styles *c.* 3 mm long; stigmas globose, sticky. Pods elliptic, sparsely pubescent. Seeds orbicular.



Distribution: The native range of this species is Tropical & Subtropical Asia to N. Queensland (POWO, 2023); *Habitat:* Semi-evergreen and moist deciduous forests, also in the plains; *Fl.* & *Ft.*: November-May.

Specimens examined: Eravikulam, 25.02.2003, *N. Divya* 90590; Kanketty, 22.05.2018, *Vishnu Mohan & Santhosh Nampy* 186642; Kanthalloor, Mannavan Shola, 25.02.2003, *Reesha Karally* 89462; Thekkady, 22.12.1996, *Jomy Augustine* 16995 (CALI).

Flemingia strobilifera (L.) W.T.Aiton, Hort. Kew. ed., 2. 4: 350. 1812; Hook.f., Fl. Brit. India 2: 227. 1876; Gamble, Fl. Madras 1: 377. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 125. 2016.

Erect shrubs, up to 50 cm tall. Stems ribbed, densely gray to dull brown villous. Leaves simple, alternate; lamina ovate-lanceolate, 6–10 × 3–7 cm, acuminate at apex, rounded at base, entire, glabrous above,



sparsely hairy below, leathery; petioles 0.3–0.6 cm, densely hairy. Stipules linear-lanceolate, 0.3–0.8 × *c.* 0.2 cm, acuminate at apex, entire, persistent. Flowers in terminal thyrses; peduncles 5–15 cm long; pedicels 0.5–1.5 cm long, hispid. Bracts widely orbicular, 10–30 × 20–40 mm, rounded at apex, cordate at base, papery to almost leathery, both surfaces hirsute, ciliate. Calyx campanulate, lobed; lobes ovate. Standard petals obovate, 3–3.5 × 2–2.5 mm, acute at apex, entire; wing petals narrower, elliptic; keel petals falcate. Staminal sheath 2.5–3 mm long, glabrous. Pods elliptic, sparsely pubescent, inflated. Seeds 2, sub-orbicular.

Distribution: The native range of this species is Tropical & Subtropical Asia to NW. Pacific (POWO, 2023); *Habitat:* Deciduous and semi-evergreen forests, also in the plains; *Fl.* & *Ft.*: November-March.

Specimens examined: Choondal, Mathikettan Shola National Park, 21.11.2014, *Syam Radh S.* 143571; Kumarikulam, 12.12.1993, *Jomy Augustine* 13013; *Ibid*., 05.03.2021, *Vishnu Mohan & Santhosh Nampy* 186610; Pambla dam, 28.12.2018, *Vishnu Mohan & Santhosh Nampy* 152025 (CALI).

Grona Lour.

Fl. Cochinch. 2: 459. 1790.

Key to the species

1. Prostrate creeping herbs…… *G. styracifolia*

1. Erect herbs or shrubs……..2

2. Terminal leaflets up to 4.5 cm long……*G. heterophylla*

2. Terminal leaflets more than 6 cm long…..……*G. heterocarpos*

Grona heterocarpos (L.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 112. 2018. *Hedysarum heterocarpon* L., Sp. Pl. 747. 1753. *Desmodium heterocarpon* (L.) DC., Prodr. 2: 337. 1825.

Undershrubs, up to 1 m tall. Stems terete, adpressed hairy. Leaves alternate, 3-foliate; leaflets obovate, 1.5–5 × 1–3 cm (6–8 × 2–4 cm in terminal leaflets), acute-rounded at apex, entire, glabrous above, appressed-pubescent below,

glabrous above; petioles 2–3 cm long, pulvinate at base, glabrous; petiolules *c.* 0.2 cm long, hispid, stout. Stipules lanceolate, *c.* 0.4 ×0.1 cm, acuminate at apex, pubescent out, glabrous within, subulate. Flowers purple, in terminal racemes; peduncles *c.* 4 cm long, glabrous, pedicels *c.* 0.2 cm long, glabrous. Bracts lanceolate, *c.* 4 × 2 mm, acuminate at apex, entire, glabrous. Calyx-tube acuminate at apex, *c.* 3 mm long, hispid. Standard petals obovate-orbicular, 6–8 × 4–5 mm, rounded at apex, entire; wing petals elliptic, 5–6 × 2–3 mm, rounded at apex, entire, glabrous; keel petals falcate. Staminal sheath glabrous. Pods jointed, densely hispid on both surfaces.

Distribution: The native range of this species is Tanzania (incl. Zanzibar), Tropical & Subtropical Asia to W. Pacific (POWO, 2023); *Habitat:* Moist deciduous and semi-evergreen forests, also in plains; *Fl.* & *Ft.*: October-December.

Specimens examined: Attathodu, 14.11.1993, *Jomy Augustine* 1274; Banglavuthara, 21.12.2019, *Vishnu Mohan & Santhosh Nampy* 164842; Eravikulam, 26.12.2003, *Tomson Mani* 90880 (CALI); Periyar Tiger Reserve, 24.11.1993, *Jomy Augustine* 12745 (KFRI).

Grona heterophylla (Willd.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 114. 2018. *Hedysarum heterophyllum* Willd., Sp. Pl. ed., 4. 3: 1201. 1803; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 104. 2016. *Desmodium heterophyllum* (Willd.) DC., Prodr. 2: 334. 1825; Gamble, Fl. Madras 1: 347. 1918.

Prostrate herbs, up to 50 cm tall. Stems terete, glabrous. Leaves alternate, 3-foliate; leaflets broadly elliptic, 1–4.5 × 0.8–2 cm, rounded at apex, obtuse at base, entire, glabrous; petioles 0.5–1.5 cm long. Flowers solitary or in axillary clusters; pedicels 1–2 cm long, glabrous, terete. Calyx campanulate, 5-lobed; upper 2 lobes deeply incised near base, villous and minutely hooked hairy. Corolla purple-white, *c.* 5 mm; standard petals broadly obovate, 6–10 × 4–8 mm, rounded at apex, entire, glabrous; wing petals elliptic, 4–5 × 1.5–3 mm, rounded at apex, entire, glabrous; keel petals falcate. Stamens diadelphous;

staminal sheath *c.* 4 mm long. Ovary adpressed pubescent; styles *c.* 3 mm long, glabrous; stigmas capitate. Pods narrowly oblong, straight, 3–5-jointed, flat.

Distribution: The native range of this species is Madagascar, Tropical & Subtropical Asia (POWO, 2023); *Habitat:* Degraded moist deciduous forests, also in the plains; *Fl.* & *Ft.*: July-February.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 188869; Ramakalmedu, 07.09.2017, *Vishnu Mohan & Santhosh Nampy* 152934; Thekkady, 14.07.2017, *Vishnu Mohan & Santhosh Nampy* 152864; (CALI).

Grona styracifolia (Osbeck) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 116. 2018. *Desmodium styracifolium* (Osbeck) Merr., Amer. J. Bot. 3(10): 580. 1916; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 111. 2016.

Desmodium retroflexum (L.) DC., Prodr. 2: 336.1825; Baker in Hook.f., Fl. Brit. India 2:170.1876; Gamble, Fl. Madras 347. 1918.

Prostrate creeping herbs. Stems slender, terete, villous. Leaves 1-foliate, alternate; lamina elliptic-ovate, *c.* 3 × 3 cm, rounded at apex and base, glabrous, chartaceous, sparsely hairy below, glabrous above; petioles *c.* 2 cm long, glabrous. Stipules lanceolate, *c.* 0.8 × 0.4 cm, acuminate at apex, entire. Flowers in terminal or axillary racemes, 5–20 cm long, axillary, slender; pedicels *c.* 1.5 cm long, paired. Bracts ovate, lanceolate, *c.* 4 cm long. Calyx campanulate; lobes 5, lanceolate, acuminate at apex, villous out, glabrous within. Standard petals ovate, *c.* 6 × 5 mm, clavate, not clawed; keel petals yellowish white. Staminal sheath *c.* 5 mm long, delicate. Ovary glabrous; elliptic; styles *c.* 2 mm long; stigmas capitate. Pods 5–7-jointed, curved, thinly villous.

Distribution: The native range of this species is Tropical & Subtropical Asia to NW. Pacific (POWO, 2023); *Habitat:* Moist deciduous forests; *Fl.* & *Ft.*: March-November.

Specimens examined: Mangaladevi, 11.11.1994, *Jomy Augustine* 14185; Uppupara, 17.04.1994, *Jomy Augustine* 13531 (CALI).

Gliricidia Kunth

Walpers, Repert. Bot. Syst. 1: 679. 1842.

Gliricidia sepium (Jacq.) Kunth, Walpers, Repert. Bot. Syst. 1: 679. 1842. *Robinia sepium* Jacq., Enum. Syst. Pl. 28. 1760; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 130. 2016.



Trees to 8 m tall. Stems woody, terete, glabrous; bark grey, lenticellate. Leaves pinnate, alternate, crowded at apex; leaflets 7–21, opposite; lamina ovate-elliptic, 2.5–6 × 1.5–5 cm, acuminate at apex, obtuse at base, entire, glabrous above, glaucous and puberulent beneath, membranous; rachis 8–30 cm long, slender, pulvinate, pubescent; petiolule 0.4–0.7 cm long, slender, pubescent. Flowers bisexual, in long racemes; Calyx campanulate; lobes obscure. Standard petal orbicular, 20–30 × 15–20 mm, rounded at apex, entire, glabrous; wing petals oblong-elliptic, 18–28 × 5–6 cm, rounded at apex, auricled at base, entire, glabrous; keel petals obovate, incurved. Stamens 9+1; staminal sheath15–16 cm long. Ovary sessile; styles incurved, glabrous; stigmas capitate. Pod elliptic, glabrous.

Distribution: The native range of this species is Mexico to Colombia (POWO, 2023); *Habitat:* Along fences; *Fl.* & *Ft.*: March-May.

Specimen examined: Kattappana, 11.05.1994, *Vishnu Mohan & Sathosh Nampy* 156743 (CALI)

Indigofera L.

Sp. Pl. 2: 751. 1753.

Key to species

1. Leaves trifoliate……2

1. Leaves multifoliate……3

2. Racemes longer than leaves……..……..*I. pedicelslata*

2. Raceme shorter than leaves……..*I. psoraloides*

3. Leaflets alternately arranged……..……..4

3. Leaflets opposite……..……..5

4. Racemes sub-capitate, shorter than leaves……*I. tsiangiana*

4. Racemes elongate, longer than leaves……..*I. hendecaphylla*

5. Lamina covered with gland tipped hairs……..…… *I. colutea*

5. Lamina without gland tipped hairs……..……6

6. Pods densely hairy ……..……..……7

6. Pods glabrous ……..……..……..8

7. Leaflets usually 6–10-paired…….. ……..…..*I. wightii*

7. Leaflets usually 2–3-paired……..……...*I. hirsuta*

8. Standard petal 1 cm across……..……..*I. cassioides*

8. Standard petal 0.3–0.35 cm across..……*I. tinctoria*

Indigofera cassioides Rottler ex. DC., Prodr. 2: 225. 1825; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 135. 2016.

Indigofera pulchella Roxb., Fl. Ind. ed., 1832, 3: 382. 1832; Hook.f., Fl. Brit. India 2: 101. 1876; Gamble, Fl. Madras 1: 313. 1918.

Erect shrubs, up to 1 m tall. Stems brown, young branches angular. Leaves pinnately compound, opposite, 9–21-foliate; lamina elliptic, 1–2 × *c.* 0.5 cm, rounded at apex, acute at base, entire, sparsely glabrous above, densely hairy below; petioles 4–9 cm long, hispid; petiolules *c.* 0.2 cm long, sparsely hairy. Stipels linear lanceolate, *c.* 0.1 cm long, acuminate at apex. Stipules linear, *c.* 0.3 × 0.1 cm, glabrous, caducous. Flowers in terminal racemes; peduncles 5–8 cm long, densely pubescent; pedicels *c.* 0.4 cm long, hispid. Bracts ovate-lanceolate, *c.* 4 × 2 mm, acuminate at apex, caducous, with greyish brown trichomes. Calyx cup-shaped, outside with sparse appressed white trichomes; lobes triangular, as long as tube. Corolla purple to light purple; standard petals broadly ovate, 10–12 × 8–10 mm, rounded at apex, entire, glabrous, base

clawed; wing petals elliptic, 6–8 × 2.5–3 mm, rounded at apex, entire, auriculate and clawed at base; keel petals falcate, outside apically hairy, very shortly spurred, ciliate. Staminal sheath 5–6 mm long. Ovary glabrous. Pods cylindric, glabrous. Seeds 8–12.

Distribution: The native range of this species is Indian Subcontinent to China (W. Guangxi, Yunnan) and Indo-China (POWO, 2023); *Habitat:* Grasslands along hill slopes; *Fl.* & *Ft.*: July-January.

Specimens examined: Karimutty, 29.12.2017, *Vishnu Mohan & Santhosh Nampy* 156598 (CALI); Mangaladevi, 10.01.1996, *Jomy Augustine* 17189 (CALI); Pius Nagar, 22.06.2018, *Vishnu Mohan & Santhosh Nampy* 159346 (CALI); way to top station, 13.09.1968, *D.B. Deb* 30809 (MH).

Indigofera colutea (Burm.f.) Merr., Philipp. J. Sci. 19: 355. 1921. *Galega colutea* Burm.f., Fl. Ind. 172. 1768; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 136. 2016.

Indigofera viscosa Lam., Encycl. 3(1): 247. 1789; Hook.f., Fl. Brit. India 2: 95. 1876; Gamble, Fl. Madras 1: 311. 1919.

Erect herbs, up to 1 m tall. Stems terete, with brown gland-tipped trichomes. Leaves imparipinnate, opposite, 9–11-foliate; leaflets opposite, narrowly elliptic, 4–10 × 1.5–4 mm, mucronate at apex, acute-rounded at base, entire, adpressed white medi fixed and gland-tipped trichomes; petioles up to 1 cm long, sparsely pubescent, pulvinate at base. Stipels absent. Stipules linear, 0.3–0.4 cm long, acuminate at apex, entire, with adpressed medi fixed trichomes. Flowers in lax flowered axillary racemes; peduncles 3–5 cm long, narrow, slender, with adpressed and gland-tipped trichomes; pedicels thin. Bracts linear, *c.* 0.1 cm long, thread-like, with appressed and gland-tipped trichomes. Calyx campanulate; lobes 5, 6–7 mm long, with spreading trichomes and gland-tipped trichomes. Corolla red; standard petals obovate, 4–6 × 2–3 mm, acute at apex, entire, hairy out; wing petals linear-oblong, 4–5 × 1.5–2 mm, rounded at apex, entire; keel petals narrowly obovate. Stamens 3–4 mm long; anthers globose. Ovary linear, densely hairy; styles short,

glabrous. Pods cylindric and gland-tipped trichomes. Seeds 9–12 per legume, dark brown.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat:* Dry deciduous forests and scrub jungles, also in the plains; *Fl.* & *Ft.*: May-December.

Specimens examined: Chinnar, 09.06.2017, *Vishnu Mohan* & *Santhosh Nampy* 152199; Thekkady, 16.08.1994, *Jomy Augustine* 13948 (CALI).

Indigofera hendecaphylla Jacq., Collectanea 2: 358. 1789; Gamble, Fl. Madras 1: 311. 1918.

Prostrate shrubs. Stems terete, slender, pubescent. Leaves pinnately compound; leaflets alternate, 8–10 pairs, oblanceolate, 15–20 × *c.* 6 mm, shortly mucronate at apex, obtuse at base, entire, glabrous, sessile; rachis 3–4 cm long, slender, glabrous. Stipules lanceolate, *c.* 1 × 0.5 cm, subulate, entire, glabrous. Flowers in axillary racemes; peduncles 3–6 cm long, glabrous; pedicels 0.15–0.23 cm long, slender. Calyx campanulate; lobes 5, subulate, 3 × 1 mm, acute at apex, entire, glabrous. Corolla red; standard petal obovate, 3–5 × *c.* 2 mm, acute-rounded at apex, entire, hispid out; wing petals linear-oblong, *c.* 3 × 2 mm, rounded at apex, entire; keel petals narrowly obovate. Stamens 9 + 1; filaments 4–5 mm long, slender. Ovary cylindric, densely hairy; styles short, glabrous. Pods compressed, rugose. Seeds 5-10.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat:* Degraded forest areas, also in the plains; *Fl.* & *Ft.*: September-December.

Specimens examined: Vallakkadavu, 22.09.1972, *B.D. Sharma* 40813 (MH); Clavary mount, 14.12.1982, *C.N. Mohanan* 76111 (MH)

Indigofera hirsuta L., Sp. Pl. 751. 1753; Hook.f., Fl. Brit. India 2: 98. 1876; Gamble, Fl. Madras 1: 312. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 139. 2016.

Annual erect herbs, up to 1 m tall. Stems terete, densely brown hirsute. Leaves pinnately compound; leaflets opposite, 2−5 paired, elliptic-oblong, 1–2 × 0.5–1

cm, obtuse at apex, rounded-attenuate at base, entire, hirsute; rachis 3–5 cm long, slender, pubescent; petioles 0.1–0.13 cm long, stout. Stipules lanceolate, 0.8–1 × 0.5 cm, acuminate, entire, hairy. Flowers in axillary many-flowered, dense racemes; peduncles 3–7 cm long, slender, pubescent; pedicels 0.3–0.6 cm long, slender, glabrous. Calyx campanulate, *c.* 1 mm long; lobes 5, subulate, *c.* 4 × 2 mm, acuminate, entire, hirsute. Corolla brick-red; standard petal obovate, *c.* 4 × 3 mm, acute at apex, obtuse at base, entire, pubescent out; wing petals linear-oblong, *c.* 3 × 2 mm, rounded at apex, entire; keel petals narrowly obovate. Ovary cylindric, densely hairy; styles slightly curved; stigmas capitate. Pods reflexed, linear, sub-tetragonous, densely hirsute. Seeds 5-8, angular, pitted.

Distribution: The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat:* Degraded moist deciduous forests and wastelands; *Fl.* & *Ft.*: July-December.

Specimen examined: Calvary Mount, 14.10.1982, *C.N. Mohanan* 74619 (MH).

Indigofera pedicelslata Wight & Arn., Prodr. Fl. Ind. Orient. 1: 200 1834; Gamble, Fl. Madras 1: 311. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2:142. 2016.

Prostrate herbs. Stems terete, adpressed-pubescent. Leaves 3-foliolate; leaflets obovate, *c.* 2 × 2.5 cm, rounded at apex, obtuse at base, entire, gland-dotted and adpressed-pubescent below; rachis 2–3 cm long, slender; petioles *c.* 0.5 cm long, slender. Stipules ovate, 3–5 × *c.* 2 mm, acute, entire, scaly. Flowers in axillary racemes; peduncles *c.* 0.4 cm long; pedicels 2.5–3 cm long, slender. Bracts ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Calyx campanulate; lobes 5, sub-equal, 2–3 × *c.* 1 mm, acute at apex, entire. Corolla red; standard petal obovate, *c.* 5 × 2 mm, acute-rounded at apex, entire, pubescent out; wing petals oblong *c.* 4 × 2 mm, rounded at apex, entire, glabrous; keel petals erect. Stamens 9 + 1; filaments 5–6 mm long, slender. Ovary sessile; styles slightly curved; stigmas capitate. Pods elliptic, straight. Seeds *c.* 6.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat:* Grassland; *Fl.* & *Ft.*: July-December.

Specimen examined: Umiyamala, 06.08.1967, *B.V. Shetty* 28327 (MH).

Indigofera psoraloides (L.) L., Syst. Nat. ed., 12. 2: 496. 1767. *Cytisus psoraloides* L., Sp. Pl. 1043. 1753.

Indigofera trifoliata L., Pl. Rar. Afr. 15. 1760, *nom. illeg.*; Hook.f., Fl. Brit. India 2: 96. 1876, *p.p.*; Gamble, Fl. Madras 1: 310. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 144. 2016.

Creeping prostrate herbs. Stems terete, with trichomes. Leaves alternate, trifoliate; leaflets narrowly obovate, 5–16 × 3–5 cm, mucronate at apex, acute at base, recurved at margins, appressed hairy; petioles 0.6–1.5 cm long, glabrous, pulvinate at base, hairy; petiolules 0.2–0.3 cm long, narrow. Stipels linear, *c.* 0.05 cm long, acuminate at apex, glabrous. Stipules lanceolate, 0.4–0.5 × *c.* 0.02 cm, acuminate at apex, entire, sparsely pubescent. Flowers in axillary racemes; peduncles 0.3–0.5 cm long, narrow; pedicels slender, narrow, *c.* 0.2 cm long. Bracts narrowly lanceolate, *c.* 1 × 0.2 mm, acuminate at apex, entire, pubescent. Calyx campanulate, lobed; lobes triangular, *c.* 1.5 mm long. Corolla red; standard petals orbicular, 5–6 × 3–4 mm, rounded at apex, entire, hairy out, glabrous within; wing petals elliptic, 4–5 × *c.* 2 mm, rounded at apex, entire, glabrous; keel petals falcate, hairy out. Staminal sheath glabrous. Ovary glabrous; styles *c.* 3 mm long; stigmas globose. Pods straight, laterally flattened. Seeds *c.* 2 × 2 mm.

Distribution: The native range of this species is Cape Prov. (POWO, 2023); *Habitat:* In degraded forest areas and scrub jungles; *Fl.* & *Ft.*: September-December.

Specimen examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175931 (CALI).

Indigofera tinctoria L., Sp. Pl. 751. 1753; Baker in Hook. f., Fl. Brit. India 2: 99. 1876; Gamble, Fl. Madras 312. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 144. 2016.

Erect shrubs, up to 1 m tall. Stems erect, terete, adppresed-pubescent. Leaves imparipinnate, opposite, 5–13-foliate; leaflets opposite, elliptic, 0.6–2 × 0.4–1.2 cm, rounded at apex and base, entire, glabrous; petioles 3–7 cm long, glabrous, pulvinate at base; petiolules obscure. Stipules lanceolate, *c.* 0.2 × 0.1 cm, acuminate at apex, entire. Flowers in axillary racemes; peduncles 2–5 cm long; pedicels *c.* 0.1 cm long, slender, narrow. Calyx campanulate, pubescent, lobed; lobes narrow lanceolate, acuminate. Corolla red; standard petals sub-orbicular, 3–3.5 × 2–3 mm, acute at apex, entire, glabrous. Staminal sheath glabrous. Ovary hairy; styles *c.* 3 mm long; stigmas globose. Pods linear, straight, glabrous, 8–12-seeded.

Distribution The native range of this species is Sahara to Pakistan (POWO, 2023); *Habitat*: Degraded forest areas and scrub jungles, also in the plains; *Fl.* & *Ft.*: August-February.

Specimens examined: Kuruthode, 16.11.1992, *Jomy Augustine* 16957; Mannavan Shola, 25.02.2003, *P. Nisha Kumari* 88842; Munnar, 12.02.2001, *P.D. Priya* 51711 (CALI).

Indigofera tsiangiana F.P.Metcalf, Sunyatsenia 4: 156. 1940.

Indigofera enneaphylla L., Mant. Pl. Altera 2: 272. 1771, *nom. illeg.*; Hook.f., Fl. Brit. India 2: 94. 1876; Gamble, Fl. Madras 1: 309. 1918.

Prostrate spreading herbs. Stems terete, pubescent, woody at base. Leaves imparipinnate, alternate; leaflets 5–9, sub-sessile, oblong, 0.3–0.5 × 0.2–0.3 mm, obtuse at apex, cuneate at base, entire, adpressed pubescent; petioles erect, slender, 3–5 cm long, hispid; petiolules obscure. Stipules ovate, *c.* 3 × 2 mm long, acuminate at apex, cuspidate, scarious. Flowers in axillary sub-capitate racemes; peduncles *c.* 5 cm long; pedicels *c.* 0.3 cm long. Bracts ovate, *c.* 2 × 1 mm, acuminate at apex, deltoid. Calyx-tubes *c.* 2 mm long; lobes lanceolate, *c.* 2 mm long, entire, setaceous. Corolla red; standard petal obovate,

5–7 × 3–3.5 mm, acute at apex, entire, glabrous; wing petals elliptic, 4–6 × 2–2.4 mm, rounded at apex, entire, glabrous; keel petals falcate. Staminal sheath 2.5–3 mm long, glabrous. Ovary sparsely pubescent; styles apically incurved. Pods oblong-cylindrical or sub-globose, adpressed hairy. Seeds 2.

Distribution: The native range of this species is Sudan, China (S. Sichuan, Yunnan) to Tropical Asia and Australia (POWO, 2023); *Habitat:* Grasslands, also in the plains; *Fl.* & *Ft.*: September-February.

Specimens examined: Chinnar Wildlife Sanctuary, 14.02.2001, *K. Sonia* 72661; Karimutty, 29.12.2017, *Vishnu Mohan & Santhosh Nampy* 156599; Thekkady, 10.12.1996, *Jomy Augustine* 16963 (CALI).

Indigofera wightii Graham ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 202. 1834; Hook.f., Fl. Brit. India 2: 99. 1876; Gamble, Fl. Madras 1: 313. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 147. 2016.

Erect shrubs. Stems terete, glabrous. Leaves alternate, imparipinnate, 11–19-foliate; leaflets opposite, elliptic, 5–10 × 2.5–5 mm, rounded at apex with a mucronate tip, acute at base, entire, with appressed trichomes; petioles 3–5 cm long, adaxially grooved, with appressed gray medi fixed trichomes; petiolules *c.* 0.1 cm long. Stipules lanceolate, 0.15–0.25 cm, caducous. Flowers in axillary-terminal racemes; peduncles 4–7 cm long, with appressed trichomes; pedicels 0.1–0.2 cm long, with spreading trichomes. Bracts rhomboid, *c.* 1.5 × 1 mm, acute at apex, caducous. Calyx campanulate with appressed trichomes, lobed; lobes ovate, *c.* 2 × 1 mm, acute at apex. Corolla red; standard petals broadly ovate, *c.* 6 × 4 mm, rounded-acute at apex, entire, glabrous; wing petals narrowly elliptic, *c.* 3 × 1 mm, rounded at apex, entire, glabrous; keel petals falcate. Anthers ellipsoid, glabrous. Ovary hairy; styles *c.* 3 mm long; stigmas obscure. Pods cylindric, with dense appressed medi fixed trichomes. Seeds 6–11.

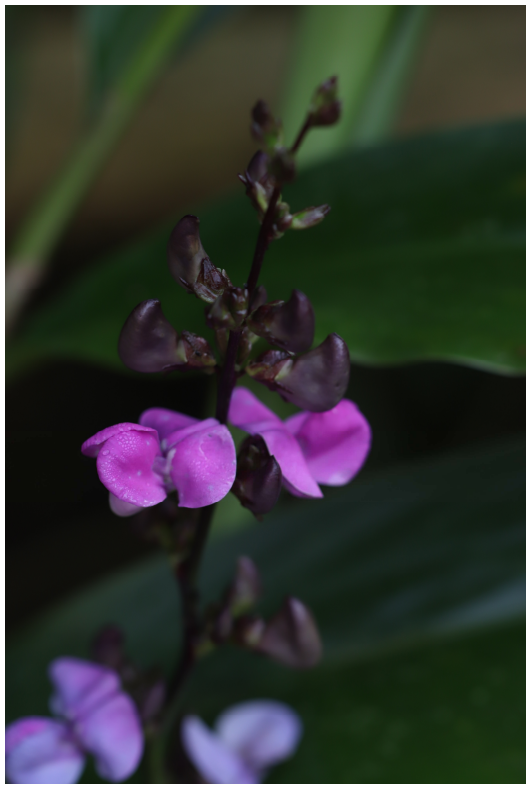
Distribution: The native range of this species is India, Sri Lanka, Hainan to Indo-China (POWO, 2023); *Habitat:* Grasslands; *Fl.* & *Ft.*: February-July.

Specimens examined: Chinnar, 12.02.1995, *K.K. Sajeev* 11946 (KFRI); Mangaladevi, 08.07.1993, *Jomy Augustine* 12047 (CALI).

Lablab Adans,

Fam. Pl. 2: 325. 1763.

Lablab purpureus (L.) Sweet subsp**. uncinatus** Verdc., Kew Bull. 24: 410. 1970.



Twinning vines. Stems climbing, terete, non woody, glandular on young parts, glabrous when mature, nonsticky. Leaves trifoliate, alternate; petioles pulvinate at base, erect, straight, 6–8.5 cm long, non-sticky, sparsely hairy towards apex; petiolules 0.4–0.6 cm long, densely pubescent; leaflets widely ovate, middle lamina 6–9 × 5–8 cm, acuminate at apex, rounded at base, entire, glabrous above, velvetish below; lateral laminas 5–8 × 4–7 cm; acuminate at apex, rounded at base entire, glabrous within, velvetish out. Stipels lanceolate, *c.* 0.6 × 0.2 cm, acuminate at apex, entire, sparsely ciliate at lower margin, glabrous; stipules lanceolate, *c.* 0.5 × 0.2 mm, acuminate at apex, entire, glabrous, smooth. Flowers in many flowered axillary racemes; peduncles straight, erect, 17–82 cm long, terete, sparsely pubescent, sticky. Flowers purple; petioles erect, stout, *c.* 0.3 mm long, glabrous, terete. Bracts elliptic, cymbifirm, 9–10 × 2.5–3 mm, rounded-acute at apex, entire, glabrous. Calyx fused at base; lobes 3 + (2), linear-ovate, 3–5 mm long, acuminate at apex, falcate, glabrous. Standard petals widely orbicular, 1.2–1.4 × 2.3–2.5 cm, clefted at apex, cordate at base, smooth, glabrous; wing petals obovate, *c.* 1.8 × 1.2 mm, rounded at apex, entire, glabrous; keel petals falca te, cymbiform, 2.4–2.6 × *c.* 0.6 cm, entire, glabrous. Anthers monodelphous; staminal sheath 10–12 mm long,

glabrous; stamens elliptic, *c.* 1.5 × 1 mm, longitudinally dehiscing. Ovary fusiform, *c.* 10 × 2 mm; styles falcate, *c.* 10 mm long, densely pubescent on top; stigmas sticky. Pods oblong-falcate, 48–53 ×15–18 mm. Seeds 4, molted, ovoid, *c.* 9 × 6 mm; aril linear, white.

Distribution: The native range of this subspecies is Eritrea to S. Africa, Madagascar (POWO, 2023); *Habitat:* Grown in association with trees in forest margins; *Flowering & fruiting:* The plants started flowering from September with a peak blooming observed from October to December and thereafter declined by March.

Specimen examined: Munnar, 04.12.2022, *Vishnu V.S.* & *Vishnu Mohan* 176139 (CALI)

Notes: Lablab purpureus subsp. *uncinatus* Verdc. is not cultivated due to its anti-nutritional properties of the pod. The species is morphologically close to *Lablab purpureus* (L.) Sweet in having habit, stems, leaves, flower colour and seed shape. This taxon is so far not reported from Asia and therefore it forms a new distributional record for the flora of Asia. Most probably, this species might have entered the locality through horticultural trade.

Leptodesmia (Benth.) Benth. & Hook.f.

Gen. Pl. 1(2): 522. 1865.

Leptodesmia microphylla (Thunb.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 186. 2018. *Hedysarum microphyllum* Thunb. in J.A.Murray, Syst. Veg. ed., 14: 675. 1784. *Desmodium microphyllum* (Thunb.) DC., Prodr. 2: 337. 1825.

Erect herbs. Stems terete, glabrous. Leaves trifoliate; leaflets narrowly obovate-elliptic, 10–12 × 4–6 mm, rounded at both ends, entire, glabrous; petioles *c.* 3 mm long, glabrous, slender. Flowers terminal or axillary, solitary. Pedicels *c.* 0.8 cm long, glabrous. Calyx 5-parted; lobes linear-lanceolate, *c.* 4 mm long, acuminate at apex, entire. Corolla pink; standard petals, obovate-orbicular, 6–8 × 4–5 mm, long, rounded at apex, shortly clawed at base; wing petals elliptic, 5–7 × *c.* 3 mm, rounded at apex, auriculate and clawed at base; keel petals narrowly elliptic. Stamens diadelphous; staminal sheath *c.* 4 mm

long, glabrous. Ovary pubescent; styles *c.* 3 mm long; stigmas capitate. Pods elliptic.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat:* Grasslands and savannahs; *Fl.* & *Ft.*: September-March.

Specimens examined: Kumarikulam, 16.09.1994, *Jomy Augustine* 14256; *Ibid.*, 05.03.2021, *Vishnu Mohan & Santhosh Nampy* 186612 (CALI).

Mucuna Adans.

Fam. Pl. 2: 325, 579. 1763, *nom. cons.*

Mucuna bracteata DC. ex Kurz, J. Asiat. Soc. Bengal Pt. 2, 42: 231. 1873; Hook.f., Fl. Brit. India 2: 186. 1876; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 151. 2016.



Twining vines. Stems terete, glabrous. Leaves alternate, trifoliate; leaflets rhombic-broadly ovate, 7–14 × 4–11 cm, acute-acuminate at apex, broadly cuneate at base, entire, glabrous; petioles 6–11 cm long, sparsely hairy, pulvinate at base; petiolules 0.5–1 cm long, glabrous. Stipels lanceolate, 0.3–0.5 × *c.* 0.2 cm, acuminate at apex. Flowers in terminal or axillary racemes; peduncles 5–10 cm long, terete; petioles 0.5–0.8 cm long, glabrous. Bracts ovate, *c.* 5 × 3 mm, acute at apex, entire, persistent; bracteoles smaller than Bracts, persistent. Calyx densely clothed with soft hairs, campanulate, lobed; lobes 2–6 mm long. Corolla deep purple; standard petals ovate, 15–20 × 5–8 mm, acute at apex, entire, glabrous; wing petals elliptic 17–1 9 × 4–6 mm, rounded at apex, entire, glabrous; keel petals falcate. Staminal sheath 15–19 mm long, glabrous. Ovary hispid; styles short; stigmas not prominent. Pods linear, clothed with dark brown irritant hairs. Seeds 3–6.

Distribution: The native range of this species is E. Himalaya to China (Guangdong, Yunnan) and Sumatera (POWO, 2023); *Habitat:* Grown as cover crop in rubber plantations; *Fl.* & *Ft.*: December-June.

Specimens examined: way to Karimutty, 25.06.2018, *Vishnu Mohan & Santhosh Nampy* 158019; Padikkappu, 28.12.2017, *Vishnu Mohan & Santhosh Nampy* 156566 (CALI).

Phyllodium Desv.

J. Bot. Agric. 1: 123, t. 5. 1813.

Phyllodium pulchellum (L.) Desv., Mém. Soc. Linn. Paris 4: 324. 1826 *Desmodium pulchellum* (L.) Benth., Fl. Hongk. 83. 1861; Hook.f., Fl. Brit. India 2: 162. 1876; Gamble, Fl. Madras 1: 344. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 109. 2016. *Hedysarum pulchellum* L. in Sp. Pl.: 747 1753.

Erect shrubs, up to 1 m tall. Stems white or gray pubescent, terete. Leaves trifoliate, alternate; terminal leaflet ovate-elliptic, 4–10 × 2.5–5 cm, rounded at apex, entire, glabrous; lateral leaflets smaller than terminal; petioles *c.* 0.7 cm long, glabrous, pulvinate at base; petiolules *c.* 0.2 cm long, glabrous. Flowers in terminal panicles, enclosed by pair of leaflike Bracts; peduncles 20–40 cm long, drooping; pedicels reduced. Bracts orbicular, 1–1.5 × *c.* 1 cm, slightly pubescent, ciliate, foliaceous. Calyx campanulate; lobes *c.* 3 mm long, green. Corolla white or pale yellow; standard petals obovate, 5–6 × *c.* 4 mm, rounded at apex, attenuate at base, entire, shortly and broadly clawed; wing petals elliptic, *c.* 5 × 3 mm, rounded at apex, auriculate at base, clawed; keel petals falcate, clawed, not auriculate. Pistil *c.* 6 mm long; styles *c.* 4 mm long, sparsely pubescent. Pods usually 2-jointed sparsely pubescent and ciliate, lower surface deeply lobed. Seed broadly elliptic or nearly orbicular.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat:* Moist deciduous forests; *Fl.* & *Ft.*: September-March.

Specimen examined: Way to Kumarikulam, 05.03.2021, *Vishnu Mohan* 186609 (CALI).

Pleurolobus J.St.-Hil.

Nouv. Bull. Soc. Philom. 3: 192. 1812.

Pleurolobus pryonii (DC.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 387. 2018; *Desmodium pryonii* DC., Prodr. 2: 334. 1825.

Desmodium wightii Graham ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 266. 1834; Hook.f., Fl. Brit. India 2: 169. 1876; Gamble, Fl. Madras 1: 346. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 109. 2016.

Erect shrubs, up to 40 m tall. Stems angled, villous. Leaves alternate, trifoliate; leaflets rhomboid-ovate, 4–7 × 2–3.5 cm, acuminate at apex, acute at base, entire, glabrous above, densely hairy below; petioles 4–7 cm long, pulvinate at base, glabrous; petiolules *c.* 0.2 cm long glabrous. Flowers in terminal racemes; peduncles *c.* 10 cm long, slender; pedicels *c.* 0.8 cm long, slender, glabrous. Corolla pink. Calyx campanulate; lobes 5, acute, *c.* 2 × 1 mm, entire, hairy out, glabrous within. Standard petals orbicular, *c.* 10 × 5 mm, rounded at apex, entire, glabrous; wing petals elliptic, *c.* 8 × 4 mm, rounded at apex, entire, glabrous. Staminal sheath *c.* 4 mm long. Pods 6-jointed, glabrous.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat:* Deciduous forests; *Fl.* & *Ft.*: January-April.

Specimens examined: Mangaladevi, 16.01.1996, *Jomy Augustine* 17191; Munnar, 12.02.2001, *P. Hajarommabi* 72802 (CALI).

Pseudarthria Wight & Arn.

Prodr. Fl. Ind. Orient. 1: 209. 1834.

Pseudarthria viscida (L.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 209. 1834; Hook.f., Fl. Brit. India 2: 154. 1876; Gamble, Fl. Madras 1: 334. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 164. 2016. *Hedysarum viscidum* L., Sp. Pl. 747. 1753.

Erect pubescent herbs, up to 50 cm tall. Leaves alternate, trifoliate; leaflets rhomboid, 3–8 × 2–6 cm, acute at apex, cuneate at base, entire, glabrescent above, densely woolly below; petioles 4–6 cm long, glabrous. Stipules lanceolate, 0.5–0.6 × *c.* 0.3 cm, acuminate at apex, subulate. Flowers in axillary or terminal racemes. Bracts subulate, 4–5 × 2–3 mm, acute at apex, entire; bracteoles *c.* 3 × 2 mm, acute at apex, subulate, pubescent. Calyx campanulate, lobed; lobes ovate, 3–4 × *c.* 2 mm, acute at apex, entire, subulate, pubescent. Standard petals ovate-orbicular, 4–5 × 2.5–3 mm, acute at apex, entire, glabrous; wing petals elliptic, 3.6–4 × 1.5–2 mm, rounded at apex, entire, crimped. Staminal sheath *c.* 4 mm long. Ovary 4–5 mm long, terete, densely pubescent; styles subulate, incurved; stigmas capitate. Pods linear-oblong, compressed, pubescent with hooked hairs. Seeds reniform.

Distribution: The native range of this species is India to Myanmar and Malesia (POWO, 2023); *Habitat:* Moist deciduous forests, also in the plains; *Fl.* & *Ft.*: November-March.

Specimens examined: Kanjira, 17.12,1982, *V.S. Ramachandran* 76166 (MH); MSNP, 11.12.2016, *Vishnu Mohan & Santhosh Nampy* 151394; Mangaladevi, 16.11.1993, *Jomy Augustine* 12672 (CALI).

Pterocarpus Jacq.

Select. Stirp. Amer. Hist. 238. 1763, *nom. cons.*

Pterocarpus marsupium Roxb., Pl. Coromandel 2: 9. 1799; Hook.f., Fl. Brit. India 2: 239. 1876; Gamble, Fl. Madras 1: 385. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 166. 2016.

Deciduous trees, up to 20 m tall. Stems woody, bark rough, exudation blood-red. Leaves imparipinnate, alternate; leaflets 5–7, alternate, elliptic, 3–8 × 2–5 cm, obtuse at apex and base, entire, glabrous, coriaceous; petioles *c.* 6–10 cm long, slender, pulvinate, glabrous; petiolules 0.5–1 cm long, slender, glabrous. Stipules lanceolate, *c.* 0.4 × 0.2 cm, acuminate at apex, entire. Flowers in terminal and axillary panicles; peduncles woody, 7–15 cm long; pedicels *c.* 0.4 cm long, glabrous. Bracts ovate, 4–5 × 2–2.5 mm, acuminate at apex; bracteoles ovate, *c.* 3 × 2 mm, acute at apex, caducous. Calyx

campanulate; lobes widely ovate, 2–3 × 2–3 mm, entire, glabrous. Petals yellow clawed; standard petals orbicular, 10–15 × 8–10 mm, glabrous; wing petals oblique, obovate, 10–13 × 3–4 mm, entire, glabrous, auricled; keel petals oblique, slightly connate. Stamens 10, monadelphous; filaments sub-equal. Ovary inferior, tomentose; styles filiform, incurved; stigmas capitate. Pods orbicular-reniform, broadly winged Seed 1, sub-reniform.

Distribution: The native range of this species is Indian Subcontinent (POWO, 2023); *Habitat:* Moist and dry deciduous forests, also in the plains; *Fl.* & *Ft.*: August-October.

Specimens examined: Kattappana, 28.08.2018, *Vishnu Mohan & Santhosh Nampy* 176329 (CALI); Thannikkudy, 02.10.1972, *B.D. Sharma* 42382 (MH).

Neustanthus Benth.

in Miquel, Pl. Jungh. 234. 1852.

Neustanthus phaseoloides (Roxb.) Benth. in Miquel, Pl. Jungh. 235. 1852. *Dolichos phaseoloides* Roxb., Fl. Ind. ed., 1832, 3: 316. 1832. *Pueraria phaseoloides* (Roxb.) Benth., J. Linn. Soc. Bot. 9: 125. 1867; Hook.f., Fl. Brit. India 2: 199. 1876; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 167. 201.



Twining herbs. Stems terete, pubescent. Leaves 3-foliate, alternate; leaflets obliquely ovate-rhombic, 6–10 × 5.5–9 cm, acute-apiculate at apex, cuneate at base, entire, appressed silky below, chartaceous. Flowers sub-sessile, in racemes; peduncles 8–15 cm long, erect, pubescent. Calyx connate; lobes 5, acute, entire, glabrous. Standard petal obovate, 7–1.2 × 5–7 mm, acute-rounded at apex, entire, glabrous; wing petal elliptic, 8–11 × 4–5 mm, rounded

at apex, entire, glabrous; keel petal cymbifor m, glabrous. Stamens 10, monadelphous. Ovary sessile; styles 5–7 mm long, sparsely pubescent; stigmas sticky. Pods up to *c.* 10 cm long, glabrscent.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat:* Along the forest cuttings; *Fl.* & *Ft.*: October-March.

Specimen examined: Kanjiar, 24.02.1982, *C.N. Mohan* 77976 (MH).

Pueraria DC.

Ann. Sci. Nat. (Paris) 4: 97. 1825.

Pueraria tuberosa (Roxb. ex Willd.) DC., Ann. Sci. Nat. (Paris) 4: 97. 1825; Hook.f., Fl. Brit. India 2: 197. 1876; Gamble, Fl. Madras 1: 360. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 168. 2016. *Hedysarum tuberosum* Roxb. ex Willd., Sp. Pl. ed., 4. 3: 1197. 1803.

Large climbing shrubs with tuberous roots. Stems terete, appressed-velvety, wiry. Leaves 3-foliolate; leaflets ovate, 5–18 × 5–12.5 cm, acuminate at apex, obtuse at base, scattered hairy above, appressed hairy beneath; petioles up to 18 cm long. Stipules ovate, *c.* 0.5 × 0.3 cm, acute at apex, entire, pubescent. Flowers in axillary racemes; peduncle 15–35 cm long, slender, pubescent; pedicels *c.* 0.3 cm long. Calyx campanulate; lobes 5, ovate, tomentose. Standard petals orbicular, *c.* 1.2 × 5 mm, acute at apex, auricled at base, emarginate, glabrous; wing petals elliptic, *c.* 10 × 3 mm, rounded at apex, entire, glabrous; keel petals long-clawed. Stamens 9+1; filaments 8–10 mm long, glabrous. Ovary oblong, densely brown-hirsute; styles incurved; stigmas capitate. Pods linear, hairy.

Distribution: The native range of this species is Indian Subcontinent (POWO, 2023); *Habitat:* Moist deciduous forests; *Fl.* & *Ft.*: December-April.

Specimen examined: Panamkutty, 22.02.1983, *C.N. Mohanan* 77941 (MH)

Rhynchosia Lour.

Fl. Cochinch. 2: 425 (460). 1790.

1. Seeds black……..……*R. rufescens*

1. Seeds deep blue……*R. hirta*

Rhynchosia hirta (Andrews) Meikle & Verdc., Taxon 16: 462. 1967; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 173. 2016. *Dolichos hirtus* Andrews, Bot. Repos. 7: t. 446. 1807. *Rhynchosia cyanosperma* Benth. ex Baker in D.Oliver & auct. suc. (eds.), Fl. Trop. Afr. 2: 218. 1871; Hook.f., Fl. Brit. India 2: 222. 1876; Gamble, Fl. Madras 1: 375. 1918.



Climbing shrubs. Stems terete, hispid. Leaves trifoliate, alternate; lamina rhomboid, 5–10 × 4–8 cm, shortly acuminate at apex, rounded at base, entire, glabrous above; petioles 4–6 cm long, sparsely pubescent, pulvinate; petiolules *c.* 0.3 cm long, glabrous. Stipules ovate *c.* 0.3 × 0.2 cm, acute at apex, entire, glabrous; stipels filiform. Flowers in axillary racemes; peduncles 4–10 cm long, branching, hispid. Bracts ovate *c.* 10 × 6 mm, acute at apex, entire, hispid out, glabrous within. Calyx campanulate, lobed; lobes oblong, densely hispid. Petals yellow; standard petals ovate-orbicular, 12–14 × 8–10 mm, acute at apex, emarginate; wing petals elliptic, 9–12 × 4–5 mm, rounded at apex, spurred; keel petals falcate, glabrous. Staminal sheath 8–10 mm long, glabrous. Ovary hispid; styles 4–6 mm long; stigmas capitate. Pods oblong, acute at apex. Seeds deep blue, smooth, shining.

Distribution: The native range of this species is Tropical & S. Africa, India, Sri Lanka (POWO, 2023); *Habitat:* Moist deciduous and semi-evergreen forests; *Fl.* & *Ft.*: December-April.

Specimens examined: Peerumedu, 27.04.2018, *Vishnu Mohan & Santhosh Nampy* 159202; Thannikkudy, 14.12.1993, *Jomy Augustine* 13045 (CALI).

Rhynchosia rufescens DC., Prodr. 2: 387. 1825; Hook.f., Fl. Brit. India 2: 220. 1876; Gamble, Fl. Madras 1: 373. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 174. 2016.

Prostrate herbs. Stems zigzag, terete, pubescent. Leaves alternate, trifoliate; leaflets ovate-elliptic, 2–5.5 × 1–2.5 cm, acute at apex, cuneate at base, entire, pubescent; petioles 2–4 cm long, pubescent; petiolules 0.1–0.2 cm long. Stipules small, linear-lanceolate, *c.* 0.4 × 0.1 cm, acuminate at apex, entire, pubescent; stipels linear *c.* 0.2 cm long, deciduous. Flowers in axillary racemes; peduncles 2–5 cm long, hispid; pedicels 0.3–0.5 cm long, glabrous, erect. Bracts ovate, *c.* 4 × 2 mm, acute at apex, entire, deciduous. Calyx campanulate, lobed; lobes ovate-lanceolate, 5–6 × 2–2.5 mm, acuminate at apex, entire, densely pubescent out. Corolla purple-yellow; standard petals obovate, 5–7 × *c.* 4 mm, acute at apex, entire, glabrous; wing petals elliptic, 4–6 × 2–2.5 mm, rounded at apex, entire, glabrous; keel petals falcate. Staminal sheath glabrous. Ovary hairy; styles *c.* 4 mm long; stigmas capitate. Pods obliquely orbicular, inflated, pubescent. Seed 1, black.

Distribution: The native range of this species is India to China (Guangxi, Yunnan) and Indo-China, Jawa to Lesser Sunda Islands (POWO, 2023); *Habitat:* Grasslands and moist deciduous forests; *Fl.* & *Ft.*: August-January.

Specimens examined: Chinnar, 08.01.1995, *K.K. Sajeev* 11694 (KFRI); Mangaladevi, 06.08.1993, *Jomy Augustine* 12454; Pothadi, near Marayur, 26.01.2018, *Vishnu Mohan & Santhosh Nampy* 158310 (CALI).

Rothia Pers.

Syn. Pl. 2: 638. 1807.

Rothia indica (L.) Druce, Rep. Bot. Exch. Club Soc. Brit. Isles 3: 423. 1913, publ. 1914; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 176. 2016. *Trigonella indica* L., Sp. Pl. 778. 1753. *Rothia trifoliata* (Roth) Pers., Syn. 2: 302. 1807; Baker in Hook.f., Fl. Brit. India 2: 63. 1876; Gamble, Fl. Madras 279. 1918.

Erect herbs. Stems terete, woody, stiff, adpressed-pilose. Leaves trifoliate, alternate; leaflets oblanceolate, 1–2 × 0.5–0.6 cm, mucronate at apex, cuneate at base, entire, adpressed pilose; petioles 0.5–0.7 cm long, glabrous; petiolules *c.* 0.1 cm long, glabrous. Stipules lanceolate, .3–0.4 × 0.2–0.24 cm, acuminate at apex, entire, glabrous. Flowers leaf-opposed; pedicels *c.* 0.3 cm long, glabrous. Bracts ovate, filiform, 1.5–2 × 1–1.5 mm, acute at apex. Calyx obconical, campanulate; lobes triangular, 3–4 × 1.5–2 mm, acuminate at apex, entire, glabrous. Corolla yellow; standard petals oblong-orbicular, 5–7 × 3–4 mm, rounded at apex, entire, pilose below along midline; wing petals oblong, 5–6 × 2.5–3 mm, rounded at apex, entire; keel petals falcate. Staminal sheath glabrous. Ovary hairy; styles 2–2.5 mm long, straight; stigmas capitate. Pods narrowly oblong, compressed, pubescent. Seeds brown.

Distribution: The native range of this species is W. & S. India, Sri Lanka, China (Guangdong) to Peninsula Malaysia, Australia (POWO, 2023); *Habitat:* Grasslands and moist deciduous forests; *Fl.* & *Ft.*: September-March.

Specimens examined: Chinnar, 17.02.1998, *K.B. Bindhu* 62071; *Ibid*., 09.03.2021, *Vishnu Mohan & Santhosh Nampy* 188818; Ramakkalmedu, 07.09.2017, *Vishnu Mohan & Santhosh Nampy* 152942; Thekkady, 10.09.1994, *Jomy Augustine* 13949 (CALI).

Sesbania Adans.

Fam. Pl. 2: 327. 1763.

Sesbania javanica Miq., Fl. Ned. Ind. 1(1): 288 1855; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 177. 2016.

Sesbania aculeata (Willd.) Poir. var. paludosa (Roxb.) Baker in Hook.f., Fl. Brit. India 2: 115. 1876.

Erect annual sub-shrubs, up to 3 m tall. Stems woody, terete, smooth, glabrous. Leaves pinnate, alternate; leaflets 21–45, opposite, elliptic, 1.5–3.2 × 0.4–0.7 cm, rounded at apex, cuneate at base, entire, thinly hairy beneath; petioles 11–24 cm long, slender, glabrous. Stipules lanceolate-caducous, 3–4 × *c.* 2 mm, acute at apex, entire, glabrous. Flowers yellow in lax drooping racemes; peduncles up to 14 cm long; pedicels 0.8–1.5 cm long, slender. Calyx campanulate; lobes triangular, obscure. Standard petal oblong, *c.* 22 × 18 mm, rounded at apex, entire, glabrous, purple dotted; wing petals elliptic, *c.* 20 × 6 mm, rounded at apex, entire, glabrous; keel petals cymbiform. Staminal sheath 15–18 mm long. Ovary elliptic; styles 4–7 mm long, glabrous; stigmas sticky. Pods linear, pendulous, somewhat twisted, slightly torulose.

Distribution: The native range of this species is Tropical Asia (POWO, 2023); *Habitat:* On road sides; *Fl.* & *Ft.*: September-December.

Specimens examined: Kattappana, 13.09.2019, *Vishnu Mohan & Santhosh Nampy* 165432 (CALI).

Shuteria Wight & Arn.

Prodr. Fl. Ind. Orient. 1: 207. 1834, *nom. cons.*

Shuteria involucrata (Wall.) Wight & Arn. ex Walp., Repert. Bot. Syst. 1: 761. 1842; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 179. 2016. *Glycine involucrata* Wall., Pl. Asiat. Rar. 3: 22. 1832. *Shuteria vestita* var. *involucrata* (Wall.) Baker in Hook.f., Fl. Brit. India 2: 182. 1876, *nom. superfl*; Gamble, Fl. Madras 1: 350. 1918.

Climbing herbs. Stems twining, slender, densely pubescent. Leaves alternate, trifoliate; leaflets ovate, 2–6 × 1–4 cm, acute at apex, cuneate at base, entire; petioles 4–7 cm, glabrous, pulvinate at base. Stipules lanceolate, *c.* 0.4 × 0.2 cm, acuminate at apex, entire, persistent; stipels linear, *c.* 0.3 cm long. Flowers in axillary racemes; peduncles 1–2 cm long, pubescent; pedicels *c.* 0.3 cm long, terete. Bracts lanceolate, *c.* 3 × 1.5 mm; bracteoles lanceolate, *c.* 2 × 1 mm, acuminate at apex, entire. Calyx campanulate; lobes 4, lanceolate, 2.5–3 × 1.5–2 mm, acute at apex. Corolla light purple; standard petal elliptic-obovate, 6–7

× 4–4.5 mm, rounded at apex, entire, glabrous; wing petals oblong, *c.* 6 × 3 mm, rounded at apex, entire, glabrous; keels petals falcate. Ovary pubescent, sessile; styles 4–5 mm long; stigmas capitate. Pods linear, compressed. Seeds 5.

Distribution: Indian Subcontinent to China (Yunnan, Guangxi) and Indo-China (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests, often in the plains; *Fl.* & *Ft.*: October-May.

Specimens examined: Devikolam, 11.10.1963, *K.M. Sebastine* 17522 (MH); Periyar Tiger Reserve, 11.12.1993, *Jomy Augustine* 12934 (KFRI); Vallakkadavu, 11.05.1995, *Jomy Augustine* 15189; Vattappara, Mathikettan Shola National Park, 24.02.2016, *Syam Radh S.* 145129 (CALI).

Spatholobus Hassk.

Flora 25(2, Beibl. 1): 52. 1842.

Spatholobus parviflorus (Roxb. ex G.Don) Kuntze, Revis. Gen. Pl. 1: 205. 1891; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 187. 2016. *Butea parviflora* Roxb. ex G.Don, Gen. Hist. 2: 373. 1832.

Spatholobus roxburghii Benth. in F.A.W.Miquel, Pl. Jungh. 238. 1852; Hook.f., Fl. Brit. India 2: 193. 1876; Gamble, Fl. Madras 1: 358. 1918.

Large climbers. Stems woody, terete, puberulous. Leaves 3-foliate, alternate; leaflets ovate, 0.8–1 × 0.4–0.5 cm, obtusely acute at apex, rounded at base, entire, densely hairy below; petioles 3–6 cm long, slender, pubescent. Flowers in axillary panicles; peduncles slender, densely hispid. Calyx campanulate; lobes 5, acuminate, densely villous within. Standard petal obovate, *c.* 8 × 6 mm, acute-rounded at apex, entire, glabrous; wing petal elliptic, *c.* 6 × 4 mm, rounded at apex, long-clawed at base, entire; keel petal obovoid. Staminal sheath delicate, glabrous. Ovary elliptic, pubescent; styles *c.* 3 mm long, pubescent; stigmas capitate. Pods stalked.

Distribution: The native range of this species is Indian Subcontinent to China (W. Yunnan) and Indo-China (POWO, 2023); *Habitat:* Semi-

evergreen and moist deciduous forests, also in sacred groves; *Fl.* & *Ft.*: September-April.

Specimen examined: Vazhathoppe, 18.02.1982, *C.N. Mohanan* 73386 (CALI).

Sohmaea H.Ohashi & K.Ohashi

J. Jap. Bot. 93(3): 159. 2018.

Key to the species

1. Joints of pod 3–4 times longer than broad……...*S. zonatum*

1. Joints of pod 2 times longer than broad……*S. laxiflorum*

Sohmaea laxiflora (DC.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 162. 2018. *Desmodium laxiflorum* DC., Ann. Sci. Nat. (Paris) 4: 100. 1825, Prodr. 2: 335. 1825; Hook.f., Fl. Brit. India 2: 164. 1876; Gamble, Fl. Madras 1: 344. 1918.

Erect shrubs, up to 120 cm tall. Stems terete, young parts with adpressed hooked hairs. Leaves trifoliate, alternate; Lamina ovate-elliptic, 5–15 × 2.5–4 cm, acuminate at apex, rounded at base, entire, abaxially densely yellow sericeous, adaxially sparsely adpressed hairy; petioles 1.5–4 cm long. Flowers in terminal or axillary racemes; peduncles pubescent with minute hooked hairs; pedicels 0.5–1 cm long, densely hairy. Calyx campanulate, densely villous; lobes ovate-lanceolate, *c.* 3 mm long, acuminate at apex. Corolla white to violet; standard petals broadly obovate, *c.* 7 × 5 mm, rounded at apex, acute at base, entire, glabrous; wing petals elliptic, *c.* 6 × 3 mm, rounded at apex, auriculate at base, entire; keel petals clawed. Staminal sheath delicate, glabrous. Styles *c.* 3 mm long, pubescent; stigmas capitate. Pods linear, hooked hairy, 4–12-jointed, joints of pods 2 times longer than broad.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat:* Moist deciduous forests, also in the plains; *Fl.* & *Ft.*: September-January.

Specimen examined: Thekkady, 16.10.1994, *Jomy Augustine* 12499 (CALI).

Sohmaea zonata (Miq.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93(3): 163. 2018. *Desmodium zonatum* Miq., Fl. Ned. Ind. 1(1): 250. 1855; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 116. 2016.

Desmodium ormocarpoides auct. non DC. 1825; Baker in Hook.f., Fl. Brit. India 2: 164. 1876; Gamble, Fl. Madras 345. 1918.

Erect herbs, up to 30 cm tall. Stems narrow, terete, glabrous. Leaves simple, alternate, ovate-elliptic, 8–10 × 4–5 cm, acute to acuminate at apex, rounded at base, entire, glabrous above, densely hairy below; petioles *c.* 2 cm long, pubescent, pulvinate. Stipules lanceolate, 0.8–1 × *c.* 0.3 cm, acuminate at apex, glabrous inside, ciliate. Flowers in terminal racemes; peduncles 10–20 cm long; pedicels *c.* 1 cm long, slender, narrow. Calyx campanulate; lobes ovate, *c.* 5 mm long, acute at apex, glabrous. Corolla white; standard petals orbicular, 5–7 × 2.6–3 mm, rounded at apex, entire, glabrous; wing petals elliptic, 4–6 × 2–2.5 mm, rounded at apex, glabrous; keel petals falcate. Staminal sheath glabrous. Pods fragile, 6–8-jointed, densely covered with viscid hooked-hairs, joints of pod 3–4 times longer than broad.

Distribution: The native range of this species is Tropical & Subtropical Asia to Vanuatu (POWO, 2023); *Habitat:* Moist deciduous and semi-evergreen forests; *Fl.* & *Ft.*: July-December.

Specimen examined: Thekkady, 08.10.2018, *Vishnu Mohan & Santhosh Nampy* 152848 (CALI).

Smithia Scop.

Intr. Hist. Nat. 322. 1777.

1. Leaves glabrous……*S. venkobarowii*

1. Leaves hairy……..3

2. Stems villous……....*S. blanda*

2. Stems glabrous……...*S. conferta*

Smithia blanda Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 221. 1834; Gamble, Fl. Madras 1: 330. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 181. 2016.

Erect shrubs, up to 50 cm tall. Stems terete, densely villous. Leaves alternate, imparipinnate; leaflets obovate-elliptic, 0.6–1 × *c.* 0.3 cm, rounded at apex and base, entire, sparsely hairy, papery; petioles 3–5 cm long, pulvinate at base; petiolules less obscure, glabrous. Stipules lanceolate, *c.* 0.3 × 0.14 cm, acuminate at apex, villous. Flowers in axillary scorpioid cymes; peduncles 2–

4 cm long, glabrous, setose; pedicels *c.* 0.3 cm long, slender. Bracts ovate-orbicular, *c.* 4 × 2 mm, acute at apex, entire; bracteoles sub-orbicular, 2.5–3.5 × 1.7–2 mm, membranous. Corolla yellow; standard petals orbicular, 10–12 × 6–8 mm, clefted at apex, entire, glabrous, with a short claw; wing petals elliptic, 8–10 × 3–5 mm, rounded at apex, entire, glabrous, auricled; keel petals falcate, auricled. Stamens diadelphous; staminal sheath glabrous. Ovary with trichomes; styles filiform; stigmas ter minal. Pods shortly stipitate, divided into 6 articles.



Distribution: The native range of this species is Indian Subcontinent to China (Guizhou, SW. Sichuan, Yunnan) and Indo-Chin (POWO, 2023); *Habitat:* Marshy areas in grasslands; *Fl.* & *Ft.*: October-January.

Specimen examined: Vakavanam, 25.11.2018, *Vishnu Mohan & Santhosh Nampy* 170297 (CALI).

Smithia conferta Sm. in A.Rees, Cycl. 33: n. 2. 1816; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 182. 2016.

Smithia geminiflora Roth, Nov. Pl. Sp. 352.1821; var. conferta (Sm.) Baker Hook.f., Fl. Brit. India 2:149.1876; Gamble, Fl. Madras 329. 1918.

Creeping herbs. Stems slender, terete, glabrous. Leaves alternate, imparipinnate, 6–10-foliate; leaflets sub-sessile; leaflets elliptic, 5–11 × 2–3 mm, rounded at apex, attenuate at base, entire, papery, abaxially hirsute, adaxially glabrous; petioles 4–6 cm long, glabrous; petiolules *c.* 0.1 cm long, glabrous. Stipules lanceolate, *c.* 0.8 × 0.3 cm, acuminate at apex, entire. Flowers in axillary scorpioid cymes; peduncles compressed, sparsely long hirsute. Bracts ovate, 6–8 × 2–3 mm, acute at apex, entire, glabrous, membranous; bracteoles ovate, *c.* 4 × 2 mm, membranous. Calyx campanulate. Corolla yellow; standard petals oblong-obovate, *c.* 10 × 6 mm, clefted at apex,

attenuate at base, entire, glabrous; wing petals elliptic, *c.* 8 × 4 mm, rounded at apex, entire; keels petals cymbiform. Stamens diadelphous. Ovary with a short stipe, pubescent; styles *c.* 3 mm long; stigmas capitate. Pods inflated, shortly stipitate.

Distribution: The native range of this species is SE. China to Tropical Asia and N. Australia (POWO, 2023); *Habitat:* Grasslands, in moist areas; *Fl.* & *Ft.*: August-December.

Specimens examined: Mangaladevi, 17.11.1994, *Jomy Augustine & K.P. Rajesh* 14195 (CALI); Vallakaadavu, 23.09.1972, *B.D. Sharma* 40845 (MH).

Smithia venkobarowii Gamble, Bull. Misc. Inform. Kew 1919: 223. 1917; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 185. 2016.

Erect shrubs, up to 50 cm tall. Stems terete, villous. Leaves alternate, imparipinnate; leaflets elliptic, 1–2 × *c.* 0.5 cm, rounded at apex with mucronate tip, obtuse at base, entire, glabrous above, glaucous beneath; petioles hairy, 2–4 cm long. Stipules lanceolate, *c.* 1.2 × 4 mm, 2-lobed, glabrous. Flowers in terminal compressed racemes; *c.* 3 cm long; pedicels *c.* 0.3 cm long. Bracts ovate, *c.* 5 × 2 mm, acute at apex, entire, deciduous; bracteoles ovate, *c.* 3 × 1.5 mm, bristled. Calyx campanulate; lobes obtuse, sparsely ciliate. Corolla yellow; standard petals obovate, *c.* 12 × 10 mm, acute at apex, attenuate at base, entire, glabrous; wing petals elliptic, *c.* 10 × 5 mm, rounded at apex, entire, glabrous; keel petals cymbiform, glabrous. Staminal sheath *c.* 7 mm long, glabrous. Ovary pubescent; styles *c.* 4 mm long; stigmas capitate. Pods orbicular, strongly reticulate, smooth.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat:* Grasslands, in moist areas; *Fl.* & *Ft.*: August-December.

Specimen examined: Vallakkadavu, 17.11.1995, *Jomy Augustine* 16893 (CALI).

Tephrosia Pers.

Syn. Pl. 2: 328. 1807.

Key to the species

1. Pods glabrous……...2

1. Pods tomentose…… *T. vogelii*

2. Staminal sheath< 0.5 cm long ……..……*T. purpurea*

2. Staminal sheath> 1 cm long ……..……*T. maxima*

Tephrosia maxima Pers., Syn. 2: 329. 1807; Gamble, Fl. Madras 1: 319. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 192. 2016.

Erect shrubs. Stems terete, pubescent. Leaves imparipinnate; leaflets 9–17, narrowly elliptic, 1–3 × 0.5–1 cm, acute at apex, attenuate at base, entire, glabrous above, appressed-pubescent beneath, thin-coriaceous; petioles 5–10 cm long, grooved above; petiolules *c.* 0.2 cm long, stout, glabrous. Stipules lanceolate, 0.4–0.6 × *c.* 0.2 cm, acuminate at apex, entire. Flowers in terminal-axillary racemes; peduncles 4–6 cm long, glabrous; pedicels 0.2–0.3 cm long. Bracts ovate, 4–5 × *c.* 2 mm, acuminate at apex, entire, glabrous. Calyx campanulate, pubescent; lobes unequal, lanceolate, 4–6 mm long, appressed-pubescent. Corolla pale pinkish white; standard petals obovate, 15–20 × 10–13 mm, rounded at apex, cuneate at base, entire, glabrous; wing petals elliptic, 12–18 × 5–6 cm, rounded at apex, entire, glabrous; keel petal cymbiform, falcate. Staminal sheath 10–13 mm long. Ovary cylindric, compressed, hirsute; styles 5–8 mm long, hirsute; stigmas capitate. Pods cylindric, glabrous; Seeds orbicular, dark-brown.

Distribution: The native range of this species is Tanzania, India and Sri Lanka (POWO, 2023); *Habitat:* Rocky areas, waste places and sea coasts; *Fl.* & *Ft.*: June-September.

Specimen examined: Kannadippara, 27.06.2018, *Vishnu Mohan & Santhosh Nampy* 159347 (CALI).

Tephrosia purpurea (L.) Pers., Syn. 2: 329. 1807; Hook.f., Fl. Brit. India 2: 112. 1876; Gamble, Fl. Madras 1: 320. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 194. 2016; *Cracca purpurea* L., Sp. Pl. 2: 752. 1753.



Erect herbs, up to 50 cm tall. Stems terete, woody base, ridged, glabrous. Leaves alternate, imparipinnate; leaflets 9–17-foliate, oblong-elliptic, 0.6–1.5 × 0.4–0.7 cm, mucronate at apex, cuenate at base, entire; petioles 7–15 cm long; petiolules *c*. 0.2 mm long, pubescent. Flowers in terminal racemes; peduncles 5–8 cm long, pubescent; pedicels 0.2–0.4 cm long, slender. Calyx campanulate; lobes ovate, 3–3.5 × 2–2.6 mm, attenuate at apex, entire, pubescent. Corolla pink; standard petal orbicular, 7–12 × 4–5 mm, rounded at apex, acute at base, entire, glabrous; wing petals elliptic, 6–9 × 2–3.5 mm, rounded, glabrous; keel petals falcate. Staminal sheath 4−4.5 mm long. Ovary with trichomes; styles *c*. 3 mm long; stigmas capitate. Pods cylindric, glabrous, apically slightly curved. Seeds ellipsoid.

Distribution: The native range of this species is Africa to Arabian Peninsula, Tropical & Subtropical Asia to S. Pacific (POWO, 2023); *Habitat:* Moist deciduous forests and grasslands, also in the plains; *Fl.* & *Ft.*: October-December.

Specimen examined: Chottuppara, 26.09.2018, *Vishnu Mohan & Santhosh Nampy* 159346 (CALI)

Tephrosia vogelii Hook.f. in Hook., Niger Fl. 296. 1849. *Cracca vogelii* (Hook.f.) Kuntze, Revis. Gen. Pl. 1: 175. 1891; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 197. 201.

Erect much branched shrubs. Stems terete, tomentose with short and long white and yellow trichomes. Leaves imparipinnate, 13–19-foliate; leaflets

oblong-elliptic, 3–7 × 1–1.5 cm, rounded at apex, acute at base, entire, tomentose below, sericeous above; petioles 10–25 cm long, pulvinate, hispid; petiolules 0.3–0.4 cm long, glabrous. Flowers terminal or axillary; peduncles 5–10 cm long, rusty tomentose; pedicels 5–10 mm long, rusty tomentose. Calyx campanulate; lobes ovate, 4–5 × 2–3 mm, acute at apex, brown tomentose. Corolla white; standard petals orbicular, 10–20 × 7–14 mm, acute at apex, attenuate at base, entire. Staminal sheath 10–15 mm long. Ovary sericeous; ovules numerous; styles *c.* 5 mm long, hispid; stigmas capitate. Pods ctlindric, straight, yellowish, white tomentose, rusty on suture. Seeds 12–16, black.

Distribution: The native range of this species is Tropical & S. Africa, Comoros (POWO, 2023); *Habitat:* Cultivated as fodder plant; *Fl.* & *Ft.*: October-December.

Specimen examined: Munnar, 17.10.2020, *Vishnu Mohan & Santhosh Nampy* 173321 (CALI).

Tadehagi H.Ohashi

Ginkgoana 1: 280. 1973.

Tadehagi triquetrum (L.) H.Ohashi, Ginkgoana 1: 290. 1973. *Hedysarum triquetrum* L., Sp. Pl. 746. 1753; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 114. 2016. *Desmodium triquetrum* (L.) DC., Prodr. 2: 326. 1825; Hook.f., Fl. Brit. India 2: 163. 1876; Gamble, Fl. Madras 1: 345. 1918.

Erect shrubs, up to 1 m tall. Stems terete, glabrous. Leaves simple, alternate; lamina narrowly lanceolate, 5–8 × 2–3 cm, acuminate at apex, truncate at base, entire; petioles 1–3 cm, winged; wings *c.* 0.4 cm wide. Flowers in terminal racemes; peduncles up to 30 cm long, sparsely hairy; pedicels *c.* 0.6 cm long, with spreading, minute, hooked and silky hairs. Calyx broadly campanulate; lobes *c.* 3 mm long, glabrous. Corolla pale pink; standard petal orbicular, 4–6 × 2–4 mm, acute at apex, entire, glabrous, emarginate at apex; wing petals obovate, 4–5 × 1.5–2 mm, auriculate, clawed, glabrous; keel petals auriculate. Stamens diadelphous; staminal sheath glabrous, 4–5 mm long. Ovary densely

puberulent except at upper part of styles; stigmas capitate. Pods 5–8-jointed, strigose. Seeds broadly elliptic.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat:* Semi-evergreen and moist deciduous forests, also in the plains; *Fl.* & *Ft.*: July-December.

Specimen examined: Thommankutthu, 12.12.2018, *Vishnu Mohan & Santhosh Nampy* 151306 (CALI)

Teramnus P.Browne

Civ. Nat. Hist. Jamaica 290. 1756.

Teramnus labialis (L.f.) Spreng., Syst. Veg. ed., 16. 3: 235. 1826; Hook.f., Fl. Brit. India 2: 184. 1876; Gamble, Fl. Madras 1: 352. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 198. 2016.

Slender climbers; branches appressed pubescent, wiry. Leaves 3-foliolate; leaflets ovate-elliptic, 1.5–3.5 × 1.5–2 cm, acute at apex, rounded at base, entire, membranous, puberulent below; petioles up to 4 cm long, pulvinate. Flowers in axillary racemes; pedicels *c.* 0.2 cm long, slender. Bracts ovate, 2–3 × 1.5–2 mm, rounded at apex, entire, glabrous. Calyx-tube 2–3 mm long, campanulate; lobes acuminate, villous. Standard petal obovate, 3–4 × 2–3 mm long, rounded at apex, entire, glabrous; wing petals elliptic, 2.5–3 × 1.5–2 mm, rounded at apex, entire, glabrous; keel petals oblanceolate. Stamens monadelphous; anthers alternately fertile and sterile. Ovary tomentose; styles 4–6 mm long, slender; stigmas capitate, sticky. Pods cylindric, compressed, thinly adpressed pubescent. Seeds dark brown.

Distribution The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat:* Deciduous forests, also in the plains; *Fl.* & *Ft.*: October-December.

Specimen examined: Thommankutthu, 12.12.2018, *Vishnu Mohan & Santhosh Nampy* 151308 (CALI)

Uraria Desv.

J. Bot. Agric. 1: 122, t. 5, f. 19. 1813.

Uraria rufescens Schindl., Repert. Spec. Nov. Regni Veg. 21: 14. 1925; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 199. 2016. *Desmodium rufescens* DC., Ann. Sci. Nat. (Paris) 4: 101. 1825.

Uraria hamosa Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 222. 1834; Hook.f., Fl. Brit. India 2: 150. 1876; Gamble, Fl. Madras 1: 336. 1918.

Erect shrubs. Stems terete, grey-white, hooked hairy. Leaves alternate, 3-foliate; leaflets ovate-elliptic, 4–8 × 2–4 cm, rounded at apex, acute at base, entire, abaxially pilose, adaxially glabrous; petioles 1–2.5 cm long, pubescent; petiolules *c.* 0.2 cm long, glabrous. Flowers in terminal racemes, densely hooked hairy and pubescent; pedicels 0.3–0.6 cm long, hairy. Calyx campanulate; lobes acute, pubescent. Corolla purple; standard petal obovate, 5–8 × 2–4 mm, acute at apex, attenuate at base, entire, glabrous; wing petals 4–7 × 1.5–2 mm, rounded at apex, entire, glabrous. Staminal sheath glabrous. Ovary pubescent; styles *c.* 3 mm long; stigmas capitate. Pods persistently folded up within calyx, 4–7 jointed, compressed.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat* Deciduous forests, also in the plains; *Fl.* & *Ft.*: September-January.

Specimens examined: Way to Mamalakkandam, 08.09.2018, *Vishnu Mohan & Santhosh Nampy* 156545; Thannikkudy, 16.09.1993, *Jomy Augustine* 12629; (CALI).

Vigna Savi

Nuovo Giorn. Lett. ser. 3, 8: 113. 1824.

Vigna vexillata (L.) A.Rich. in R.de la Sagra, Hist. Fis. Cuba, Bot. 10: 191. 1845; Hook.f., Fl. Brit. India 2: 206. 1876; Gamble, Fl. Madras 1: 364. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 205. 2016. *Phaseolus vexillatus* L., Sp. Pl. 724. 1753.



Climbing herbs. Stems slender. twining, glabrescent. Leaves alternate, trilobed; leaflets membranous, ovate-lanceolate, 5–8 × 2–5 cm, acuminate at apex, rounded-oblique at base, entire, brown or grey pubescent; petioles 3–5 cm long, glabrous, pulvinate at base. Stipules ovate-lanceolate, 0.3–0.5 × *c.* 0.2 cm, acuminate at apex, auriculate at base, ciliate. Flowers in axillary racemes; peduncles 5–10 cm long, slender, narrow; pedicels *c.* 0.4 cm long, glabrous. Bracteoles subulate, *c.* 3 × 2 mm, acute at apex, caducous. Calyx campanulate; lobes linear-lanceolate, 2–4 × *c.* 3 mm, acuminate at apex, entire, bristly hairy. Corolla bluish white; standard petal widely orbicular, 2–3 × 2–4 cm, emarginate; keel petals elliptic, *c.* 2 × 1.5 mm, round ed at apex, glabrous. Staminal sheath glabrous, lateral. Ovary hairy; stigmas capitate. Pods erect, linear-terete, bristly. Seeds oblong or oblong-reniform.

Distribution: The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat:* Moist deciduous forests; *Fl.* & *Ft.*: December-April.

Specimen examined: Thekkady, 12.12.1996, *Jomy Augustine* 17916 (CALI).

Zornia J.F.Gmel.

Syst. Nat., ed. 13. 2: 1076. 1792.

Key to the species

1. Leaflets lanceolate; Bracts gland-dotted ……*Z. gibbosa*

1. Leaflets ovate; Bracts glabrous & not not gland dotted……..…*Z. diphylla*

Zornia diphylla (L.) Pers., Syn. Pl. 2(2): 318. 1807; Hook.f., Fl. Brit. India 2: 147. 1876; Gamble, Fl. Madras 1: 325. 1918; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 208. 2016. *Hedysarum diphyllum* L., Sp. Pl. 747. 1753.

Erect slender herbs. Stems terete, glabrous. Leaves alternate, 2-foliate; leaflets ovate, 5–15 × 1–2 mm, acuminate at apex and base, entire, glabrous; petioles 0.5–0.9 cm long, glabrous, pulvinate. Stipules ovate, 0.4–0.6 × 0.2–0.3 cm, acuminate at apex, glandular. Flowers in terminal racemes; peduncles 4–6 cm long, zigzag, glabrous; pedicels *c.* 0.2 cm long, glabrous. Bracts foliaceous, lanceolate, 40–60 × 30–40 mm, acuminate at apex and base, entire, glabrous, ciliate, epunctuate. Calyx campanulate; lobes 5, unequal, 2.5–3 × 1.3–1.5 mm, acute at apex, entire. Corolla yellow; standard petal obovate, 4.5–5 × 2.6–3 mm, acute at apex, attenuate at base; wing petals elliptic, 4–4.6 × 1.7–2 mm, rounded at apex, glabrous; keel petals falcate. Staminal sheath glabrous; anthers monadelphous. Ovary pubescent; styles filiform, stigmas capitate. Pods 4–6-articulate.

Distribution: The native range of this species is Indian Subcontinent to S. Central China and Indo-China (POWO, 2023); *Habitat*: Lateritic grassy slopes, forest plantations, also in the plains; *Fl.* & *Ft.*: November-August.

Specimens examined: Palkulamedu, 11.06.2018, *Vishnu Mohan & Santhosh Nampy* 164667; Vellappara, Idukki wildlife sanctuary, 05.08.2017, *Vishnu Mohan & Santhosh Nampy* 154151 (CALI).

Zornia gibbosa Span., Linnaea 15: 192. 1841; E.Vajr. & K.A.A.Kabeer in G.V.S.Murthy & V.J. Nair (eds.), Fl. Kerala 2: 208. 2016.

Prostrate herbs. Stems terete, glabrous. Leaves 2-foliate; leaflets lanceolate, 6–20 × 2–5 mm, acute at apex, rounded at base, entire, glabrous; petioles 10–15 cm long, glabrous. Stipules lanceolate, 0.5–0.8 × *c.* 0.4 cm, acuminate at apex. Flowers in terminal or axillary racemes. Bracts lanceolate, 4–8 × 3–5 cm, ciliated, gland-dotted; auricle punctuate. Calyx campanulate; lobes sub-equal, membranous. Corolla yellow, sometimes with red stripes; standard petal orbicular-cordate, 5.5–7 × 3–4.6 mm, acute at apex, entire, glabrous; wing petals elliptic 5–6 × 1.6–2 mm, rounded at apex, glabrous; keel petals falcate, curved. Stamens monadelphous; anthers dimorphic. Ovary pubescent; styles 2–2.5 mm long; stigmas capitate. Pods 4–5-articulate, with strong reticulate bristles.

Distribution: The native range of this species is Mascarenes, Tropical & Subtropical Asia (POWO, 2023); *Habitat:* Lateritic grassy slopes, forest plantations, also in the plains; *Fl.* & *Ft.*: August-February.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 188843; Paalkulamedu, 01.12.2019, *Vishnu Mohan & Santhosh Nampy* 164667; Thannikkudy, 10.09.1993, *Jomy Augustine* 12343; Vellappara, Idukki Wildlife Sanctuary, 05.08.2017, *Vishnu Mohan & Santhosh Nampy* 154151 (CALI).

Subfamily: **CAESALPINIOIDEAE** DC.

Prodr. 2: 473. 1825.

Leaves once or twice compound, even- or odd-pinnate (reduced to 1 leaflet and apparently simple in Cercis); stipules very small, often falling early; sepals united or separate; petals 5, slightly or markedly unequal; stamens 5 or 10, separate.

Key to the genera

1. Leaves simple……..……..….*Bauhinia*
1. Leaves pinnate…….……2
2. Climbing shrubs; stems spinose; leaves bipinnate……..…… *Biancaea*
2. Erect, shrubs or trees; stems without spines; leaves unipinnate……..3
3. Petals absent……..…… *Prioria*
3. Petals present……4
4. Inflorescence drooping……..……....*Cassia*
4. Inflorescence not drooping……..……..……5
5. Flowers white……..…… *Humboltia*
5. Flowers yellow……..…*Senna*

Bauhinia L.

Sp. Pl. 1: 374. 1753.

Bauhinia phoenicea B.Heyne ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 296. 1832; Hook.f., Fl. Brit. India 2: 283. 1878; Gamble, Fl. Madras 1: 408. 1919; R.Gopalan in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 215. 2016.



Climbing shrubs. Stems terete, woody; bark brown. Leaves simple alternate; lamina orbicular, 10–16 × 7–14 cm, deeply bifid at apex, rounded at base, entire, glabrous; petioles 5–10 cm long, terete, glabrous, pulvinate at base. Flowers in extra-axillary racemes; peduncles 6–10 cm long; pedicels 3–4 cm long, glabrous. Calyx campanulate; lobes acute, *c.* 3 cm long, acute at apex, entire, glabrous within, puberulous out. Petals 5, elliptic-spathulate, 4–6 × 0.8–1 cm, acute at apex, wavy at margins, long-clawed, glabrous. Stamens 5, exserted; anthers linear. Ovary hairy; styles slender, 5–6 mm long; stigmas peltate. Pods oblong, broaden above, pubescent Seeds many.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests; *Fl.* & *Ft.*: December-April.

Specimen examined: Karimanal, 28.03.2017, *Vishnu Mohan & Santhosh Nampy* 152040 (CALI).

Biancaea Tod.

Nuov. Gen. Sp. 21. 1860.

Biancaea decapetala (Roth) O.Deg., Fl. Hawaiiensis K 7. 1936. *Reichardia decapetala* Roth, Nov. Pl. Sp. 212. 1821; G.V.S.Murthy in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 221. 2016.

Caesalpinia sepiaria Roxb., Fl. Ind. 2: 360. 1832; Hook.f., Fl. Brit. India 2: 256. 1878; Gamble, Fl. Madras 1: 394. 1919.

Climbing shrubs. Stems woody with prickles, dark brown. Leaves bipinnate, alternate; leaflets opposite, 8–12 pairs, oblong, 1–2 × 0.5–1 cm, rounded at apex and base, entire, membranous, puberulent, glabrescent when old. Stipules absent. Flowers in terminal racemes; peduncles 9–20 cm long, glabrous; pedicels *c.* 3 cm long, sparsely hairy. Calyx 5, oblong, 5.5–6 × 3–3.4

mm, rounded at apex, acute at base, entire, puberulent above, glabrous within. Petals yellow, orbicular, *c.* 1 × 8 cm, rounded at apex, acute at base, entire, glabrous, membranous. Stamens sub-equal; filaments glabrous. Ovary glabrous; styles 4–5 mm long, hispid; stigmas capitate. Pods oblong-ligulate, leathery, shiny, glabrous. Seeds 6–9, brown.

Distribution: The native range of this species is India to S. Central & S. Japan (POWO, 2023); *Habitat:* Degraded forests; *Fl.* & *Ft.*: January-February.

Specimen examined: Kattappana, 18.08.2019, *Vishnu Mohan & Santhosh Nampy* 186644 (CALI).

Cassia L.

Sp. Pl. 1: 376. 1753.

Cassia fistula L., Sp. Pl. 377. 1753; Hook.f., Fl. Brit. India 2: 201. 1878; Gamble, Fl. Madras 1: 400. 1919; G.V.S.Murthy in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 225. 2016.

Deciduous trees, up to 10 m tall. Stems terete, woody; bark pale grey. Leaves imparipinnate; leaflets broadly ovate, 6–10 × 3–5 cm, acuminate at apex and base, entire, leathery, both surfaces puberulent when young, glabrous when mature, adaxially shiny; petioles 13–40 cm long, glabrous, pulvinate at base. Flowers in axillary racemes, drooping; peduncles 30–50 cm long; pedicels 3–5 cm, slender, glabrous. Sepals narrowly ovate, 1.5–2 × 1–1.4 cm, rounded at apex, entire, glabrous. Petals 5, golden yellow, broadly ovate, sub-equal, narrowly orbicular, 2.5–3.5 × 1.5–2 cm, rounded at apex and base, entire, glabrous, shortly clawed. Stamens 10; filaments curved. Ovary stalked, strigulate; stigmas small. Pods pendulous, blackish brown, terete, sausage-shaped, indehiscent. Seeds numerous, separated by papery septa, glossy brown, elliptic, flattened.

Distribution: The native range of this species is Indian Subcontinent to Myanmar (POWO, 2023); *Habitat:* Moist deciduous forests, widely planted as ornamental plant; *Fl.* & *Ft.*: February-September.

Specimen examined: Chinnar, 02.07.2018, *Vishnu Mohan & Santhosh Nampy* 186731 (CALI).

Humboldtia Vahl

Syms. Bot. 3: 106. 1794.

Humboldtia vahliana Wight, Icon Pl. Ind. Orinet 4: t. 1607. 1850; Hook.f., Fl. Brit. India 2: 274. 1878; Gamble, Fl. Madras 1: 411. 1919; Sanjappa in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 242. 2016.

Trees, up to 10 m tall. Stems terete, glabrous, sometimes zig-zag. Leaves paripinnate, alternate; leaflets 4–8, opposite, estipulate; lamina lanceolate, 10–20 × 4–6 cm, acute at apex and base, entire, glabrous; petioles 10–18 cm long, pulvinate, tomentose. Flowers white, in axillary many flowered racemes; peduncles condensed, *c.* 8 cm long; pedicels 0.5–0.6 cm long, pubescent. Bracts lanceolate, *c.* 5 × 2 mm, acute at apex, entire, villous, persistent; bracteoles 2, connate by base, obovate, rounded at apex, fugacious. Calyx campanulate, obconical, lobes 4, obovate-oblong, rounded at apex, slightly concave. Petals 5, obovate, *c.* 12 × 4 mm, shortly clawed at apex, broadly rounded at apex, glabrous. Stamens 5, perfect, alternating with staminodes; filaments *c.* 10 mm long. Ovary half inferior, obliquely linear; filiform, pilose at base, reddish; stigmas capitate. Pods elliptic, compressed, brown villous Seeds 3–4, almost orbicular, glabrous.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat:* Along river banks in semi-evergreen and evergreen forests; *Fl.* & *Ft.*: February-May.

Specimens examined: Mankulam, 20.05.2018, *Vishnu Mohan & Santhosh Nampy* 186732 (CALI); Meenmutty, 19.02.1984, *A.G. Pandurangan* 78045 (MH); Panamkutty, 22.02.1983, *C.N. Mohanan* 77944 (MH).

Prioria Griseb.

Fl. Brit. W. I. 215. 1860.

Prioria pinnata (Roxb. ex DC.) Breteler, Wageningen Agr. Univ. Pap. 99(3): 52. 1999. *Hardwickia pinnata* Roxb. ex DC., Prodr. 2: 487. 1825. *Kingiodendron pinnatum* (Roxb. ex DC.) Harms in H.G.A.Engler & K.A.E.Prantl, Nat. Pflanzenfam., Nachtr. 1: 194. 1897; Gamble, Fl. Madras 1:

412. 1919; G.V.S.Murthy in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 243. 2016.

Trees, up to 15 m tall. Stems terete, woody; bark brown. Leaves imparipinnate, alternate; leaflets 7–9, lanceolate, 5–10 × 3–4 cm, acuminate at apex, rounded at base, entire, glabrous, coriaceous; petioles 10–15 cm long, pulvinate at base, glabrous; petiolules *c.* 0.5 cm long, stout. Stipules lanceolate, *c.* 0.3 × 0.2 cm, caducous. Flowers white, in axillary and terminal panicled racemes. Calyx campanulate, lobed; lobes 5, ovate, *c.* 4 × 2 mm, acute at apex. Petals 0. Stamens 10, equal; filaments filiform. Ovary sessile, villous at base; styles *c.* 4 mm long; stigmas oblique. Pods ellipsoid, turgid, obtusely beaked. Seed one.

Distribution: The native range of this species is India (POWO, 2023); *Habitat:* Evergreen forests; *Fl.* & *Ft.*: February-December.

Specimen examined: Koruthode, 15.09.1995, *Jomy Augustine* 16227 (CALI).

Senna Mill.

Gard. Dict. Abr. ed. 4. 1754.

Key to the species

1. Plants glabrous……2
1. Plants hairy……3
2. Leaflets lanceolate……*S. occidentalis*
2. Leaflets oblong……*S. alata*
3. Flowers in few flowered simple racemes……*S. hirsuta*
3. Flowers in many flowered spike-like racemes……*S. didymobotrya*

Senna alata (L.) Roxb., Fl. Ind. 2: 349. 1832; G.V.S.Murthy in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 248. 2016. *Cassia alata* L., Sp. Pl. 1: 378. 1753; Hook.f., Fl. Brit. India 2: 264. 1878; Gamble, Fl. Madras 1: 404. 1919.

Erect shrubs, up to 5 m tall. Stems terete, woody, glabrous. Leaves alternate, imparipinnate; leaflets 11–23, oblong, 6–10 × 4–6 cm, rounded at apex, truncate at base, entire, leathery, glabrous; petioles 20–40 cm long, pulvinate at base; petiolules *c.* 0.3 cm long. Stipules persistent, triangular, *c.* 1 × 0.6 cm, acuminate. Flowers in axillary racemes; peduncles 7–14 cm, stiff; pedicels

short. Bracts caducous, strobilaceous, broadly ovate, 20–40 × 10–20 mm, rounded at apex and base, entire, glabrous. Sepals orange-yellow, oblong, unequal. Petals bright yellow, ovate-orbicular, 12–18 × 8–13 mm, rounded at apex, shortly clawed. Fertile stamens 7; staminodes 3. Ovary puberulent, sessile; stigmas capitate. Pods winged, tetragonal, glabrous, cren ulate Seeds compressed, deltoid.



Distribution: The native range of this species is SW. Mexico to Tropical America (POWO, 2023); *Habitat:* Along riversides and margins of ponds; *Fl.* & *Ft.*: September-January.

Specimen examined: Kaliyar, 30.11.2019, *Vishnu Mohan & Santhosh Nampy* 164648 (CALI).

Senna didymobotrya (Fresen.) H.S.Irwin & Barneby, Mem. New York Bot. Gard. 35: 467. 1982 ; G.V.S.Murthy in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 249. 2016. *Cassia didymobotrya* Fresen., Flora 22: 53. 1839.

Erect shrubs, up to 5 m tall. Stems terete, sparsely hairy. Leaves alternate, imparipinnate; leaflets 9–23, elliptic, 2–4 × 1–1.5 cm, mucronate at apex, rounded at base, entire, sparsely hairy; petioles 15 –25 cm long, hispid, pulvinate at base; petiolules *c.* 0.3 cm long. Flowers in many flowered spike-like racemes; peduncles 20 –30 cm long; pedicels *c.* 0.5 cm long, narrow, glabrous. Bracts ovate, *c.* 9 × 5 mm, sub-acute at apex. Calyx oblong-obovate, *c.* 8 × 4 mm, acute at apex, entire, glabrous. Petals yellow, obovate, 10–15 × 8–12 mm, rounded at apex, shortly clawed at base, entire, glabrous. Stamens 10, curved. Ovary densely pilose; styles *c.* 4 mm long, pubescent; stigmas obscure. Pods compressed, leathery. Seeds 9–16, obovoid-oblong, compressed.

Distribution: The native range of this species is Ethiopia to S. Tropical Africa (POWO, 2023); *Habitat:* Grown as garden plant, also as an escape in the High Ranges; *Fl.* & *Ft.*: October-March.

Specimens examined: Anamudi shola, 04.04.2017, *Vishnu Mohan & Santhosh Nampy* 152090; way to Karimutty, 28.06.2019, *Vishnu Mohan & Santhosh Nampy* 158040 (CALI).

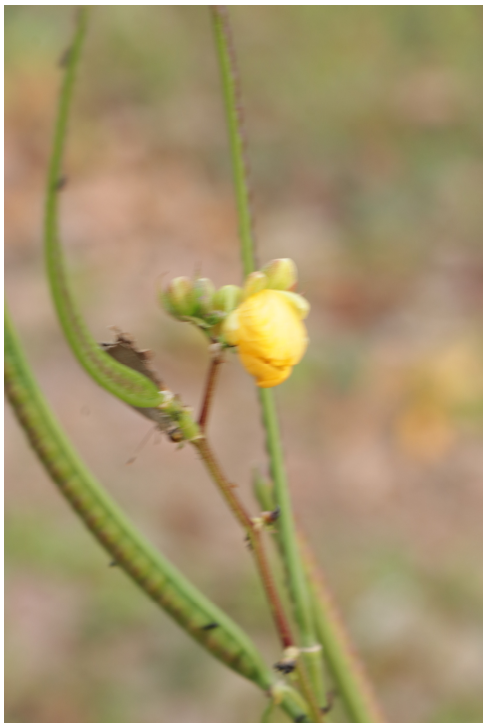
Senna hirsuta (L.) H.S.Irwin & Barneby, Phytologia 44: 499. 1979; G.V.S.Murthy in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 249. 2016. *Cassia hirsuta* L., Sp. Pl. 378. 1753; Hook.f., Fl. Brit. India 2: 263. 1878; Gamble, Fl. Madras 1: 401. 1919.

Erect shrubs, up to 1 m tall. Stems terete, hirsute. Leaves imparipinnate, alternate; leaflets 9–17, ovate-oblong 5–9 × 2–3.5 cm, acuminate at apex, rounded at base, entire, papery, both surfaces villous; petioles 10–15 cm long, hispid, pulvinate at base; petiolules *c.* 0.4 cm long hispid. Flowers in axillary few flowered racemes; peduncles 2–5 cm long, villous; pedicels 1–2 cm long, villous. Bracts subulate, lanceolate, *c.* 7 × 3 mm, acute at apex, entire. Calyx 5, unequal, lanceolate, 4–6 × *c.* 3 mm, acuminate at apex, densely villous, outer 2 small. Petals yellow, obovate, 15–20 × *c.* 8 mm, rounded at apex, entire at apex, glabrous. Stamens 10, unequal in length. Ovary hirsute, sub-sessile; styles glabrous; stigmas capitate. Pods slender, flat, densely hirsute on surfaces of valves. Seeds numerous.

Distribution: The native range of this species is Tropical & Subtropical America (POWO, 2023); *Habitat:* Degraded forests, also in the plains; *Fl.* & *Ft.*: September-March.

Specimens examined: Erattayar, 03.03.2021, *Vishnu Mohan & Santhosh Nampy* 176014 Karimutty, 27.11.2019, *Vishnu Mohan & Santhosh Nampy* 159779; way to Mannavan Shola, 08.01.2004, *M. Amritha* 96935 (CALI).

Senna occidentalis (L.) Link, Handbuch 2: 140. 1831; G.V.S.Murthy in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 250. 2016. *Cassia occidentalis* L., Sp. Pl. 1: 377. 1753; Hook.f., Fl. Brit. India 2: 262. 1878; Gamble, Fl. Madras 1: 401. 1919.



Erect shrubs, up to 1 m tall. Stems terete, glabrous. Leaves alternate, imparipinnate; leaflets 9–15, lanceolate, 3–6 × 1–1.5 cm, acuminate at apex, attenuate at base, entire, glabrous, membranous; petioles 10–24 cm long, glabrous, pulvinate; petiolules 0.1–0.2 cm long. Flowers yellow, in axillary corymbose racemes. Bracts linear-lanceolate *c.* 6 × 3 mm, acuminate at apex, entire, glabrous. Stipules lanceolate *c.* 0.5 × 0.2 cm, acuminate at apex, entire, glabrous, membranous, caducous. Sepals unequal, suborbicular, 8–10 × 5–6 mm, acute at apex, entire, glabrous. Petals yellow, 5, narrowly orbicular, *c.* 15 × 5 mm, rounded at apex, entire, glabrous, shortly clawed. Fertile stamens 7; staminodes 3. Ovary tomentose; styles glabrous. Pods linear. Seeds many, flat, orbicular.

Distribution: The native range of this species is Tropical & Subtropical America (POWO, 2023); *Habitat:* Grown as garden plant, also as an escape in the High Ranges; *Fl.* & *Ft.*: October-March.

Specimens examined: Anayiragal dam, 05.01.2017, *Vishnu Mohan & Santhosh Nampy* 151547; Kaliyar, 30.11.2019, *Vishnu Mohan & Santhosh Nampy* 164647 (CALI).

Subfamily: **MIMOSOIDEAE** DC.

Prodr. 2: 424. 1825.

Leaves twice even-pinnately compound; stipules thread-like or minute, often falling early; flowers in heads or spikes; sepals united; petals 4 or 5, equal, separate or united, rather inconspicuous; stamens 5 to many, separate or the filaments all united toward base, exceeding the corolla.

Key to genera

1. Stamens more than to the sepals……..……2

1. Stamens equal to sepal……..…...6

2. Pods straight, flat ……..…… *Albizia*

2. Pods curved or twisted, (if straight margins constricted)…… 3

3. Stems with spines or prickles……4

3. Stems smooth……..5

4. Flowers two colored (pink and yellow)……..*Dichrostachys*

4. Flowers single colored …… *Senegalia*

5. Pods hispid……..…….. *Archidendron*

5. Pods glabrous…….. *Acacia*

6. Large trees……..……...*Xylia*

6. Sub-shrubs…….*Mimosa*

Acacia Mill.

Gard. Dict. Abr. ed., 4. 1: 25. 1754.

Key to the species

1. Flowers white; calyx lobes obscure; pods helically spiral ……*A. mangium*

1. Flowers cream; calyx lobes prominent; pods straight to slightly curved……..*A. mearnsii*

Acacia mangium Willd., Sp. Pl. ed., 4. 4: 1053. 1806; M.Mohanan & N.P.Balakr. in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 267. 2016. *Racosperma mangium* (Willd.) Pedley, Austrobaileya 2(4): 352. 1987.

Trees, up to 30 m tall. Stems terete, bark pale grey-brown. Phyllode simple, alternate, elliptic-oblong, sickle-shaped, 11–20 × 2.5–5 cm, acute at apex, attenuate at base, entire, glabrous, coriaceous; petioles *c.* 1 cm long, pulvinate, glabrous. Flowers white, in axillary spikes. Calyx campanulate, lobed; lobes obscure. Corolla campanulate, deeply lobed; lobes ovate, *c.* 4 × 2 mm, entire, glabrous. Stamens many; filaments free. Ovary puberulous; styles *c.* 3 mm long, glabrous; stigmas capitate. Pods woody, helically spiral Seeds ovate-oblong, brown; funicle orange-red.

Distribution: The native range of this species is Maluku to N. Queensland (POWO, 2023); *Habitat:* Open lands; *Fl.* & *Ft.*: January-December.

Specimen examined: Way to Kanthallur, 26.01.2018, *Vishnu Mohan & Santhosh Nampy* 158328 (CALI).

Acacia mearnsii De Wild., Pl. Bequaert. 3: 61. 1925; M.Mohanan & N.P.Balakr. in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 267. 2016.

Trees, up to 10 m tall. Stems terete, young parts silky. Leaves bipinnate, alternate; leaflets numerous, sub-sessile, sub-opposite; lamina elliptic, *c.* 1 × 0.5 mm, rounded at apex and base, entire, glabrous; petioles slender, pulvinate, pubescent; petiolules obscure. Flowers creamy, sessile in axillary or terminal panicles. Calyx campanulate; lobes oblong, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Corolla campanulate; lobes 5, ovate, 2.5–3 × 1–2 mm, acute at apex, entire, glabrous. Stamens many, *c.* 5 mm long. Ovary *c.* 4 mm long; styles *c.* 4 mm long; stigmas capitate. Pods flat, narrow, straight to slightly curved, usually constricted between the seeds, tomentose, blackish-brown.

Distribution: The native range of this species is SE. Australia (POWO, 2023); *Habitat:* Rocky areas, waste places and sea coasts; *Fl.* & *Ft.*: February-September.

Specimens examined: Choondal, MSNP, 22.11.2014, *Syam Radh S. & Rajeevan R.* 137850; Meesapulimala, 02.02.2019, *Vishnu Mohan & Santhosh Nampy* 159180; Meesapulimala, Base camp, 04.04.2017, *Vishnu Mohan & Santhosh Nampy* 152077; Nymakkad, 26.03.2018, *Vishnu Mohan & Santhosh Nampy* 158229 (CALI).

Albizia Durazz.

Mag. Tosc. 3(4): 13. 1772.

Key to the species

1. Leaflets 5–6 pairs……..……*A. lebbeck*
1. Leaflets more than 6 pairs……...2
2. Filaments red ……*A. chinensis*
2. Filaments white…….....3
3. Leaves glabrous ……..…… *A. amara*
3. Leaves appressed pubescent ……*A. odoratissima*

Albizia amara (Roxb.) Boivin, Encycl. Dix-Neuvième Siécle 2: 34. 1837; Hook.f., Fl. Brit. India 2: 301. 1878; Gamble, Fl. Madras 1: 432. 1919; M.Mohanan & N.P.Balakr. in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 274. 2016. *Mimosa amara* Roxb., Pl. Coromandel 2(1): 122. 1799. *Acacia*

amara (Roxb.) Willd., Sp. Pl. 4: 1074. 1806. *Acacia wightii* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 274. 1834.

Trees, up to 10 m tall. Stems, woody, terete. Leaves bipinnate, alternate; leaflets 20–60, opposite, linear, 5–8 × *c.* 2 mm, sub-acute at apex, oblique at base, entire, ciliate, glabrous; petioles 5–15 cm, slender, pulvinate. Stipules minute, free, lanceolate, caducous. Flowers in axillary fascicles; peduncles 3–5 cm long, slender, densely pubescent; pedicels *c.* 1 mm long, puberulous. Bracts caducous. Calyx funnel-shaped, puberulous; lobes 5. Corolla lobes 5, oblong, *c.* 5 × 2 mm, entire. Stamens many, monadelphous, white. Ovary stipitate, pubescent; styles filiform; stigmas minute. Pods flat, greyish-brown, indehiscent. Seeds compressed, ovate-orbicular.

Distribution: The native range of this species is Eritrea to S. Africa, India and Sri Lanka (POWO, 2023); *Habitat:* Evergreen and deciduous forests, also in the plains; *Fl.* & *Ft.*: February-July.

Specimen examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 188870 (CALI).

Albizia chinensis (Osbeck) Merr., Amer. J. Bot. 3: 575. 1916; M.Mohanan & N.P.Balakr. in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 275. 2016. *Mimosa chinensis* Osbeck, Dagb. Ostind. Resa 233. 1757.

Albizia marginata (Lam.) Merr., Philipp. J. Sci., C 5: 23. 1910; Gamble, Fl. Madras 1: 433. 1919.

Trees, up to 20 m tall. Stems terete, pubescent. Leaves alternate, bipinnate; leaflets numerous, sessile, oblong-linear, *c.* 6 × 2 mm, rounded at apex and base, entire, abaxially villous, ciliate; petioles 8–15 cm long, glabrous, pulvinate. Stipules deciduous, cordate, *c.* 5 × 3 mm, membranous. Flowers in terminal panicles; peduncles, densely villous. Flowers dimorphic, green-white. Calyx funnel-shaped; lobes acute, *c.* 4 mm long, entire, glabrous. Corolla campanulate; lobes ovate-deltoid, *c.* 5 mm long, entire, glabrous. Staminal sheathlonger than corolla tube; filaments red. Ovary yellow-brown villous, sessile; styles *c.* 3 mm long; stigmas capitate. Pods glabrous when mature. Seeds elliptic, flat.

Distribution: Native range is S. China to Tropical Asia (POWO, 2023); *Habitat:* Evergreen and deciduous forests, also in the plains; *Fl.* & *Ft.*: March-July.

Specimens examined: Koruthode, 06.03.1994, *Jomy Augustine* 13521; Koymanchola, 10.02.2021, *Vishnu Mohan & Santhosh Nampy* 188793 (CALI).

Albizia lebbeck (L.) Benth. in Hooker's J. Botany. 3: 87. 1844; Hook.f., Fl. Brit. India 2: 298. 1878; Gamble, Fl. Madras 1: 432. 1919; M.Mohanan & N.P.Balakr. in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 276. 2016. *Mimosa lebbeck* L., Sp. Pl. 516. 1753.

Trees, up to 15 m tall. Stems terete, bark rough, pubescent, glabrous when old. Leaves bipinnate; leaflets 11–13, narrowly elliptic, 2–3 × *c.* 1 cm, rounded at apex and base, entire, glabrous; petioles 8–17 cm long, glabrous, pulvinate; petiolule obscure. Stipules ovate-lanceolate, *c.* 0.4 × 0.2 cm, acuminate at apex, entire, caducous. Flowers in axillary corymbs; peduncles 10–20 cm long, glabrous; pedicels 0.3–0.4 cm long, puberulent. Calyx funnel-shaped; lobes acute, *c.* 3 × 1 mm, puberulent. Corolla yellow, funnel-shaped; lobes ovate, *c.* 5 × 3 mm, glabrous. Staminal sheath shorter than corolla tube, cream colored. Ovary glabrous, sessile; styles *c.* 4 mm long. Pods strap-shaped. Seeds brown.

Distribution: The native range of this species is Indian Subcontinent to Myanmar **(**POWO, 2023); *Habitat:* Deciduous forests, also in the plains; *Fl.* & *Ft.*: March-December.

Specimens examined: Koruthode, 06.03.1994, *Jomy Augustine* 13520; *Ibid*., 25.03.1996, *Jomy Augustine* 17166; (CALI).

Albizia odoratissima (L.f.) Benth. London J. Bot. 3: 88. 1844; Hook.f., Fl. Brit. India 2: 299. 1878; Gamble, Fl. Madras 1: 431. 1919; M.Mohanan & N.P.Balakr. in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 277. 2016. *Mimosa odoratissima* L.f., Suppl. Pl. 437. 1782.

Trees, up to 15 m tall. Stems woody, terete, pubescent when young. Leaves bipinnate; leaflets sessile, 17–21, oblong, 2–3 × 1–1.5 cm, rounded, entire, papery, sparsely appressed pubescent; petioles 8–15 cm long, glabrous, pulvinate. Stipules filiform, *c.* 2.5 × 1 mm, acute at apex, entire, caducous.

Flowers in axillary panicles; peduncles 3–5 cm long, glabrous. Calyx cup-shaped, tomentose; lobes obscure. Corolla funnel-shaped; lobes lanceolate, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Staminal sheathlong as corolla tube, white. Ovary ferruginous tomentose. Pods oblong, compressed, sparsely pubescent when mature. Seeds ovate.

Distribution: The native range of this species is Indian Subcontinent to S. China and Indo-China (POWO, 2023); *Habitat:* Deciduous forests, also in the plains; *Fl.* & *Ft.*: April-January.

Specimen examined: Koruthode, 16.05.1995, *Jomy Augustine & K.P. Rajesh* 15240 (CALI).

Archidendron F.Muell.

Fragm. 5(34): 59. 1865.

Archidendron clypearia (Jack) I.C.Nielsen, Adansonia sér. 2, 19: 15. 1979. *Inga clypearia* Jack, Malayan Misc. 2(7): 78. 1822. *Pithecellobium subcoriaceum* Thwaites, Enum. Pl. Zeyl. 100. 1895; Baker in Hook.f., Fl. Brit. India 2: 305. 1878; Gamble, Fl. Madras 434. 1919.

Trees, up to 10 m tall. Stems terete, young parts rusty tomentose. Leaves bipinnate, alternate; pinnae 5–12 pairs, opposite; leaflets oblong, 0.6–1 × 0.3–0.4 cm, mucronate at apex, oblique at base, entire, recurved, glabrous above, villous beneath, coriaceous; petioles 8–15 cm long, slender, tomentose, pulvinate; glandular at upper side. Flowers greenish-white, in globular spikes. Calyx campanulate; lobes ovate, *c.* 1 × 1 mm, entire, golden pubescent. Corolla funnel-shaped; lobes ovate-oblong, *c.* 5 × 3 mm, acute at apex, entire, pubescent. Stamens many, monadelphous at base, exserted. Ovary stipitate, pubescent; styles filiform; stigmas minute. Pods hispid, curved in to a circle, orange within. Seeds black, compressed.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat:* Evergreen forests; *Fl.* & *Ft.*: December-May.

Specimen examined: Way to Anamudi base camp, 10.12.2019, *Vishnu Mohan & Santhosh Nampy* 164686 (CALI).

Dichrostachys (DC.) Wight & Arn.

Prodr. Fl. Ind. Orient. 1: 271. 1834.

Dichrostachys cinerea (L.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 271. 1834; Hook.f., Fl. Brit. India 2: 288. 1878; Gamble, Fl. Madras 1: 419. 1919; M.Mohanan & N.P.Balakr. in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 282. 2016. *Mimosa cineraria* L., Sp. Pl. 520. 1753.

Small trees, up to 6 m high. Stems thorny; thorns axillary, straight. Leaves bipinnate, alternate; leaflets 20–50, opposite, sessile, oblong, *c.* 3 × 1 mm, acute at apex, obtuse at base, entire, ciliate, tomentose below; petioles 3–4 cm, pulvinate, pubescent; pinnae 5–15 pairs, opposite, slender, pulvinate, pubescent. Stipules 2, lanceolate. Flowers in axillary paired spikes; upper flowers bisexual, yellow; lower ones neutral, pink. Bracts ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Calyx tube campanulate; lobes 5, ovate *c.* 3 × 1.5 mm, glabrous. Petals 5, lanceolate, connate below; lobes ovate, *c.* 5 × 3 mm, entire, pubescent. Stamens 10, free. Ovary sub-sessile, pubescent; styles *c.* 3 mm long; stigmas truncate. Pods linear, coiled, indehiscent Seeds ovoid, compressed.

Distribution: The native range of this species is Africa, Arabian Peninsula, India, Sri Lanka, Myanmar, Malesia to N. Australia (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl.* & *Ft.*: June-January.

Specimen examined: Chinnar, 09.06.2017, *Vishnu Mohan & Santhosh Nampy* 159178 (CALI).

Mimosa L.

Sp. Pl. 1: 516. 1753.

Mimosa diplotricha C.Wright, Anales Acad. Ci. Méd. Habana 5: 405. 1869 ; M.Mohanan & N.P.Balakr. in G.V.S.Murthy & V.J. Nair (eds.), Fl. Kerala 2: 287. 2016.

Sub-shrubs. Stems 4-angulate, with prickles along angles. Leaves bipinnate, alternate; leaflets 20–30 pairs, linear-oblong, 3–5 × 1–2 mm, entire, sparsely pubescent below; petioles with 4 rows of recurved prickles. Flowers in axillary

heads. Peduncles 0.5–1 cm long. Calyx inconspicuous. Corolla narrowly funnel-shaped; lobes 4, ovate, *c.* 4 × 2 mm, acute at apex, entire, slightly pubescent out. Stamens 8; filaments pale purple-pink. Ovary elliptic; styles *c.* 3 mm long; stigmas capitate. Pods in clusters, oblong, with prickly bristles.



Distribution: The native range of this species is Tropical & Subtropical America (POWO, 2023); *Habitat:* Weed in degraded forests, also in the plains; *Fl.* & *Ft.*: November-March.

Specimen examined: Neriyamangalam, 02.11.2020, *Vishnu Mohan & Santhosh Nampy* 176166 (CALI).

Senegalia Raf.

Sylva Tellur. 119. 1838.

Senegalia torta (Roxb.) Maslin, Seigler & Ebinger, Blumea 58(1): 42. 2013. *Mimosa torta* Roxb., Fl. Ind. ed., 1832. 2: 566. 1832; M.Mohanan & N.P.Balakr. in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 272. 2016. *Acacia torta* (Roxb.) Craib, Bull. Misc. Inform. Kew 1915: 410. 1915; Gamble, Fl. Madras 1: 428. 1919.

Shrubs. Stems terete, puberulous. Leaves alternate, bipinnate; leaflets numerous, *c.* 6 × 2 mm, obtuse at apex, sub-cordate at base, entire, slightly pubescent; petioles *c.* 5 cm long, pulvinate at base, glabrous. Flowers in solitary or in terminal panicles. Calyx campanulate; lobes ovate, *c.* 3 mm long, acute at apex, entire, glabrous. Petals oblong, *c.* 3 × 1.5 mm long, acute at apex, entire, glabrous. Staminal filaments *c.* 5.5 mm long, yellow. Ovary elliptic, styles *c.* 3 mm long; stigmas capitate. Pods flat, yellowish-brown, densely glandular.

Distribution: The native range of this species is Indian Subcontinent (POWO, 2023); *Habitat:* Deciduous forests, also in the plains; *Fl.* & *Ft.*: April-December.

Specimens examined: Kattappana, 14.09.2018, *Vishnu Mohan & Santhosh Nampy* 176115; Thekkady, 06.05.1995, *Jomy Augustine & K.P. Rajesh* 15319 (CALI).

Xylia Benth.

in Hooker's J. Bot. 4: 417. 1842.

Xylia xylocarpa (Roxb.) W.Theob., Burmah ed. 3, 2: 541. 1883; Gamble, Fl. Madras 1: 417. 1919; M.Mohanan & N.P.Balakr. in G.V.S.Murthy & V.J.Nair (eds.), Fl. Kerala 2: 295. 2016. *Mimosa xylocarpa* Roxb., Pl. Coromandel 1: 68. 1798.

Deciduous trees, up to 20 m tall. Stems woody, terete; bark reddish-brown, mottled with white, rough. Leaves bipinnate, alternate; leaflets 4–18, opposite, oblong, 5–28 × 2.5–6 cm, acute-acuminate at apex, obtuse at base, entire, glabrous, coriaceous; rachis 8–30 cm long, slender, glabrous. Stipules ovate, 5–7 × 2–3 cm, acute at apex, entire, deciduous. Flowers sessile, dull yellow, in axillary globose heads. Bract club shaped, 3–4 × –3 mm, rounded at apex, entire, glabrous. Calyx 4 mm long, tubular, 5-toothed, glabrous. Petals 5, linear, 1.5 × 1 cm, acute at apex, slightly connate at base, entire, glabrous. Stamens 10, free, exserted; filaments slender. Ovary sessile; styles filiform; stigmas terminal. Pod broadly falcate, woody, compressed, dehiscent, septate between the seeds. Seeds 4–10, oblong, compressed, brown, shining.

Distribution: The native range of this species is India to Indo-China (POWO, 2023); *Habitat:* Moist deciduous forests, also in the plains; *Fl.* & *Ft.*: February-December.

Specimen examined: Kattappana, 14.09.2018, *Vishnu Mohan & Santhosh Nampy* 176120 (CALI).

ROSACEAE Juss.

Gen. Pl. 334. 1789, *nom. cons.*

Herbs, shrubs, scramblers or trees. Leaves simple or compound, alternate, stipulate. Flowers regular or irregular, hermaphrodite, monoecious, dioecious, or polygamous. Calyx campanulate or urceolate, free or adnate in part to the receptacle. Petals 5 or 0. Stamens 1 to many, sometimes biseriate, exserted or included; staminodes (if present) usually inserted on one side of the receptacle. Styles terminal or basal, exserted or included. Carpels 1 to many.

The family includes 110 genera (POWO, 2023); four genera and seven species in the study area.

Key to the genera

1. Ovaries inferior; ripe carpels enclosed in the calyx tube……*Photinia*

1. Ovaries superior; ripe carpels not enclosed in the calyx tube……2

2. Carpel 1……*Prunus*

2. Carpels many……3

3. Ovules 2; pendulous……*Rubus*

3. Ovule 1; erect……*Potentilla*

Photinia Lindl.

Bot. Reg. 6: t. 491. 1820, *nom. cons.*

Photinia integrifolia Lindl., Trans. Linn. Soc. London 13: 103. 1821; N.P.Balakr. in G.V.S. Murthy& V.J.Nair (ed.), Fl. Kerala 2: 300. 2016.

Photinia notoniana Wight & Arn., Prodr. Fl. Ind. Orient. 1: 302. 1834; Hook.f., Fl. Brit. India 2: 380. 1878; Gamble, Fl. Madras 1: 445. 1919.



Trees, up to 10 m tall. Branchlets woody, terete; bark brown, glabrous. Leaves

simple, alternate; lamina lanceolate-oblanceolate, 5–10 × 3–5 cm, acute at apex, cuneate at base, entire, glabrous, leathery; petioles 2–4 cm long, glabrous. Flowers in terminal compound corymbs; peduncles 5–10 cm long, stout, glabrous, rarely puberulous; pedicels 0.3–0.5 cm long, glabrous. Sepals ovate, 1.5–2 × 1–1.7 mm, obtuse at apex, entire, glabrous. Petals 5, orbicular, 2–3 × 1.7–2.3 mm, rounded at apex, clawed at base, entire, glabrous. Stamens 20; filaments *c.* 3 mm long, slender, narrow. Ovaries apically pilose; styles 2, shorter than stamens; stigmas capitate. Drupes purplish red, sub-globose, glabrous; ripe carpels enclosed in the calyx tube.

Distribution: The native range of this species is S. China to Tropical Asia (POWO, 2023); *Habitat*: Shola forests; *Fl.* & *Ft.*: December-April.

Specimens examined: Way to Anamudi peak, 26.04.2019 *Vishnu Mohan & Santhosh Nampy* 159124; Banther, Pambadum shola, 21.12.2018, *Vishnu Mohan & Santhosh Nampy* 167883; Kanthalloor - Mannavan Shola, 25.02.2003, *P.Nisha Kumari* 88832; Vattappara, 16.02.2017, *S. Syam Radh* 191165 (CALI).

Potentilla L.

Sp. Pl. 1: 495. 1753.

Potentilla leschenaultiana Ser. in A.DC., Prodr. 2: 584. 1825; Hook.f., Fl. Brit. India 2: 350. 1878; Gamble, Fl. Madras 1: 443. 1919 N.P.Balakr. in G.V.S. Murthy & V.J.Nair (ed.), Fl. Kerala 2: 301. 2016.



Creeping herbs. Stems terete, hispid. Leaves pinnate, leaflets 3–5, opposite, elliptic, 4–6 × 3–4 cm, rounded at apex and base, denticulate, hispid; petioles 4–6 cm long, slender, hispid. Stipules lanceolate, *c.* 5 × 3 mm, acuminate at apex, entire, hispid, persistent. Flowers solitary or in terminal

corymbs; pedicels 5–8 cm long, erect, hispid. Bracts lanceolate, *c.* 6 × 3 mm, acuminate at apex, entire, hispid. Sepals 5, free, lanceolate, 4.5–5 × 2.7–3 mm, acute at apex, entire, strigose out, glabrous within. Petals 5, free, obovate, 4.7–5 × 4–4.3 mm, retuse at apex, entire, glabrous. Stamens 20; filaments sub-equal, glabrous. Pistils numerous; ovaries ovoid; styles slender. Achenes clustered on rounded receptacle.

Distribution: The native range of this species is India (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft*.: December-May.

Specimens examined: Banther, Pambadum shola, 21.12.2018, *Vishnu Mohan & Santhosh Nampy* 167875; way to Meesappulimala, 06.05.2019, *Vishnu Mohan & Santhosh Nampy* 159137; Vakavanam 05.05.2017, *Vishnu Mohan* & *Santhosh Nampy* 174521 (CALI).

Prunus L.

Sp. Pl. 1: 473. 1753.

Prunus ceylanica (Wight) Miq., Fl. Ned. Ind. 1(1): 366. 1855; N.P.Balakr. in G.V.S.Murthy& V.J.Nair (ed.), Fl. Kerala 2: 303. 2016. *Polydontia ceylanica* Wight, Ill. Ind. Bot. 1: 203. 1840.

Pygeum acuminatum Colebr., Trans. Linn. Soc. London 12: 360. 1819; Hook.f., Fl. Brit. India 2: 318. 1878; Gamble, Fl. Madras 1: 439. 1919.



Evergreen trees, up to 20 m tall. Branchlets woody, terete, glabrous; bark brownish grey. Leaves simple, alternate; lamina ovate-lanceolate, 10–15 × 5–8 cm, acute at apex, rounded at base, entire, glabrous, coriaceous; petioles 1–3 cm long, stout, glabrous. Flowers in axillary racemes; peduncles 5–10 cm long, slender, glabrous; pedicels *c.* 0.5 cm long, stout, pubescent. Bracts ovate, 3.6–4 × 2–2.8 mm, acute at apex, entire, silky pubescent out, glabrous within. Calyx campanulate; lobes 5, ovate, *c.* 3 mm

long, acute at apex, entire, pubescent out, glabrous within. Petals 5, oblong, 5–5.7 × 2.8–3 mm, rounded at apex, entire, tomentose out, glabrous within. Stamens 20, free; filaments glabrous, slender, narrow, erect. Ovaries sessile; stigmas capitate. Drupes woody.

Distribution: The native range of this species is Indian Subcontinent to Indo-China (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and moist deciduous forests; *Fl.* & *Ft.*: August-May.

Specimens examined: Mathikettan Shola National Park, Mannankudi, 06.01.2017, *Vishnu Mohan & Santhosh Nammpy* 151576; Nymakkad, 24.01.2017, *Vishnu Mohan & Santhosh Nampy* 158196; Upper Manalar, 17.05.1993, *Jomy Augustine* 13720; Vallakkadavu, 16.08.2018, *Vishnu Mohan* & *Santhosh Nampy* 184523 (CALI).

Rubus L.

Sp. Pl. 1: 492. 1753, *nom. cons.*

Key to the species

1. Leaves simple, lobed……..……2
1. Leaves pinnately compound……..……3
2. Bracts divided into linear lobes……..……*R. glomeratus*
2. Bracts toothed, boat-shaped……..……*R. indicus*
3. Leaves 3-foliate; petals white……..……*R. ellipticus*
3. Leaves 5–7-foliate; petals pink……..……*R. niveus*

Rubus ellipticus Sm. in A.Rees, Cycl. 30: n.° 16. 1815; Hook.f., Fl. Brit. India 2: 336. 1878; Gamble, Fl. Madras 1: 441. 1919; N.P.Balakr. in G.V.S.Murthy& V.J.Nair (ed.), Fl. Kerala 2: 306. 2016.



Shrubs, up to 3 m tall. Stems terete, covered with red bristles, spiny. Leaves alternate, 3-foliate; leaflets obovate, 3–8 × 2–6.5 cm, rounded-truncate at apex, attenuate at base, crenate, glabrous above, hispid below; petiolules 0.3–0.5 cm long, stout,

with red bristles and spines; rachis 3–4 cm long, with red bristles and spines. Flowers in terminal panicles; peduncles with red bristles and spines; pedicels *c.* 1 cm long, slender, red bristled. Bracts ovate-lanceolate, *c.* 4 × 2 mm, acute at apex, entire, pubescent. Sepals 5, free, ovate, 5–5 × 2.7–3 mm, acuminate at apex, entire, strongly hispid out, glabrous within. Petals 5, free, obovate, *c.* 6.7–8 × 3.5–4 mm, rounded at apex and base, entire, glabrous, white. Stamens numerous, shorter than petals; filaments broadened and flattened basally. Ovaries pubescent; styles glabrous, slightly longer than stamens. Drupes golden yellow, sub-globose.

Distribution: The native range of this species is Indian Subcontinent to S. Central China and Indo-China, Philippines (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and shola forests; *Fl.* & *Ft.*: November-May.

Specimens examined: Adimali-Munnar road, 21.02.2008, *M. Sheela* 107636; Anamudishola National Park, 18.11.2018, *Vishnu Mohan* & *Santhosh Nampy* 152358; Devikulam, 12.12.1970, *O.K. Premavally* 1315; way to Marayoor, 07.01.2004, *V.K. Sreenivas* 96510; Mathikettan Shola National Park, Choondal, 04.01.2017, *Vishnu Mohan* & *Santhosh Nampy* 151509; Sivanpara, 23.08.2014, *Syam Radh. S* 143513; Munnar, 15.02.2018, *Vishnu Mohan* & *Santhosh Nampy* 158120; Munnar, 12.12.1970, *A. Prabhakaran* 1214; Nymakkad, 8th mile, 24.01.2018, *Vishnu Mohan* & *Santhosh Nampy* 158232 (CALI); PTR, 18.05.1994, *Jomy Augustine,* 13758 (KFRI).

Rubus glomeratus Blume, Bijdr. Fl. Ned. Ind. 17: 1111. 1826; N.P.Balakr. in G.V.S. Murthy & V.J.Nair (ed.), Fl. Kerala 2: 308. 2016.

Rubus fulvus Focke, Sp. Rub. 81. 1910, *nom. illeg.*; Gamble, Fl. Madras 1: 441. 1919.

Spreading shrubs. Stems terete, reddish, densely hairy, thorny. Leaves simple, alternate; lamina shallowly 5-lobed, 5–8 × 4–8 cm, acute at lobe apex, cordate at base, crenate, rugose above, densely fulvous cottony tomentose below; petioles 4–7 cm long, thorny, fulvous, hairy. Brats deeply divided into linear lobes, densely pubescent. Flowers in terminal panicles; peduncles 4–10 cm long, slender, golden pubescent; pedicels 0.4–0.7 cm long, stout, pubescent.

Sepals united below, lobes 5, 5–6 × 2–3 mm, acuminate at apex, serrulate, densely pubescent out, glabrous within. Petals 5, free, obovate, 6–8 × 4–6 mm, rounded-acute at apex, entire, glabrous. Stamens many; filaments smaller than petals. Ovaries glabrous; styles reduced. Drupes ovoid, yellow.

Distribution: The native range of this species is SW. India, Malesia to Papuasia (POWO, 2023); *Habitat*: Evergreen forests and grasslands; *Fl.* & *Ft.*: June-April.

Specimens examined: way to Kannadippara, 08.06.2018, *Vishnu Mohan & Santhosh Nampy* 159281; Methappu, 29.01.2019, *Vishnu Mohan* & *Santhosh Nampy* 152358; Munnar, 26.03.2018, *Vishnu Mohan & Santhosh Nampy* 152075; Vellimala, 16.04.1995, *Jomy Augustine* 15333 (CALI).

Rubus indicus Thunb., De Rubo 5. 1813; N.P.Balakr. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 309. 2016.

Rubus wightii Gamble, Fl. Madras 1: 440. 1919.



Shrubs, up to 3–4 m tall. Stems terete, spiny, densely tomentose. Leaves simple, alternate, shallowly 5-lobed; lamina 6–13 × 5–10 cm, acute at apex, cordate at base, crenate, minutely rugose above, densely white-tomentose below; petioles 3–6 cm long, spinose, pubescent. Flowers in axillary or terminal panicles; peduncles 3–7 cm long, stout, pubescent; pedicels 0.3–0.6 cm long, stout, pubescent. Bracts toothed, boat-shaped, 5–6 × 2.5–3 mm, acute at apex, entire, pubescent out, glabrous within. Sepals united below; lobes 5, ovate-lanceolate, 5–7 × 3–3.5 mm, acuminate at apex, entire, silky pubescent out, glabrous within. Petals 5, free, obovate, 7.5–8 × 5–6 mm, rounded at apex, entire, glabrous. Stamens numerous; filaments 6–6.4 mm long, erect, glabrous. Ovaries densely hairy; styles reduced; stigmas sticky. Drupes yellow, glabrous.

Distribution: The native range of this species is India and Sri Lanka (POWO, 2023); *Habitat*: Degraded forests; *Fl.* & *Ft.*: October-June.

Specimens examined: Mathikettan Shola National Park, Choondal, 21.11.2014, *Syam Radh S. & Rajeevan R.* 143562; Munnar, 18.10.2017, *Vishnu Mohan* & *Santhosh Nampy* 145263; Parunthanpara, 29.04.2018, *Vishnu Mohan & Santhosh Nampy* 152936; Uppupara, 08.06.1995, *Jomy Augustine* 15482 (CALI).

Rubus niveus Thunb., De Rubo 9. 1813; Gamble, Fl. Madras 1: 442. 1919; N.P.Balakr. in G.V.S.Murthy& V.J.Nair (ed.), Fl. Kerala 2: 310. 2016.



Shrubs, up to 5 m tall. Stems terete, glaucous, spiny. Leaves imparipinnate alternate; leaflets 5–7, elliptic, 3–5 × 2–3 cm, acute at apex, rounded-cordate at base, serrate, white-tomentose beneath, glabrous above; petiolule 0.2–0.3 cm long, stout; rachis 8–13 cm long, strongly spiny. Flowers in axillary racemes; peduncles up to 1 cm long, erect, spiny; pedicels 0.5–1.2 cm long, stout, pubescent, spiny. Bracts lanceolate, 4–5 × 2.5–3 mm, acuminate at apex, entire, pubescent. Sepals lanceolate, united at base; lobes ovate, 5–5.5 × 3–3.2 mm, sharply acuminate at apex, entire, pubescent out. Petals 5, free, obovate 6–7 × 4–5 mm, acute-rounded at apex, entire, glabrous, pink. Stamens numerous; filaments 5–6 mm long, glabrous, erect. Ovaries densely pubescent; styles reduced, thick, curved; stigmas sticky. Drupes ovoid, acute, sub-glabrous.

Distribution: The native range of this species is Afghanistan to Central China and Indo-China, Jawa (POWO, 2023); *Habitat*: Degraded forests Indo-Malesia and China; *Fl.* & *Ft.*: January-October.

Specimens examined: Anamudi shola, 04.04.2017, *Vishnu Mohan & Santhosh Nampy* 152075 (CALI); Chinnar, 11.05.1995, *K.K. Sajeev* 15671

(KFRI); Devikulam, 18.10.2017, *Vishnu Mohan* & *Santhosh Nampy* 145263; Malayalippara, 04.01.2017, *Vishnu Mohan & Santhosh Nampy* 151486; way to Marayoor, 24.03.2003, *N. Divya* 90566 (CALI).

CRASSULACEAE J.St.-Hil.

Expos. Fam. Nat. 2: 123. 1805.

Herbs and under shrubs, usually succulent. Leaves opposite or alternate, exstipulate. Flowers actinomorphic, hermaphrodite. Petals the same number as the sepals, free or variously connate. Stamens as many or twice as many as the petals. Carpels the same number as the petals. Fruit follicular, membranous or leathery, often surrounded by the persistent membranous corolla.

This family includes 36 genera in the world (POWO, 2023); seven species under one genus in the study area.

Kalanchoe Adans.,

Fam. Pl. 2: 248. 1763.

Key to the species

1. Leaves sessile…….. *K. dineshii*

1. Leaves petiolate……2

2. Corolla with a much-constricted tube; leaves bulbiferous ……...3

2. Corolla with a flask-shaped tube; leaves not bulbiferous ……..…..5

3. Leaves simple ……...*K. fedtschenkoi*

3. Leaves pinnate……..…..…..……4

4. Calyx tube almost covers corolla tube…….…..…..…. *K. pinnata*

4. Calyx tube restricted to the base of corolla tube…… *K. delagoense*

5. Leaves simple……6

5. Leaves pinnatifid……*K. laciniata*

6. Flowers yellow; calyx lobe ovate ……..…….. *K. grandiflora*

6. Flowers white; calyx lobe lanceolate ……..……7

7. Sepals glabrous on both sides……..…*K. bhidei*

7. Sepals glandular hairy……*K. olivaceae*

Kalanchoe bhidei T.Cooke, Fl. Bombay 1: 467. 1903; Gamble, Fl. Madras 1: 450. 1919; N.B.Sing, U.C.Bhattach. & Uniyal, Crassulaceae India 54. 2011.Mayur D. Nandikar *et al.* Taxonomy and typification of *Kalanchoe olivacea* and *K. bhidei* (Crassulaceae) Rheeedea 29(3): 197–208 2019.



Erect succulent herbs, up to 50 cm tall. Stems terete, glabrous, glaucous. Leaves simple, opposite; lamina elliptic-ovate, 5–8 × 3–6 cm, acute at apex, obtuse at base, crenate, glabrous, sessile. Flowers in terminal panicles, white; peduncles 8–15 cm long, erect, glabrous, glaucous; pedicels *c.* 0.5 cm long, slender, glabrous. Sepals 4, lanceolate, 5–6 × 1–2 mm, acuminate at apex, entire, glabrous. Corolla campanulate; tube *c.* 1 cm long; lobes 4, ovate, 4–5 × 2–3 mm, acuminate at apex, entire, glabrous. Stamens 8; filaments 5–8 mm long, erect, slender, glabrous. Ovaries ovate, glabrous, glaucous; styles *c.* 3 mm long, erect, glabrous; stigmas sticky. Follicles ovate, glabrous.

Distribution: The native range of this species is W. India (POWO, 2023);

Habitat: Grasslands; *Fl. & Ft.*: November-May.

Specimen examined: Near Subran shed, Pettimudi, 30.12.2019, *Vishnu Mohan & Santhosh Nampy* 170062 (CALI).

Kalanchoe delagoensis Eckl. & Zeyh., Enum. Pl. Afric. Austral. 3: 305. 1837. *Bryophyllum delagoense* (Eckl. & Zeyh.) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 4: 611. 1916, publ. 1917.

Erect fleshy herbs, up to 40 cm tall. Stems terete, hollow, glabrous, glaucous. Leaves simple, opposite, elliptic-oblong, 3–6 × *c.* 0.5 cm, rounded at apex, attenuate at base, margin with numerous plantlets; petioles reduced, fleshy. Flowers in terminal-axillary corymbs; peduncles erect, 5–15 cm long, glabrous, glaucous; pedicels 0.5–0.8 cm long, slender, glabrous. Bracts linear, 8–9 × 2–2.5 mm, acute at apex, entire, glabrous. Sepals fused at base, tube 085−0.9 cm

long; 4-lobed; lobes lanceolate, 6–8 × 1–2 mm, acuminate at apex, entire, glandular pubescent. Corolla fused; tube *c.* 1.5 cm long; lobes 4, acute, 4–6 × 3–5 mm, rounded-acute at apex, entire, glabrous. Stamens 8; filaments *c.* 1.8 cm long, glabrous, slender, erect. Carpels 4; styles *c.* 3 mm long, erect, slender; stigmas curved, sticky. Follicles ovate.



Distribution: The native range of this species is S. Central & S. Madagascar (POWO, 2023); *Habitat*: Ro adsides; *Fl.* & *Ft.*: September-December-February.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175911; Kanthallur, 26.01.2018, *Vishnu Mohan & Santhosh Nampy* 158329; Santhanpara, 06.01.2017, *Vishnu Mohan & Santhosh Nampy* 151628 (CALI).

Kalanchoe dineshii Syam Radh & Nampy, Anales Jard. Bot. Madrid 79(2)-e127: 2. 2022.

Erect succulent herbs, 30–40 cm tall, glabrous. Stems woody at base, glabrous, with prominent leaf scars on lower part. Leaves simple, opposite, sessile; lamina obovate to obtrullate, 4–4.5 × 2–3 cm, obtuse to rounded at apex, undulate, glabrous. Flowers in terminal, trichotomous corymbs; peduncles 6–8 cm long, glabrous; pedicels 0.3–0.5 cm long, glabrous. Involucre bracts leafy, obtrullate, 2.5–3 × 1.5–2 cm, acuminate, incised. Bracts lanceolate *c.* 1.5 × 0.5 mm, glabrous. Sepals fused at base; lobes 4, basally fused, widely ovate, 2–3 × 1.5–2 mm, glabrous, persistent in fruit. Corolla fused at base; lobes 4, widely ovate, 3–5 × 2–3 mm, wavy, glabrous. Stamens 8; filaments unequal, 1–2 mm long, glabrous. Carpels 4, bottle-shaped, free; ovaries *c.* 3 × 1 mm, glabrous; ovules numerous; styles 3–5 mm long, cylindrical, glabrous; stigmas capitate. Follicles glabrous.

Distribution: The native range of this species is India; *Habitat*: Grasslands; *Fl. & Ft.*: November-May.

Specimens examined: Choondal, 04.11.2015, *S.S. Radh & K.M. Manudev* 145081; way to Perattakkalam, 04.01.2017, *S.S. Radh & D. Francis* 151529; way to Sivanpara Mathikettan Shola National Park check post, 03.12.2018 *S.S. Radh & T.K. Sreekutty* 151789 (CALI).

Kalanchoe fedtschenkoi Raym.-Hamet & H.Perrier, Ann. Mus. Colon. Marseille sér. 3, 3: 75. 1915. *Bryophyllum fedtschenkoi* (Raym.-Hamet & H.Perrier) Lauz.-March., Compt. Rend. Hebd. Séances Acad. Sci., Sér. D 278: 2508. 1974.



Erect succulent herbs, up to 30 c tall. Stems terete, hollow, glabrous, glaucous, smooth, thick and hard at base. Leaves simple, opposite; lamina obovate-elliptic, 4–6 × 2–3 cm, acute at apex, cuneate at base, crenate, glaucous, sub-succulent, glabrous; petioles 0.5–0.8 cm long, glabrous, slightly grooved above. Flowers in terminal cymes; peduncles 6–15 cm long, glabrous, erect; pedicels 0.8–1.5 cm long, slender, glabrous, tip drooping. Sepals campanulate; tube *c.* 1.5 cm long; lobes 4, ovate, 5–6 × 3–4 cm, acute at apex, entire, glabrous. Corolla fused at base, 1–2 cm long, purple-red; lobes 4, obovate, 5–6 × 3–4 mm, rounded at apex, entire, glabrous, membranous. Stamens 8; filaments exceeding corolla. Carpels 4; styles short, erect, glabrous; stigmas curved, sticky. Follicles ovate, glabrous.

Distribution: The native range of this species is Central & S. Central Madagascar (POWO, 2023); *Habitat*: Introduced as garden plant, now

running wild along the roadsides and scrub jungles in the high ranges. *Fl. & Ft.*: May-January.

Specimen examined: Mangaladevi hills, 15.05.2017, *Vishnu Mohan & Santhosh Nampy* 176305 (CALI).

Kalanchoe grandiflora Wight & Arn., Prodr. Fl. Ind. Orient. 1: 359. 1834; Hook.f., Fl. Brit. India 2: 415. 1878; Gamble, Fl. Madras 1: 451. 1919; N.B.Sing, U.C.Bhattach. & Uniyal, Crassulaceae India 60. 2011; V.Chandras. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 316. 2016.



Erect succulent herbs. Stems terete, glabrous, glaucous, hard at base. Leaves simple, opposite; lamina obovate-orbicular, 4–7 × 3–5 cm, rounded at apex, attenuate at base, entire-shallowly crenate, fleshy, glaucous, glabrous; petioles 0.3–0.5 cm long, stout, glabrous, slightly grooved above. Flowers in terminal corymbs, yellow; peduncles 4–7 cm long, erect, glabrous; pedicels *c.* 1 cm long, erect, glabrous. Bracts ovate, 2–3 × 0.8–1 cm, acute at apex and base, entire, glabrous. Sepals ovate, 5–6 × 2–3 mm, acuminate at apex, rounded at base, entire, glabrous. Corolla fused at base; tube *c.* 12 mm long; lobes 4, obovate, 6–7 × 2–4 mm, acuminate at apex, entire, glabrous. Stamens 8; filaments *c.* 15 mm long, glabrous, erect. Ovaries ovate, glabrous; styles *c.* 4 mm long, erect; stigmas sticky. Follicles orbicular, glabrous.

Distribution: The native range of this species is Himalaya and SW. India (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: December-May.

Specimen examined: way to Anamudi peak, 11.12.2019, *Vishnu Mohan & Santhosh Nampy* 164544 (CALI).

Kalanchoe pinnata (Lam.) Pers., Syn. Pl. 1: 446. 1805. *Bryophyllum pinnatum* (Lam.) Oken, Allg. Naturgesch. 3(3): 1966. 1841.

Bryophyllum calycinum Salisb., Parad. Lond. 1: t. 3. 1805; Hook.f., Fl. Brit. India 2: 413. 1878; N.B.Sing, U.C.Bhattach. & Uniyal, Crassulaceae India 73. 2011; V.Chandras. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 318. 2016.



Erect succulent herbs, up to 1 m tall. Stems terete, fleshy, glabrous, glaucous, smooth. Leaves simple, opposite; lamina elliptic, 5–10 × 3–6 cm, acute-rounded at apex, cuneate at base, deeply crenate, glabrous, succulent, glaucous; petioles 0.4–0.6 cm long, stout, shallowly grooved above. Flowers pendulous in terminal cymose panicles; peduncles 10–20 cm long, dichotomously branching, glabrous; pedicels 7–10 cm long, slender, glabrous, drooping. Sepals fused at base; tube 1.5–2 cm long; lobes 4, triangular, *c.* 3 × 2 mm, acute at apex, entire, glabrous on both sides. Corolla fused, tube 1.5–2.3 mm long; lobes 4, acute, *c.* 3 × 3 mm, acuminate at apex, entire, glabrous. Stamens 8; filaments 10–12 mm long, slender, glabrous, erect. Carpels 4; ovules many; styles short, glabrous, erect; stigmas sticky. Follicles enclosed with in reddish calyx tube.

Distribution: The native range of this species is Madagascar (POWO, 2023); *Habitat*: Rocky areas in moist deciduous forests, also in the plains; *Fl. & Ft.*: December-March.

Specimen examined: Above Cheeyapara waterfalls, 27.12.2017, *Vishnu Mohan & Santhosh Nampy* 156507 (CALI).

Kalanchoe laciniata (L.) DC., Pl. Hist. Succ. t. 100. 1802; Hook.f., Fl. Brit. India 2: 415. 1878; Gamble, Fl. Madras 1: 451. 1919; N.B.Sing, U.C.Bhattach. & Uniyal, Crassulaceae India 67. 2011.

Erect fleshy herbs, up to 40 cm tall. Stems terete, glabrous, glaucous, smooth. Leaves pinnatifid; lamina oblong, 3–5 × 0.5–2 cm, acute at apex, attenuate at base, dentate, glabrous; petioles 0.4–0.6 cm long, stout, glabrous. Flowers in terminal or axillary corymbose cyme, non-fragrant, creamish yellow; peduncles erect, dichotomously branching, glabrous; pedicels *c.* 0.4 cm long, slender, erect, glabrous. Bracts linear, *c.* 0.8 × 0.2 cm long, acuminate at apex, entire, glabrous. Sepals fused, tubular, 4-lobed; lobes lanceolate, 3.5–4 × *c.* 1.5 mm, acute at apex, glandular pubescent out, glabrous within. Corolla fused; tube *c.* 10 mm long; lobes 4, lanceolate, 3–4 × 2.5–3 mm, acuminate at apex, glandular pubescent out, glabrous within. Stamens 8; filaments exceeding calyx, slender, erect, *c.* 6 mm long. Carpels 4; styles short, erect, glabrous; stigmas sticky. Follicles ovate.

Distribution: The native range of this species is Eritrea to NW. Namibia and Arabian Peninsula (POWO, 2023); *Habitat*: Moist deciduous forests; *Fl. & Ft.*: November-February.

Specimen examined: Mannankudi, 06.01.2017, *Vishnu Mohan & Santhosh Nampy* 151621 (CALI).

Kalanchoe olivacea Dalzell in Dalzell & Gibson, Bombay Fl. 313. 1861; Gamble, Fl. Madras 450. 1919; N.B. Sing, U.C.Bhattach. & Uniyal, Crassulaceae India 71. 2011.



Erect fleshy herbs, 1 m tall. Stems terete, glabrous, glaucous, base rigid. Leaves simple, opposite; lamina obovate, 4–8 × 3–5 cm, rounded at apex, cuneate at base, crenate, fleshy, glabrous; petioles 0.3–0.6 cm

long, stout, smooth, glaucous. Flowers in terminal cymes, white; peduncles 5–10 cm long, glabrous; pedicels *c.* 0.5 cm long, erect, short. Bracts linear, *c.* 5 × 1 mm, acuminate at apex, entire, glandular hairy out, glabrous within. Sepals fused; tube 4-lobed; lobes lanceolate, 5–6 × 1–2 mm, acuminate at apex, entire, glandular hairy. Corolla fused; tube *c.* 1 cm long; lobes 4, lanceolate, 6–8 × 3–4 mm, apiculate at apex, entire, glandular hairy. Stamens 8; exceeding corolla tube, slender, glabrous. Carpels ovate, glabrous; styles *c.* 4 mm long, erect, glabrous; stigmas oblique, sticky. Follicles glabrous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: December-March.

Specimen examined: Koyman chola, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 188751 (CALI).

DROSERACEAE Salisb.

Parad. Lond. 2: ad t. 95. 1808, *nom. cons.*

Perennial herbs with glandular hairs, sometimes with bulbous roots. Leaves rosulate or cauline, the glandular hairs attracting and securing small insects. Flowers white or pink, in racemes, cymes, corymbs or solitary. Calyx lobes 5–8. Petals as many as sepals. Stamens as many as petals. Ovaries free, ovoid or globose; styles 2–5. Capsules longitudinally 2–5 valved.

The family includes three genera and 252 species in the world (POWO, 2023); three species occur in Idukki district.

Drosera L.

Sp. Pl. 281. 1753

Key to the species

1. Plants acaulescent…..……. *D. burmanni*

1. Plants caulescent ……..……..……2

2. Leaves linear; flowers purple..…..……*D. indica*

2. Leaves peltate; flowers white……..……..*D. peltata*

Drosera burmanni Vahl., Symb. Bot. 3: 50. 1794; Wight. Ic. 944. 1988; Hook.f., Fl. Brit. India 2: 424. 1878; Gamble, Fl. Madras 452. 1915; Sasidh., Fl. Pl. 168. 2004; Prasad, in Moorthy & Nair, Fl. Kerala 320. 2016.

Acaulescent herbs, 15–20 cm tall. Leaves rosulate, orbicular-obovate, 0.6–0.8 × 0.4–0.6 cm, greenish pink, glandular hairy on both surfaces; petioles 0.2–0.25 cm long, glandular hairy. Stipules linear-elliptic, 5–6 × 3–4 mm, acuminate at apex, entire at margins, membranous, connate with petioles at base. Flowers in terminal racemes, non-fragrant; peduncles 5–10 cm long, narrow, slender, glabrous; pedicels 0.3–0.5 cm long, narrow, thread like, glabrous. Sepals 5, connate at base; lobes ovate-ovoid, 3–4 × 0.5–1 mm, acute at apex, smooth at margins, glandular hairy out, glabrous within. Petals 5, free, orbicular-obovoid, 4–5 × 2.5–3 mm, rounded at apex, smooth at margins, pale pink, glabrous, membranous. Stamens 5; filaments erect, 2.5–3 mm, long, slender, glabrous. Ovaries ovoid, glabrous; styles 5, apically lobed, pale pink; stigmas crested, sticky. Capsule obovoid. Seeds black.



Distribution: Tropical and Subtropical Asia to West Pacific (POWO, 2023); *Habitat*: Marshy places in gra sslands; *Fl. & Ft.:* August–November.

Specimens examined: Anchuruli, 07.09.2017, *Vishnu Mohan & Santhosh Nampy* 152915; Mathikettan Shola National Park, Choondal top, 06.11.2018, *S. Syam Radh & Santhosh Nampy* 151760 (CALI).

Drosera indica L., Sp. Pl. 1: 282. 1753; Hook.f., Fl. Brit. India 2: 424, 1878; Gamble, Fl. Madras 452, 1915; Prasad in Moorthy & Nair, Fl. Kerala 321. 2016.



Caulescent herbs, 10–20 cm tall. Stems terete, decumbent, glandular hairy, wiry, slender. Leaves cauline, alternate, linear, 2.5–4 × 0.2–0.3 cm, acute at apex, smooth at margins, pale green, glandular hairy, thick; petioles 1.5 cm long, stout, glabrous. Stipules absent. Inflorescence axillary, 4–8 flowered; pedicels green-reddish, slender, glandular hairy. Sepals 5, free, oblong-ovate, 3–5 × 1–3 mm, acute at apex, entire at margins, green-reddish brown, glandular hairy out, glabrous within, membranous. Petals 5, free, narrowly spathulate-oblong, 5–8 × 5 mm, denticulate at apex, acute at base, smooth at margins, glabrous, purple, membranous. Stamens 5; filaments *c.* 2 mm long, erect, slender, glabrous. Ovaries superior, glabrous; styles 3, deflexed, slender, glabrous; stigmas sticky. Capsules broadly oblong. Seeds minute, ovoid, reticulate.

Distribution: Native to Tropical and South Africa, Madagascar, Tropical and Subtropical Asia (POWO, 2023); *Habitat*: Wet open grasslands; *Fl. & Ft.:* July–November.

Specimens examined: Anchuruli, 07.09.2017, *Vishnu Mohan & Santhosh Nampy* 152915; Mangaladevi hills, 05.07.2017, *Vishnu Mohan & Santhosh Nampy* 152894; Pandippara, 16.07.2021, *Vishnu Mohan & Santhosh Nampy* 176040 (CALI).

Drosera peltata Thunb., Drosera 7. 1797; Hook.f., Fl. Brit. India 2: 424. 1878; Gamble, Fl. Madras 425, 1915; Prasad in Moorthy & Nair (ed.), Fl. Kerala 322. 2016.

Caulescent herbs, 8–15 cm tall. Stems terete, wiry, slender, glabrous. Leaves alternate, peltate; lamina orbicular, 0.2–0.4 × 0.6–0.8 cm, rounded at apex and base, entire at margins, glandular above, glabrous below, thick; petioles 1–2 cm long, slender, glabrous. Stipules absent. Flowers in terminal racemes, non-fragrant, white; peduncles erect, 1–3 cm long, slender, glabrous; pedicels 0.2–

0.3 cm long, narrow, slender, glabrous. Sepals 5, connate at base; lobes ovate, 4–5 × 2 mm, acute at apex, laciniate or ciliate at margins, glabrous on both sides, membranous. Petals 5, spathulate, 7–8 × 4–5 mm, rounded at apex, acute at base, smooth at margins, glabrous on both sides, membranous. Stamens 5; filaments *c.* 3 mm long, erect, slender, narrow, glabrous. Ovaries globose, glabrous; styles 3, fimbriate, glabrous; stigmas capitate, sticky. Capsules ovoid. Seeds numerous.



Distribution: Native to New South Wales, New Zealand North, South Australia, Victoria (POWO, 2023); *Habitat:* Open grasslands; *Fl & Ft:* July-December.

Specimens examined: Kalvarimala, 06.07.1993, *Jomy Augustine* 12033; Mangaladevi hills, 19.08.2017, *Vishnu Mohan & Santhosh Nampy* 159169; Mathikettan Shola National Park, Choondal, 16.07.2015, *S. Syam Radh & Santhosh Nampy* 145037; Munnar, 13.12.1970, *O.K. Premavally* 1493; Peerumedu, 08.12.1970, *P. Rugmini* 971 (CALI).

HALORAGACEAE R.Br.

Voy. Terra Austral. 2: 549. 1814, *nom. cons.*

Herbs perennial, rarely annual, aquatic or terrestrial, monoecious or dioecious. Stem creeping, ascending or erect, often rooting at lower nodes. Leaves estipulate, 2–4-whorled, decussate, or alternate, in terrestrial species always simple, in aquatic submersed species always pectinately lobed. Inflorescence an indeterminate or determinate spike of 1–5-flowered dichasia borne in axils of leaflike primary bracts; occasional lateral inflorescences simpler. Flowers minute, actinomorphic, epigynous, protandrous, anemophilous or entomophilous, bisexual or unisexual. Sepals (2–)4, but

absent in female flowers of some *Myriophyllum*, mostly persistent. Petals alternisepalous, (2–)4, absent in female flowers of some *Myriophyllum*. Stamens 1 or 2 as many as sepals; filaments short, slender; anthers basifixed, mostly oblong or linear, 4-loculed, dehiscing by slits, antisepalous anthers sometimes somewhat longer than antipetalous ones; pollen grains shedding at 3-celled stage. Ovaries inferior, 1(or 2)– or 4-celled, septa solid or practically absent (present only at base and apex of ovaries. Fruit nutlike or a drupe; 1-seeded or breaking up into (2–)4 1-seeded mericarps. Seeds with thin testa; embryo cylindric, surrounded by thick, white albumen.

This family consist of eight genera and 163 species (POWO, 2023); three genera and four species in the study area.

Key to the genera

1. Petals present…… …*Laurembergia*

1. Petals absent……..……2

2. Leaves slightly clefted-shortly retuse at apex; sepals absent……*Callitriche*

2. Leaves acuminate at apex; sepals present..... *Myriophyllum*

Callitriche L.

Sp. Pl. 2: 969. 1753.

Key to the species

1. Lamina widely elliptic-orbicular, 4–7 mm wide; bracts absent; flowers unisexual; fruits broadly winged all round; testa with band like projections

……..…..*C. wightiana*

1. Lamina spathulate-obovate, 1.5–2.1 mm wide; bracts present; flowers bisexual; fruit wing only at apex; testa with pyramidal like projection……

……*C. idukkiana*

Callitriche idukkiana Vishnu & Nampy, **sp. nov.** Wight, Icon. Pl. Ind. Oriend 4. t. 1947. 1850.

Type: INDIA, Kerala, Idukki district, Pambadum Shola National Park, 10°07'4420"N 77°15'3550"E.±1840 m. 20th Dec. 2018, *Vishnu Mohan & Santhosh Nampy* 167856 (holo CALI & iso CAL).

Helophytic to terrestrial rooted monoecious annual creeping herbs. Stems cylindrical, glabrous, pale green. Leaves simple, nonheterophyllous, decussate, nongland-dotted, epulviniate; lamina spathulate-obovate, 3.1–5.3 × 1.5–2.1 mm, retuse at apex, attenuate at base and ending in a sheath clasping the stem, entire, glabrous, membranous; petioles 0.6–1.3 mm long, membranous. Stipules absent. Flowers solitary, axillary, consisting of single fertile stamen and pistil; pedicels 0.3–0.4 mm long, stout, glabrous. Bracts elliptic, 0.3–0.32 × 0.10–0.11 mm, rounded at apex, entire, membranous. Sepals and petals 0. Filaments 0.2–0.3 mm long, slender, glabrous; anthers dehiscing longitudinally, *c.* 0.2 × 0.2 mm; pollen yellow. Pistil 4-celled, syncarpous; ovaries 2-locular, *c.* 0.2 × 0.2 mm, sessile; styles 2, 0.16–0.26 mm long, slender, glabrous, from a depression at the top of ovaries. Schizocarps not fleshy, 0.43–0.74 × 0.61–0.88 mm; winged only at apex; wings 0.3–0.5 μm; pedicel 0.4 mm long. Seeds reniform, 0.5–0.6 × 0.35–0.45 mm; testa reticulate-foveate with pyramidal like projections.

Distribution: Hitherto known only from Idukki district in Kerala; *Habitat:* Grows in marshy areas, wet places in tea plantations and way sides, in association with *Funaria* sp. (Bryophyte), *Cyperus* sp. (Cyperaceae), *Lindernia* sp. (Scrophulariaceae), *Hydrocotyl* sp. (Apiaceae), *Anaphalis* sp. (Asteraceae), *Stenotaphrum* sp. (Poaceae), at an elevation of 1200-1400 above sea level; *Fl. & Ft.*: August-January.

Etymology- The species is named after Idukki district in Kerala where the type locality belongs.

Specimens examined: Meesappulimala-Pathinettu tea plantations way side, 15.10.2019, *Vishnu Mohan & Santhosh Nampy* 1703999; Munnar, near stream, 23.01.2018, *Vishnu Mohan & Santhosh Nampy* 158142; Rajamala way side, 31.08.2019, *Vishnu Mohan & Santhosh Nampy*

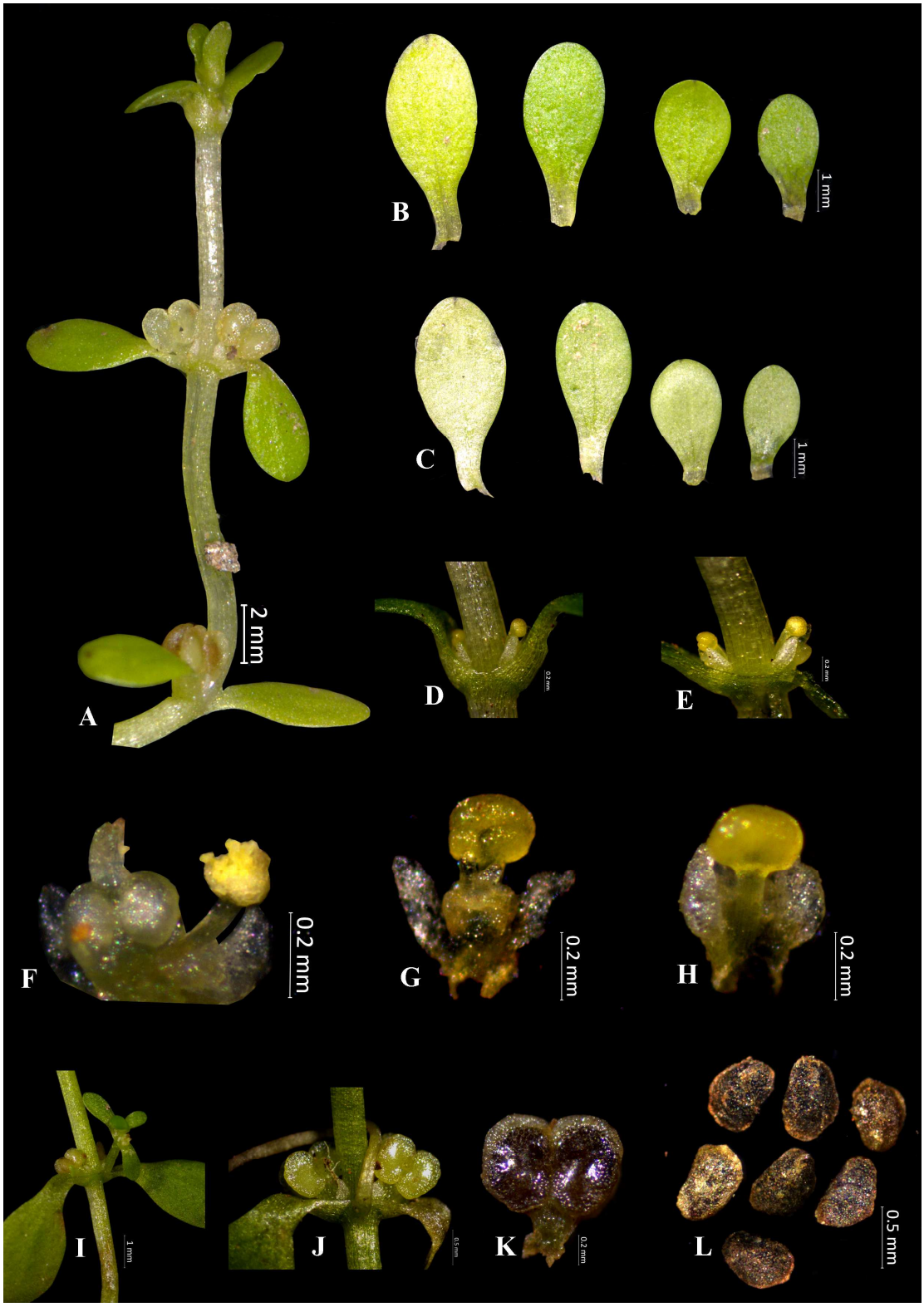
170257; Umiyamala way side, 30.08.2019, *Vishnu Mohan & Santhosh Nampy*, 159193 (CALI).

Notes: During the present study, materials of *Callitriche* were collected from different locations in Idukki district (Anamudishola National Park, Meesappulimala, Munnar, Pambadumshola National Park, Rajamalai, Umiyamala,) and from Tamil Nadu (Shooting point, Ooty Botanical Garden). A critical morphological analysis supported by molecular data shows that these specimens belongs to two different entities. So far only one species, *C. wightiana* Wall. ex Wight & Arnott characterized by clefted leaf apex, absence of bracts and inverted orientation of fruit is known from South India. The other one distinguished by acute leaf apex, presence of bracts and erect orientation of fruit is described here as new species, *C. idukkiana*.

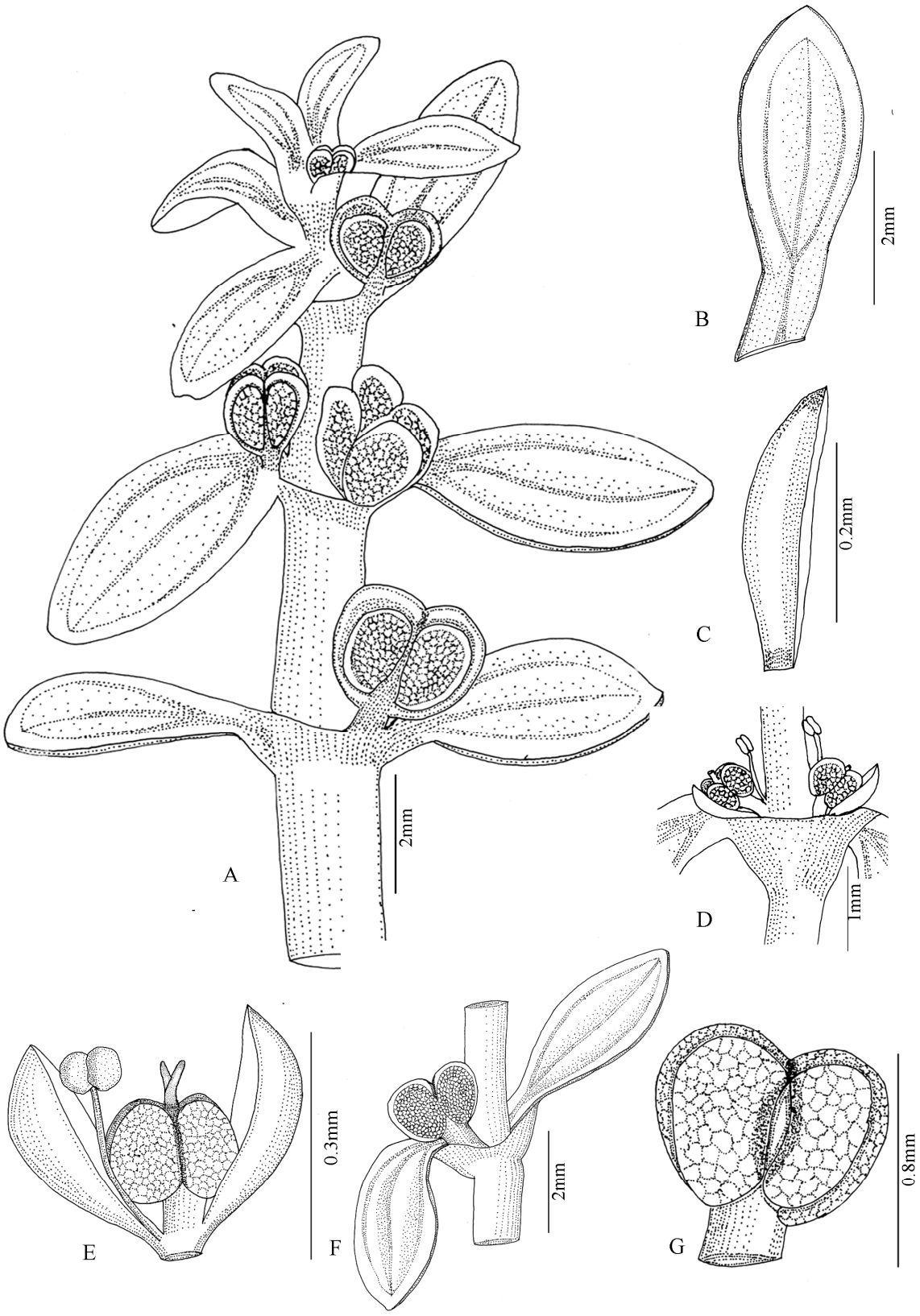
When the plant is injured, it emits resinous type of scent (https://www.medicinenet.com/what_are_the_ten_basic_smells/article.htm). The species favours a temperature ranging from 20–26˚C and has widely collected from different locations.



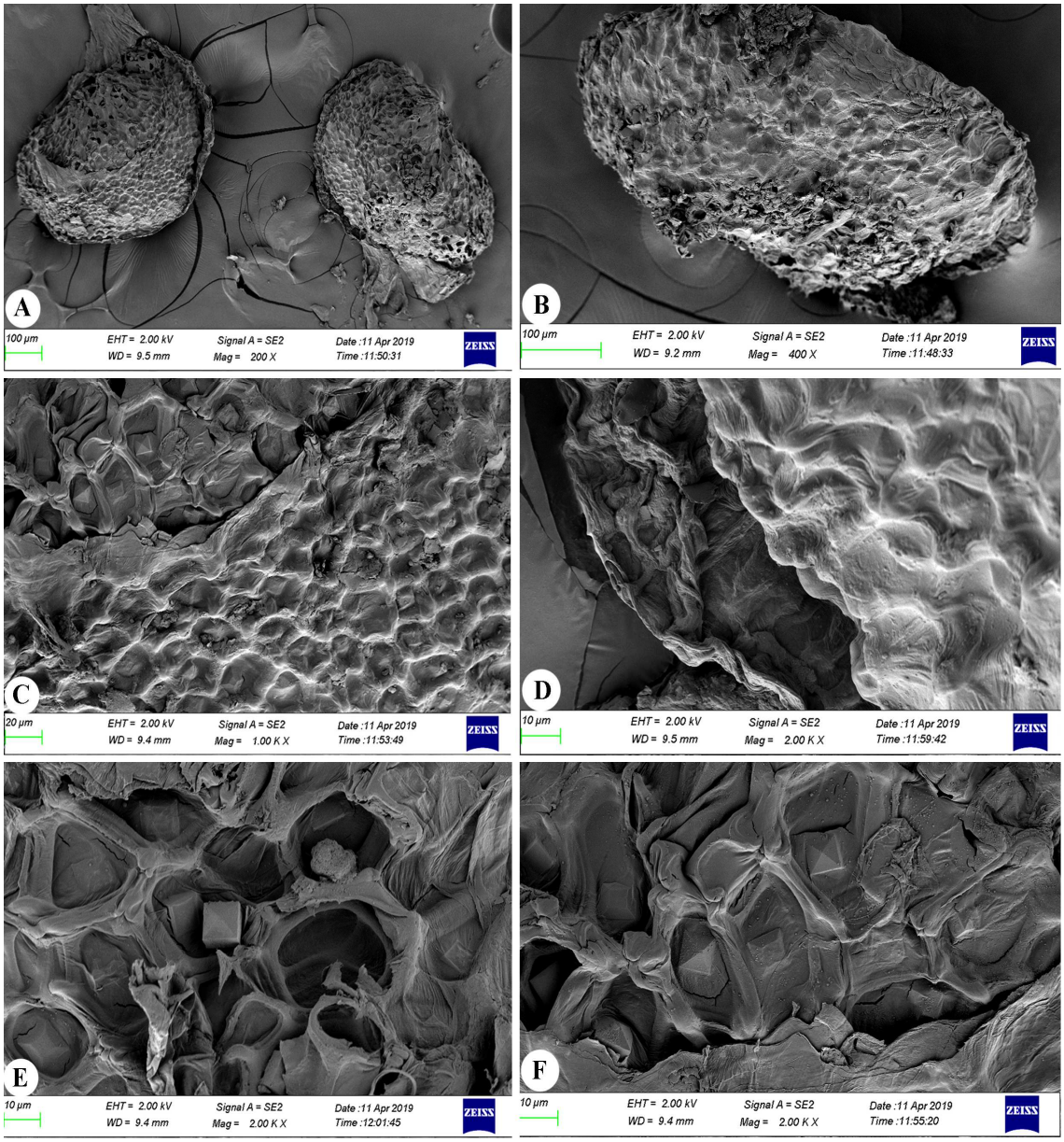
Callitriche idukkiana Vishnu & Nampy: Habitat



Callitriche idukkiana Vishnu & Nampy A: Habit; B&C: Leaves adaxial & abaxial sides; D & E: Leaf axis showing flowers; F–H: Flowers; I & J: Leaf axis showing fruits; K: Mature fruit; L: Seeds. (From Vishnu Mohan and Santhosh Nampy 167856)



Callitriche idukkiana Vishnu & Nampy A: Habit; B: Leaf; C: Bract; D: Leaf axis showing flowers; E: Flower; F: Leaf axis showing fruit; G: Fruit.

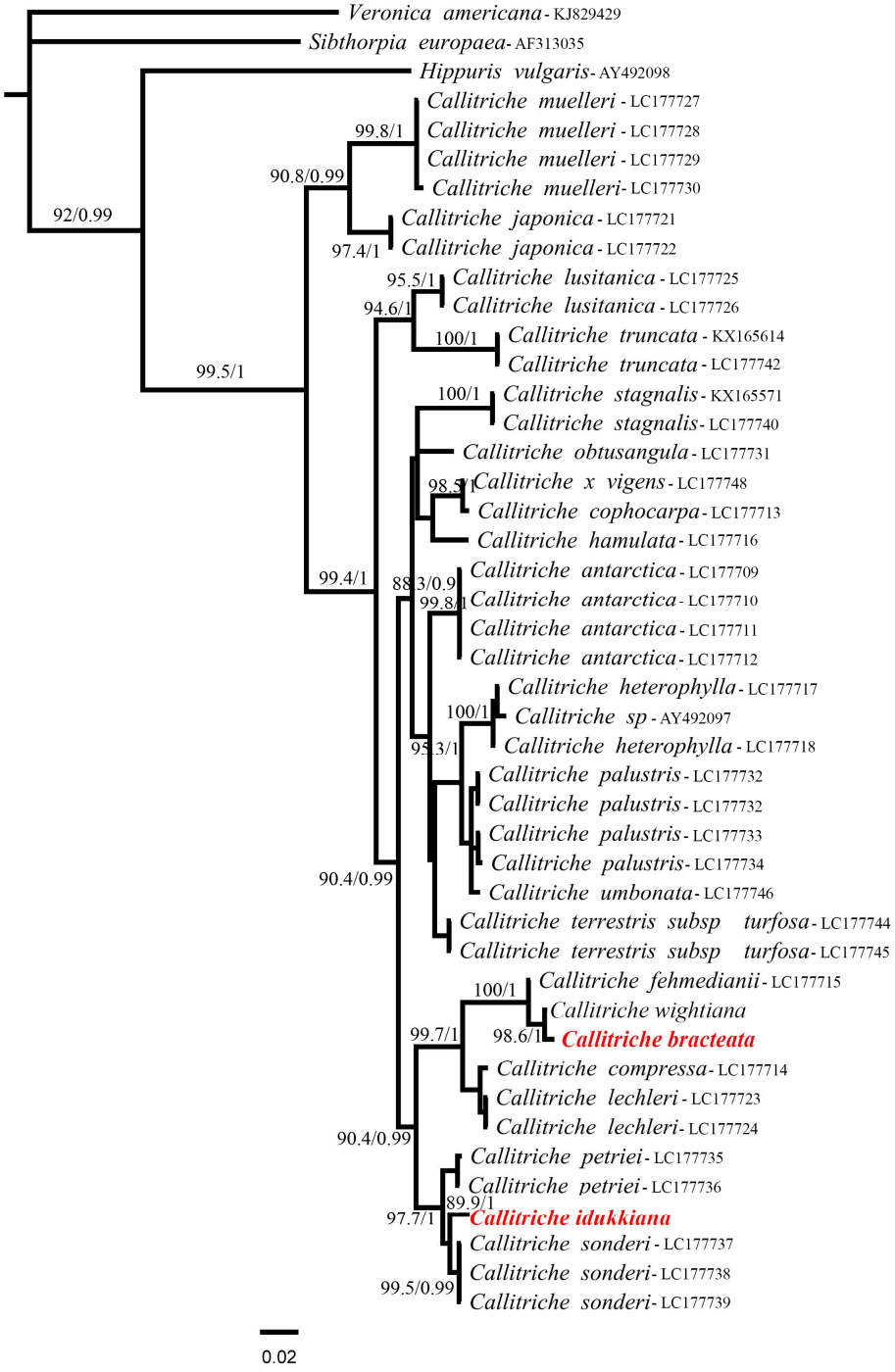


Scanning Electron Micrograph of seeds of *Callitriche idukkiana* Vishnu and Nampy. A: view from upper side; B: view from lower side; C–F: surface view in different magnification

Molecular phylogenetic analysis

The Phylogenetic tree constructed using nrITS involved 45 nucleotide sequences, including the three outgroup taxa. The model of evolution was obtained using GTR+F+G4 and GTR+I+G models for ML and BI, respectively. Obtained gene trees yielded the same topologies. Therefore, only one tree is shown here with support values from both algorithms. Two major clades in the ingroup (Clade I and clade II) were resolved with BI-PP= 1.00, ML-BP= 99.5%. The clade I have the support value BI-PP= 0.99, ML-BP= 90.8%, and in clade

II BI-PP= 1.00, ML-BP= 99.4%. In clade II, one of our new species, *C. idukkiaana* clustered together with *C. sonderi* with high support (BI-PP= 1 and ML-PP= 89%). Both species show a close relationship with *C. petriei*.



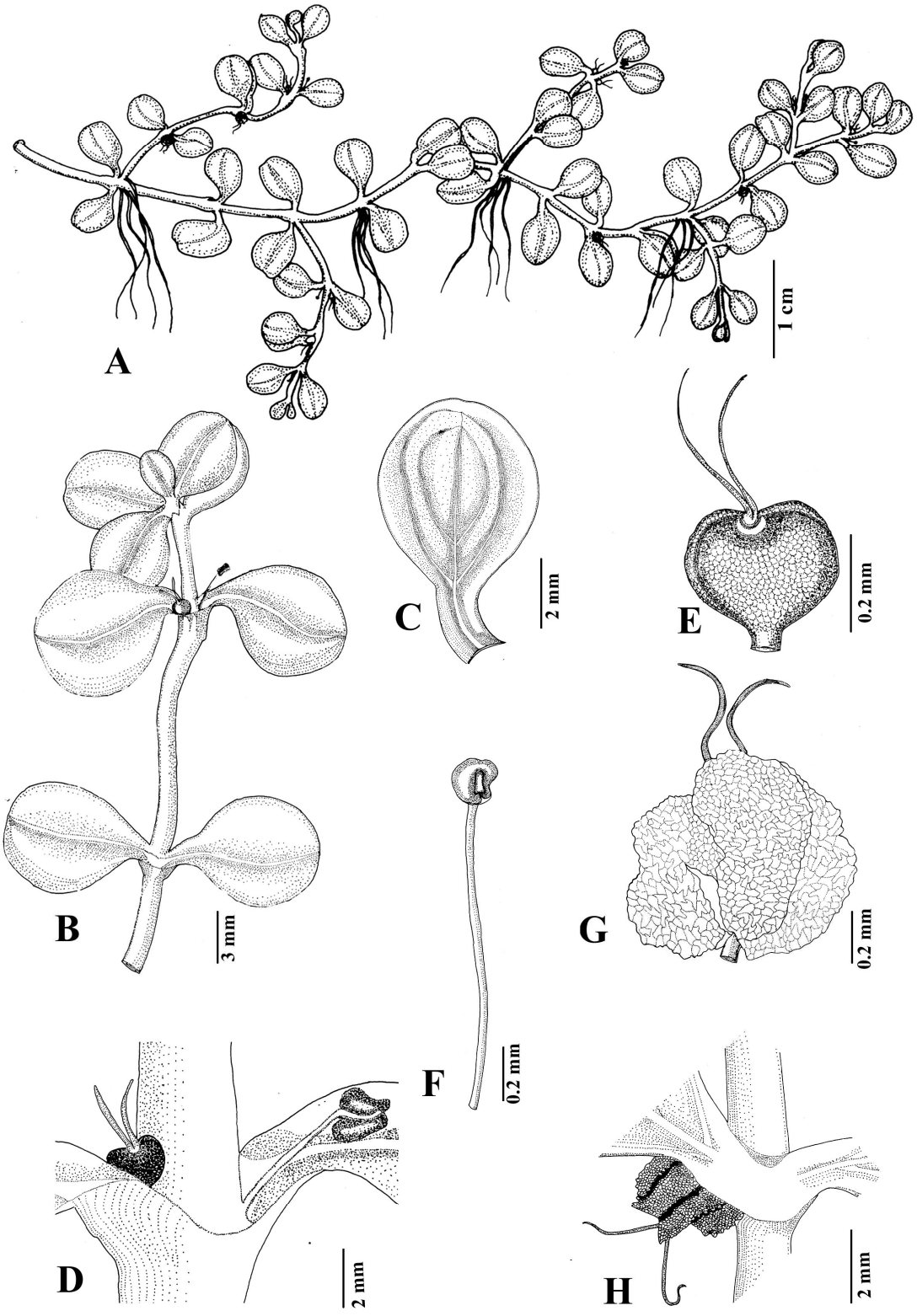
Callitriche wightiana Wall. ex Wight & Arnott, Prodr. Fl. Ind. Orient. 339. 1834. *Callitriche stagnalis sensu* C.B. Clarke in Hook.f., Fl. Brit. India 434. 1879, non Scop., 1771; Gamble, Fl. Madras 454. 1915.

Terrestrial prostrate decumbent fleshy herbs. Stems cylindrical, delicate, glabrous, pale green. Leaves simple, decussate; lamina widely elliptic to orbicular, 8–13 × 4–7 mm, rounded to shortly clefted at apex, shortly attenuate at base, entire, glabrous, membranous. Flowers solitary, most frequently as pairs of flowers with a staminate flower opposed by carpellate flower; nearly sessile. Bracts absent. Sepals and petals absent. Stamen 1; anthers elliptic, *c.* 1 × 0.5 mm, basifixed, longitudinal dehiscencing; filaments 1.3–1.5 mm long, erect, slender, glabrous. Ovaries superior, obliquely cordate, glabrous, *c.* 0.2 × 0.2 mm; styles bifid, pale yellow, glabrous, slender; stigmas 0.6–0.7 mm long, slender, sticky. Schizocarp oblate-auriculate, 2.1–2.5 × 1.4–2 mm, broadly winged all round, 3 or 4 seeded, bent downwards at maturity. Seeds pendulous, testa membranous; albumen fleshy, cotyledons short; testa with banded like projections.

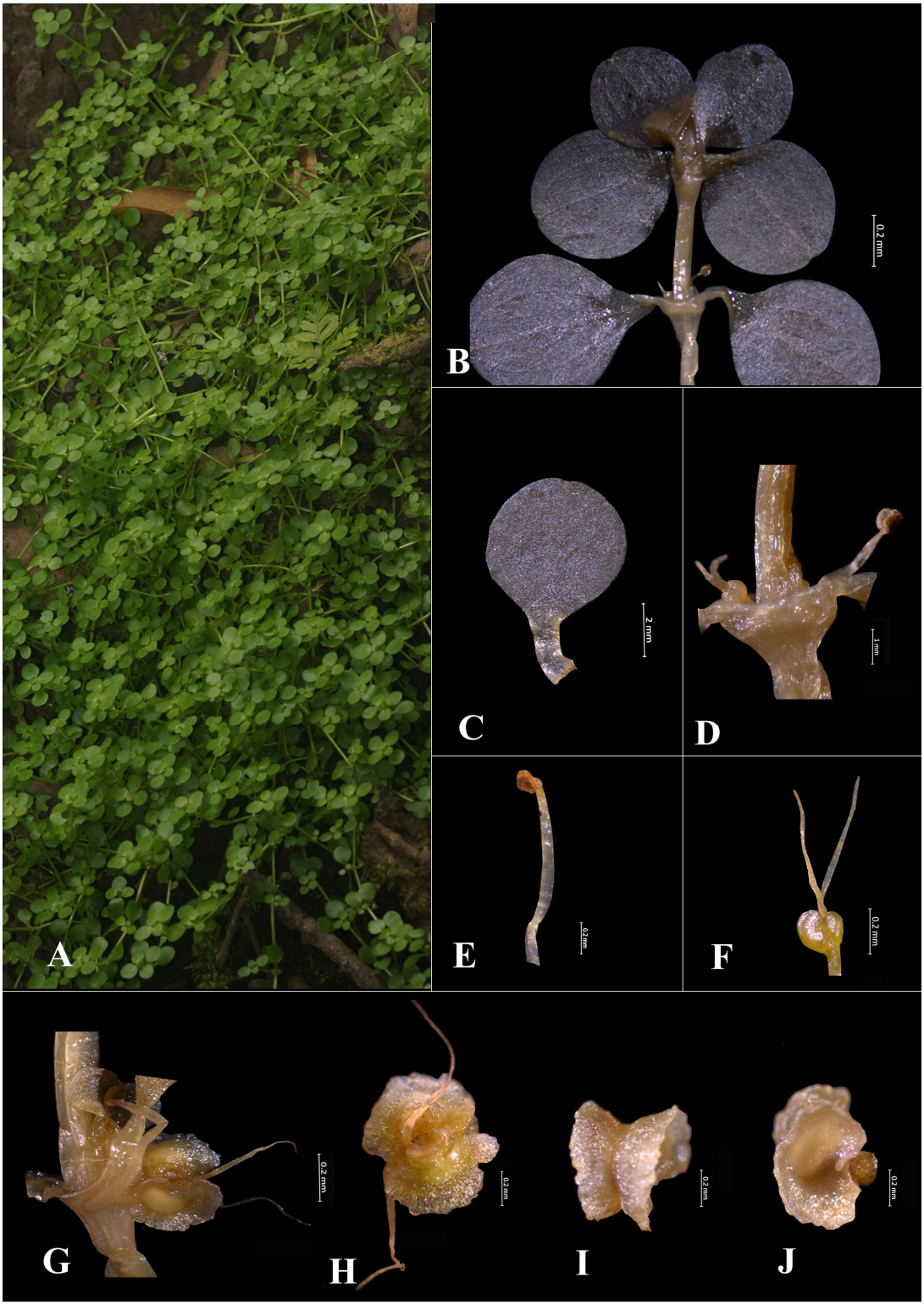
Distribution: The native range of this species is SE. India and Sri Lanka (POWO; 2023); *Habitat*: Marshy meadows and water logged areas; *Fl. & Ft.*: October-January.

Specimens examined: Anamudishola National Park, 25.01.2018, *Vishnu Mohan & Santhosh Nampy* 158257; Pambadumshola National Park, 19.12.2018, *Vishnu Mohan & Santhosh Nampy*, 167833 (CALI).

Notes: A critical study of the live material and protologue of *C. wightiana* showed the absence of bracts (*vs.* prescence of bracts), horizontal to slightly inverted orientation of mature fruits (*vs.* erect) and clefted leaf apex (*vs.* acute). These features are lacked in the illustration by Wight (Ic. Pl. Orient. f. 1947) and this illustration was cited by Hooker (1879, as *C. stagnalis*) and Gamble (1915, as *C. stagnalis*) . Specimens matching with the illustration were collected by me and is described above as *C. idukkiana*. An illustration based on fresh collections of *C. wightiana* is provided here for easy identification of this species. This species (even the genus) is not reported in any district floras and state flora of Kerala, but so far only reported from the Nilghiries. Hence this forms a new distributional record for the state of Kerala.



Callitriche wightiana Wall. ex Wight & Arn. A: Habitat; B: Habit; C: Leaf; D: Axil showing infloresence; E: Female flower; F: Male flower; G & H: Fruits.



Callitriche wightiana Wall. ex Wight & Arn. A: Habitat; B: Habit; C: Leaf; D: Axil showing infloresence; E: Male flower; F: Female flower; G-J: Fruits.

Laurembergia P.J.Bergius

Descr. Pl. Cap. 350. 1767.

Laurembergia coccinea (Blume) Kanitz in Martius, Fl. Bras. 13(2): 377 1882. *Epilithes coccinea* Blume, Bijdr. Fl. Ned. Ind. 14: 734. 1826.

Serpicula brevipes Wight & Arn., Prodr. Fl. Ind. Orient. 1: 338. 1834; Gamble, Fl. Madras 453. 1919.

Serpicula indica Thwaites, Enum. Pl. Zeyl. 123. 1859; Hook.f., Fl. Brit. India 2: 431. 1878.



Procumbent herbs. Stems terete, pilose, prostrate, fleshy, glabrous, smooth. Leaves simple, alternate to sub-opposite; lamina oblanceolate, 6–14 × 3–7 mm, crenate towards apex, cuneate at base, glabrous above, pubescent below; petioles *c.* 1 mm, long, stout, hispid. Flowers unisexual, axillary. Female flowers sessile, axillary, 3–5-together. Sepals fused at base, lobes 4, ovate-lanceolate, 3 × 1.5–2 mm, acute at apex, hispid. Petals absent. Ovaries 1-celled; styles 4, slender, glabrous; stigmas globose, sticky. Male flowers pedicelled, axillary, towards apex of stem; pedicels 0.5–1 cm long, slender. Sepals 4, free, ovate-elliptic, 1–2 × *c.* 1 mm, acute at apex, entire, hispid out. Petals 4, free, narrowly elliptic-orbicular, 4–4.5 × *c.* 1 mm, rounded at apex and base, entire, hispid out, glabrous within. Stamens 8, free; filaments slender, 3–4 mm long, glabrous. Capsules ovate-elliptic. Seed 1, hispid.

Distribution: The native range of this species is S. India, Sri Lanka and Sumatera to W. & Central Jawa (POWO, 2023); *Habitat*: Grasslands and along road cuttings in the high ranges; *Fl. & Ft.*: December-July.

Specimens examined: Kattadikkadavu, 16.01.2020, *Vishnu Mohan & Santhosh Nampy* 176106; Mannankudi, 06.01.2017, *Vishnu Mohan &*

Santhosh Nampy 151582; Meesappulimala, 06.05.2019, *Vishnu Mohan & Santhosh Nampy* 159159; Mathikettan Shola National Park (Changalakavali), 29.12.2014, *Syam Radh.S* 137914 (CALI); Munnar, 29.07.1982, *Nambiar* 1868 (KFRI); Pettimudi, 29.12.2019, *Vishnu Mohan & Santhosh Nampy* 164875 (CALI).

Myriophyllum L.

Sp. Pl. 2: 990. 1753.

Myriophyllum oliganthum (Wight & Arn.) F.Muell., Fragm. 10: 54. 1876. *Myriophyllum intermedium* Clarke in Hook.f., Fl. Brit. India 2: 433. 1878; Gamble, Fl. Madras 1: 454. 1919, non DC. 1828. *Haloragis oligantha* Wight & Arn. in Prodr. Fl. Ind. Orient. 1: 338 1834.

Aquatic erect fleshy herbs. Stems terete, thick, glabrous. Leaves simple, alternate; lamina linear to narrowly lanceolate 10–15 × *c.* 1 mm, acuminate at apex and base, slightly serrate, glabrous; petioles 1–2 mm long, stout, glabrous. Flowers sessile, in axillary clusters. Bracts absent. Sepals 4, free, oblong, 1–2 mm long, rounded to acute at apex, acute to rounded at base, entire, glabrous. Petals absent. Stamens 4, free; filaments 2–3 mm long, glabrous; anthers oblong longitudinally dehiscing. Ovaries 4-celled, ovate; styles 4, slender, 4–5 mm long, glabrous; stigmas rounded, sticky. Fruitlets tuberculate. Seed one.

Distribution: The native range of this species is India (POWO, 2023); *Habitat*: Ponds; *Fl. & Ft.*: January-April.

Specimens examined: Kumarikulam, 05.01.1994, *Jomy Augustine* 13007; *Ibid.*, 17.03.2019, *Vishnu Mohan & Santhosh Nampy* 186721 (CALI).

COMBRETACEAE R.Br.

Prodr. Fl. Nov. Holland. 351. 1810, *nom. cons.*

Trees, shrubs, shrublets or climbers. Flowers hermaphrodite. Petals 4 or 5, conspicuous to very small, or absent, usually inserted near the mouth of the upper receptacle. Stamens usually twice as many as the sepals or petals. Fruit very variable in size and shape, fleshy or dry, stipitate or sessile, usually indehiscent, often variously winged or ridged, 1-seeded.

583 species under 10 genera (POWO, 2023); three genera and seven species in the study area.

Key to the genera

1. Erect trees……..…*Terminalia*

1. Climbing shrubs……2

2. Calyx limb persistent; petals absent…….. *Getonia*

2. Calyx limb deciduous; petals present……*Combretum*

Combretum Loefl.

Iter Hispan.: 308 1758, nom. cons.

Key to the species

1. Inflorescence spikate……..*C. latifolium*

1. Inflorescence paniculate……..……*C. albidum*

Combretum albidum G.Don, Trans. Linn. Soc. London 15: 429. 1827; P.Daniel *et al*., G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 339. 2016.

Combretum ovalifolium Roxb., Fl. Ind. ed. 1832, 2: 226. 1832; Hook.f., Fl. Brit. India 2: 458. 1878; Gamble, Fl. Madras 1: 469. 1919.

Climbing shrubs. Branchlets woody, terete, glabrous. Leaves simple, opposite; lamina ovate-elliptic, 5–10 × 4–6 cm, acuminate at apex, cuneate at base, entire, glabrous, sub-coriaceous; petioles 1–3 cm long, stout, sparsely pubescent. Flowers polygamodioecious in axillary panicles; peduncles 2–5 cm long, slender, glabrous; pedicels 0.4–0.5 cm long, slender, glabrous. Calyx tube 4–6 mm long, constricted above; lobes 4, ovate, *c*. 1.5 × 1 mm, acute at apex, entire. Petals 4, oblong lanceolate, 3–4 × *c*. 1.5 mm, rounded at apex, entire, glabrous, membranous. Stamens 8, in two rows; filaments 2–3 mm long, slender, glabrous; disc circular, lobed. Ovaries 1-celled; styles *c*. 3 mm, subulate; stigmas capitate. Male and female flowers as same as bisexual flowers. Drupes 4-winged; wings chartaceous.

Distribution: The native range of this species is India and Sri Lanka (POWO, 2023); *Habitat*: Semi-evergreen forests, along river banks; *Fl. & Ft.*: December-March.

Specimen examined: PTR, 12.02.1994, *Jomy Augustine* 14804 (KFRI).

Combretum latifolium Blume, Bijdr. Fl. Ned. Ind. 641. 1826; P.Daniel *et al* in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 340. 2016.

Combretum extensum Roxb. ex G.Don, Trans. Linn. Soc. London 15: 414, 422. 1827; Hook.f., Fl. Brit. India 2: 458. 1878; Gamble, Fl. Madras 1: 469. 1919.

Climbing shrubs. Branchlets woody, terete, with pale-brown scales. Leaves simple, opposite or sub-opposite; lamina elliptic-oblong, 7–15 × 3–6 cm, obtusely acuminate at apex, cuneate at base, entire, glabrous, sub-coriaceous; petioles 1–1.5 cm long, stout, glabrous. Flowers polygamodioecious in axillary spikes; peduncles 3–7 cm long, slender, glabrous; pedicels 0.3–0.4 cm long, stout, glabrous. Calyx tubular, 5–7 mm long; lobes 4, ovate, *c.* 2 × 1.5 mm, acuminate at apex, entire, glabrous. Petals 4, orbicular, *c.* 2 × 2 mm, rounded at apex, entire, glabrous, membranous. Stamens 8; filaments *c.* 3 mm long, slender. Ovaries narrowly fusciform, 1-locular; styles *c.* 3 mm long, slender, glabrous; stigmas capitate. Drupes with 4 membranous wings.

Distribution: The native range of this species is China (S. Yunnan) to Tropical Asia (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests, also in sacred groves; *Fl. & Ft.*: December-March.

Specimen examined: Chinnar, 09.02.1995, *K.K. Sajeev* 11881 (KFRI).

Getonia Roxb.

Pl. Coromandel 1(4): 61, t. 87. 1798.

Getonia floribunda Roxb., Pl. Coromandel 1: 61. 1795. *Calycopteris floribunda* (Roxb.) Lam. ex Poir. in J.B.A.M.de Lamarck, Encycl. Suppl. 2: 41. 1811; Hook.f., Fl. Brit. India 2: 449.1878; Gamble, Fl. Madras 1: 467. 1919; P.Daniel *et al* in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 338. 2016.



Climbing woody shrubs. Branchlets woody, terete densely brown pubescent. Leaves simple, opposite; lamina ovate-lanceolate-elliptic, 4–7 × 2–3 cm, apiculate at apex, rounded at base, entire, densely pubescent;

petioles *c.* 1 cm long, pubescent, stout. Flowers in dense axillary racemes; peduncles 5–10 cm long, pubescent; pedicels *c.* 0.5 cm long, slender. Bracts leafy, ovate-elliptic, 5–10 × 3–4 mm, acuminate at apex, entire, pubescent. Calyx tubular, *c.* 5 mm long; lobes 5, ovate-obovate, 5–7 × 2–3 mm, acuminate at apex, entire, pubescent, papery. Stamens 5 + 5; filaments *c.* 5 mm long, slender, narrow, erect, glabrous. Styles *c.* 3 mm long, glabrous, erect; stigmas simple, exerted. Drupes ovate with persistent calyx lobes, 1 seeded.

Distribution: The native range of this species is India to China (W. Yunnan) and Peninsula Malaysia (POWO, 2023) ; *Habitat*: Deciduous forests; *Fl. & Ft.*: January-March.

Specimens examined: Neriyamangalam, 20.01.2020, *Vishnu Mohan & Santhosh Nampy* 176306; Vallakkadavu, 03.03.1994, *Jomy Agustine* 13420 (CALI).

Terminalia L.

Mant. Pl. 21. 1767.

Key to the species

1. Fruits dry, 3–or 5–winged……2
1. Fruits fleshy, not winged……..4
2. Calyx tube villous inside; fruits unequally 3-winged……*T. paniculata*
2. Calyx tube glabrous; fruits equally 5-winged……..3
3. Filaments 3–3.5 mm long; fruits notched at apex……*T. arjuna*
3. Filaments 4–5 mm long; fruits usually rounded at apex……*T. elliptica*
4. Flowers in simple spikes……....*T. bellirica*
4. Flowers in paniculate spikes……...*T. travancorensis*

Terminalia arjuna (Roxb. ex DC.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 314. 1834; Hook.f., Fl. Brit. India 2: 447. 1878; Gamble, Fl. Madras 1: 465. 1919. *Pentaptera arjuna* Roxb. ex DC., Prodr. 3: 15. 1828.

Terminalia cuneata B.Heyne ex Roth, Nov. Pl. Sp. 380. 1821; P.Daniel *et al* in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 346. 2016.

Large trees, up to 20 m tall. Branchlets woody, terete, glabrous, smooth; exudation red, gummy. Leaves simple, opposite; lamina elliptic-oblong-ovate, 7–13 × 4–7 cm, obtuse at apex, rounded at base, entire, glabrous, coriaceous,

with 2 glands at the base on the lower side; petioles 0.8–1 cm long, stout, grooved above, pulvinate at base, glabrous. Flowers in short axillary spikes; peduncles 5–10 cm long, stout, glabrous; pedicels *c.* 0.1 cm, slender, glabrous. Calyx fused; lobes 5, triangular, *c.* 1.5 × 1 mm, acute at apex, entire, glabrous. Stamens 5 + 5, free; filaments 3–3.5 mm long, erect, glabrous; disc pilose. Ovaries ovoid, pubescent, 1-celled; styles simple, erect, glabrous; stigmas sticky. Drupes oblong, equally 5-winged, apex notched, 1-seeded.

Distribution: The native range is Indian Subcontinent (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: January-May.

Specimen examined: Chinnar, 19.05.1999, *Raheemabi* 78449 (CALI).

Terminalia bellirica (Gaertn.) Roxb., Pl. Coromandel 2: t. 198. 1805; Hook.f., Fl. Brit. India 2: 445. 1878; Gamble, Fl. Madras 1: 463. 1915; P.Daniel *et al* in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 344. 2016. *Myrobalanus bellirica* Gaertn., Fruct. Sem. Pl. 2: 90. 1790.

Large trees, up to 25 m tall. Branchlets woody, terete, smooth, fulvous-hairy. Leaves simple, opposite tosub-opposite; lamina obovate-ovate, 7–17 × 4–10 cm, acuminate at apex, oblique at base, entire, pubescent when young, glabrous at maturity, coriaceous, with 2 sessile glands at the base of lamina; petioles 1–3 cm long, stout, grooved above, glabrous. Bracts lanceolate, *c.* 2 × 1 mm, acute at apex, entire, caducous. Flowers in axillary simple spikes; peduncles 4–8 cm long, slender, puberulous; pedicels *c.* 0.4 cm long, erect, narrow, glabrous. Calyx tube rusty pubescent, constricted above the ovaries; lobes 5, triangular, 5–6 × *c.* 3 mm, acute at apex, entire, tomentose. Stamens 5 + 5, free; filaments *c.* 6 mm long, erect, glabrous; disc 5-lobed, villous. Ovaries tomentose, 1-celled; styles subulate, erect; stigmas globose. Drupes obovoid, 5-ridged, not winged, softly tomentose, 1-seeded.

Distribution: The native range of this species is Indian Subcontinent to China (S. Yunnan) and Malesia (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests; *Fl. & Ft.*: December-February.

Specimen examined: Arjunankotta, 06.02.1994, *Jomy Augustine* 13383 (CALI).

Terminalia elliptica Willd., Sp. Pl. ed. 4, 4: 969. 1806; P.Daniel *et al* in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 347. 2016.

Terminalia crenulata Roth, Nov. Pl. Sp. 380. 1821; Gamble, Fl. Madras 1: 465. 1919.

Terminalia tomentosa var. *crenulata* (Roth) C.B.Clarke in Hook., Fl. Brit. India 2: 448. 1878.



Large trees, up to 30 m tall. Branchlets woody, terete, very rough. Leaves simple, opposite to sub-opposite; lamina oblong-ovate, 10–16 × 4–9.5 cm, acute-rounded at apex, oblique at base, entire, glabrous, coriaceous, with 2 stalked glands near the base beneath; petioles 0.6–1 cm long, stout, grooved above, glabrous, stout. Flowers in terminal and axillary paniculate spikes; peduncles 4–8 cm long, tomentose; pedicels *c.* 0.1 cm long, stout, glabrous. Bracts subulate, 2–3 × *c.* 1 mm, acute at apex, entire, pubescent out, glabrous within. Calyx tube angled, pubescent, constricted above the ovaries; lobes 5, ovate, 3–4 × *c.* 2 mm, acute at apex, entire, densely villous out, glabrous within. Stamens 5 + 5, free; filaments slender, 4–5 mm long, erect, glabrous; disc 5-lobed, villous. Ovaries densely villous, 1-celled; styles subulate; stigmas sticky. Drupes longitudinally equally 5-winged, rounded at apex, glabrous, 1seeded.

Distribution: The native range of this species is Indian Subcontinent to Indo-China (POWO, 2023); *Habitat*: Deciduous forests; *Fl. & Ft.*: April. *Specimens examined*: Koruthode, 20.05.1995, *Jomy Augustine* 16257; Neriyamangalam, 16.04.2019, *Vishnu Mohan* & *Santhosh Nampy* 188899 (CALI).

Terminalia paniculata Roth, Nov. Pl. Sp. 383. 1821; Hook.f., Fl. Brit. India 2: 448. 1878; Gamble, Fl. Madras 1: 465. 1915; P.Daniel *et al* in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 348. 2016.



Large deciduous trees, up to 35 m tall. Branchlets terete, rough, silky pubescent when young. Leaves simple, sub-opposite to alternate; lamina oblong-elliptic, 6–17 × 4–10 cm, acuminate at apex, round at base, entire, glabrescent, coriaceous, with 2 sessile glands beneath the base of lamina; petioles 1–1.5 cm long, grooved above, stout, glabrous. Flowers in axillary panicles; peduncles 6–10 cm long, pubescent; pedicels obscure. Bracts lanceolate, 5–6 × 1.5–2 mm, acuminate at apex, entire, glabrous. Calyx tube constricted above the ovaries, pubescent; lobes 5, triangular, *c.* 3 × 1 mm, acuminate at apex, entire, villous within, glabrous out. Stamens 5 + 5, free; filaments slender, *c.* 4 mm long, glabrous; disc 5-lobed, erect, villous. Ovaries 1-celled; styles subulate, erect; stigmas terminal, sticky. Drupes rusty tomentose, unequally 3-winged, 1-seeded.

Distribution: The native range of this species is S. India (POWO, 2023);

Habitat: Deciduous forests; *Fl. & Ft.*: May-October.

Specimens examined: Koruthode, 25.05.1995, *Jomy Augustine* 16299; Vellappara, 05.08.2017, *Vishnu Mohan & Santhosh Nampy* 154143 (CALI).

Terminalia travancorensis Wight & Arn., Prodr. Fl. Ind. Orient. 1: 314. 1834; Gamble, Fl. Madras 1: 464. 1915; P.Daniel *et al* in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 348. 2016.

Terminalia angustifolia Roxb., Fl. Ind. ed. 1832, 2: 437. 1832, *nom. illeg.*; Hook.f., Fl. Brit. India 2: 449. 1878.

Large trees, up to 25 m tall. Branchlets woody, terete, smooth. Leaves simple, opposite to sub-opposite; lamina ovate-lanceolate, 7–10 × 4–5 cm, acute at apex, acuminate at base, entire, glabrous, coriaceous; petioles 1–1.3 cm long, slender, grooved above, glabrous. Flowers in axillary-terminal paniculate spikes; peduncles 7–14 cm long, hispid, sender, drooping; pedicels *c.*0. 3 cm long, glabrous. Calyx tube constricted above the ovaries; lobes 5, triangular, 3–4 × 2–2.1 mm, acute at apex, entire, hispid out, densely villous within. Stamens 5 + 5, free; filaments *c.* 4 mm long, slender, glabrous, erect; disc 5-lobed, villous. Ovaries densely tomentose, glabrous; styles subulate, erect; stigmas terminal, sticky. Drupes ellipsoid, angled, not winged, 1seeded.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: May-December.

Specimen examined: Koruthode, 29.07.1993, *Jomy Augustine* 12257 (CALI).

MYRTACEAE Juss.

Gen. Pl. 322. 1789, *nom. cons.*

Trees or woody shrubs; hairs simple or occasionally dibrachiate. Leaves opposite or sub-opposite. Inflorescences dichasial, racemose, glomerulous or paniculate. Perianth free. Stamens free, numerous; anthers versatile, dehiscing by longitudinal slits. Ovaries generally inferior. Fruit fleshy, indehiscent. Seeds numerous.

The family includes 126 genera (POWO, 2023); 18 species under four genera in the study area.

Key to the genera

1. Leaves alternate ……*Eucalyptus*
1. Leaves opposite ……2
2. Fruits pubescent; leaves 3-ribbed; styles stellate hairy …… *Rhodomyrtus*
2. Fruits glabrous; leaves penninerved; styles not stellate hairy…… 3
3. Calyx tube arise above the ovaries …….. *Syzygium*
3. Calyx tube not produced above the ovaries …… *Eugenia*

Eucalyptus L'Hér.

Sert. Angl. 18. 1788.

Key to the species

1. Hypanthium obconic; capsules pyriform …….. … *E. grandis*

1. Hypanthium hemispheric; capsules ovoid ……*E. tereticornis*

Eucalyptus grandis W.Hill ex Maiden, J. Proc. Roy. Soc. New S. Wales 52(17): 501. 1919.

Large trees, up to 30 m tall. Branchlets woody, terete, smooth; bark brown, peeling off. Leaves simple, alternate; lamina lanceolate, 7–10 × 3–5 cm, acuminate at apex, slightly oblique at base, entire, glabrous, leathery; petioles 0.7–1.3 cm long, glabrous, grooved above. Flowers in axillary umbels; peduncle 1.0–1.5 cm long, slender, glabrous; pedicels *c.* 0.5 cm long, stout, glabrous. Hypanthium obconic, 5–8 mm long, glabrous; stipe *c.* 2 mm long, glabrous; calyptra conic, 3–5 mm long, apiculate at apex, glabrous. Stamens numerous; filaments 4–6 mm long, slender, erect, glabrous. Styles *c.* 3 mm long, glabrous, erect, slender; stigmas capitate. Capsules pyriform.

Distributon: The native range of this species is E. Australia (POWO, 2023); *Habitat*: In plantations in the High Ranges; *Fl. & Ft.*: September-June.

Specimen examined: Kainagiri, 09.06.2018, *Vishnu Mohan & Santhosh Nampy* 159294 (CALI).

Eucalyptus tereticornis Sm., Spec. Bot. New Holland 4: 41. 1795.

Large trees, up to 25 m tall. Branchlets terete, smooth, glabrous, glaucous; bark grayish white, smooth, peeling off. Leaves simple, alternate; lamina ovate, broadly lanceolate, 8–25 × 1.5–2 cm, acuminate at apex, rounded at base, entire, glabrous, glaucous; petioles 0.4–0.8 cm long, glabrous, slightly grooved above. Flowers in axillary umbels; peduncle *c.* 1.5 cm long, glabrous, terete; pedicels stout, glabrous. Hypanthium hemispheric, 3–4 × 4–5 mm; stipe *c.* 5 mm long; calyptra conic, *c.* 8 mm long, acuminate at apex, glabrous. Stamens numerous; filaments 6–8 mm long, slender, glabrous, erect. Styles *c.*

3 mm long, glabrous, erect, slender; stigmas capitate. Capsules ovoid, glabrous, smooth.

Distribution: The native range of this species is New Guinea to E. & SE. Australia (POWO, 2023); *Habitat*: In plantations, also planted as avenue tree; *Fl. & Ft.*: March-September.

Specimen examined: Kainagiri waterfalls, Mankulam, 09.06.2018, *Vishnu Mohan & Santhosh Nampy* 159294 (CALI).

Eugenia L.

Sp. Pl. 1: 470. 1753.

Key to the species

1. Berries ribbed ……..……..…*E. uniflora*

1. Berries not ribbed …….…… *E. argentea*

Eugenia argentea Bedd., Fl. Sylv. S. India 109. 1872; Hook.f., Fl. Brit. India 2: 503. 1879; Gamble, Fl. Madras 1: 484. 1919; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 350. 2016.



Shrubs, up to 3–5 m tall. Branchlets woody, terete, glabrous, smooth; bark brown. Leaves simple, opposite; lamina lanceolate, 10–12 × 1.5–3 cm, acuminate at apex, rounded at base, entire, glabrous above, silvery-pubescent beneath; petioles 1–1.6 cm long, glabrous. Flowers in axillary cymes; peduncles 0.6–1.4 cm long, glabrous; pedicels 0.4–0.6 cm long, slender, glabrous. Bracts filiform, lanceolate, *c.* 4 × 2 mm, acuminate at apex, entire. Calyx campanulate; lobes triangular, acuminate at apex, entire, pubescent out, glabrous within. Petals 4, obovate, 8–12 × *c.* 5 mm, rounded at apex, entire, glabrous. Stamens numerous; filaments 14–15 mm long, slender, glabrous. Ovaries 2-celled; styles 10–12 mm long, slender, erect, glabrous; stigmas simple. Berries globose.

Distribution: The native range of this species is SW. India (Kerala, Tamil Nadu) (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: December-March.

Specimen examined: Chinnar kuthu, Mankulam 05.12.2018, *Vishnu Mohan & Santhosh Nampy* 168881 (CALI).

Eugenia uniflora L., Sp. Pl. 470. 1753; Hook.f., Fl. Brit. India 2: 505. 1879.

Large shrubs, up to 8 m tall. Branches woody, terete, slender, pale brown. Leaves simple, opposite; lamina ovate, 3–5 × 1–3 cm, acute at apex, rounded at base, entire, glabrous; petioles 0.5 cm long, slender, glabrous. Flowers in axillary cymes; peduncles *c.* 2 cm long, glabrous, slender; pedicels *c.* 0.4 cm long, slender, glabrous. Calyx campanulate, funnel-shaped; lobes 4, triangular, *c.* 4 × 2 mm, acute at apex, entire, pubescent out, glabrous within. Petals 4, obovate, 5–8 × 4–6 mm, rounded at apex, entire, glabrous, membranous. Stamens numerous; filaments *c.* 5 mm long, slender, thin, glabrous. Ovaries 2-celled; styles slender, erect, glabrous; stigmas simple. Berries globose, ribbed, succulent.

Distribution: The native range of this species is E. & S. Brazil to S. South America (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests: *Fl. & Ft.*: December-July.

Specimen examined: way to Kanketty, Mankulam, 20.12.2019, *Vishnu Mohan & Santhosh Nampy* 164811 (CALI).

Rhodomyrtus (DC.) Rchb.

Deut. Bot. Herb. -Buch 177. 1841.

Rhodomyrtus tomentosa (Aiton) Hassk., Flora 25(2, Beibl.) 35. 1842; Hook.f., Fl. Brit. India 2: 469. 1878; Gamble, Fl. Madras 1: 471. 1919; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 355. 2016. *Myrtus tomentosa* Aiton in Hort., Kew. 2: 159. 1789.

Shrubs, up to 2 m tall. Stems woody, terete, tomentose on young parts. Leaves simple, opposite; lamina elliptic-obovate, 3–8 × 1–4 cm, acute-rounded at apex, acute at base, entire, tomentose; petioles 0.4–0.8 cm long, glabrous. Flowers in axillary cymes; peduncles terete, 1–2 cm long, tomentose; pedicels slender, 0.7–1.4 cm long, tomentose. Hypanthium obovoid, *c.* 6 × 4 mm, tomentose.



Calyx campanulate; lobes 4 or 5, triangular, 4–5 × *c.* 3 mm, acute-rounded at apex, entire, pubescent, persistent. Petals 4 or 5, obovate, 10–15 × 6–8 mm, rounded at apex, entire, glabrous, membranous. Stamens numerous; filaments 13–16 mm long, slender, glabrous, red. Ov aries 3-loculed; styles slender, *c.* 8 mm long; stigmas sticky. Berries globose, tomentose.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Shola forests and grasslands; *Fl. & Ft.*: January-May.

Specimens examined: Anamudishola, 05.04.2017, *Vishnu Mohan & Santhosh Nampy* 152095; Rajamalai, 08.01.1989, *Shiny Mathew* 3406 (CALI).

Syzygium P.Browne ex Gaertn.

Fruct. Sem. Pl. 1: 166. 1788, *nom. cons.*

Key to the species

1. Calyx tube with a thickened staminal disc at mouth……...2
1. Calyx tube without a thickened staminal disc at mouth……..8
2. Cymes ramiflorous……*S. rama-varmae*
2. Cymes not ramiflorous……..……3
3. Leaves cordate at base……...4
3. Leaves attenuate at base……..5
4. Calyx lobes 8 × 7 mm; petals sub-orbicular……*S. munronii*
4. Calyx lobes 5 × 6 mm; petals ovate……..……*S. mundagam*
5. Petals clawed; leaves up to 2 cm broad ……*S. occidentale*
5. Petals not clawed; leaves more than 2.5 cm broad; ……6
6. Leaves linear or lanceolate……..*S. jambos*
6. Leaves elliptic or ovate……7

7. Pedicel 2–3 cm long, jointed in the middle; hypanthium funnel shaped ……..…..*S. laetum*

7. Pedicels 1–1.5 cm long, not jointed in middle; hypanthium obconic……..……*S. hemispericum*

8. Hypanthium bulb-shaped……..……..9

8. Hypanthium variously shaped (not as above) ……10

9. Flowers in racemes……..……*S. lanceolatum*

9. Flowers in panicles……..……*S. parameswaranii*

10. Branchlets quadrangular……..……*S. densiflorum*

10. Branchlets terete……..……11

11. Inflorescence branches divaricating at right angles……..……*S. gardneri*

11. Inflorescence branches not divaricating at right angles……12

12. Cymes usually ramiflorous……..……*S. malabaricum*

12. Cymes not ramiflorous……..……*S. caryophyllum*

Syzygium caryophyllatum (L.) Alston in Trimen, Handb. Fl. Ceylon 6(Suppl.) 116. 1931; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 358. 2016. *Myrtus caryophyllata* L., Sp. Pl. 472. 1753.

Eugenia caryophyllaea Wight, Icon. Pl. Ind. Orient. 2: t. 540. 1842; Hook.f., Fl. Brit. India 2: 490. 1878.

Small trees, up to 5 m tall. Branchlets woody, terete, glabrous, smooth; bark brown, lenticulate. Leaves simple, opposite; lamina obovate-elliptic 4–8 × 1.5–3 cm, obtuse at apex, attenuate at base, entire, glabrous, coriaceous; petioles *c.* 0.5 cm long, stout, glabrous. Flowers in terminal or axillary corymbose cymes, not divaricating right angle; peduncles *c.* 1 cm long, slender, glabrous; pedicels *c.*0. 5 cm long, slender, glabrous. Bracts triangular, 2–3 × *c.* 2 mm, acute at apex, entire, glabrous, scaly. Hypanthium obconic, glabrous. Calyx campanulate; lobes triangular, 1.5–2 × *c.* 2 mm, entire, glabrous. Petals calyptrate, caducous. Stamens numerous; filaments 4–7 mm long. slender, narrow, glabrous; disc thin. Styles 3–6 mm long, slender, glabrous; stigmas simple, sticky. Berries globose, glabrous, black.

Distribution: The native range of this species is W. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, also in the plains; *Fl. & Ft.*: January-May.

Specimen examined: Mathikettan Shola National Park, 06.01.2017, *Vishnu Mohan & Santhosh Nampy* 151619 (CALI).

Syzygium densiflorum Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 329. 1834; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 360. 2016. *Eugenia arnottiana* Wight, Ill. Ind. Bot. 2: 17. 1841, *nom. superfl.*; Hook.f., Fl. Brit. India 2: 483. 1878. *Syzygium arnottianum* Walp., Repert. Bot. Syst. 2: 180. 1843, *nom. superfl.*; Gamble, Fl. Madras 1: 475. 1919.

Evergreen trees, up to 20 m tall. Branchlets quadrangular, glabrous; bark grey, rough. Leaves simple, opposite; lamina elliptic, 5–9 × 2–3 cm, acuminate at apex, attenuate at base, entire, glabrous, coriaceous; petioles 0.6–1.5 cm long, slender, grooved above, glabrous. Flowers in terminal cymes; peduncles 2–4 cm long, glabrous; pedicels *c.* 0.3 cm long, glabrous. Hypanthium obconic, glabrous. Calyx campanulate; lobes 4, triangular, *c.* 2 × 2 mm, acute at apex, entire, glabrous. Petals 4, free, obovate-orbicular, *c.* 4 × 2 mm, rounded at apex and base, entire, glabrous, deciduous. Stamens many, free; filaments 6–8 mm long, slender, glabrous; disc thin. Styles slender, glabrous; stigmas simple, sticky. Berries oblong-ovoid, dark purple, fleshy.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: January-June.

Specimens examined: Eravikulam, 26.02.2003, *Tomson Mani* 90873; Mathikettan Shola National Park, 06.01.2017, *Vishnu Mohan & Santhosh Nampy* 151625; *ibid*, Near Sivanpara checkpost, 26.06.2016, *Syam Radh* 149161 (CALI).

Syzygium gardneri Thwaites, Enum. Pl. Zeyl. 117. 1859; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 362. 2016. *Eugenia gardneri* (Thwaites) Bedd., Fl. Sylv. S. India 108. 1872; Hook.f., Fl. Brit. India 2: 489. 1878.

Evergreen trees, up to 30 m tall. Branchlets woody, terete, glabrous; bark granulated, peeling off in small flakes. Leaves simple, opposite; lamina

elliptic-ovate or ovate-lanceolate, 5–10 × 2.5–5 cm, caudate-acuminate at apex, acute at base, entire, glabrous and glossy, membranous; petioles 1.2–1.5 cm long, slender, grooved above, glabrous. Flowers in axillary and terminal trichotomous cymes, divaricating right angle; pedicels 0.2–0.5 cm long. Hypanthium obconic. Calyx tube 2–3 mm long, turbinate; lobes 4, obtuse *c.* 1 × 2 mm, acute at apex, entire, glabrous. Petals calyptrate. Stamens many; filaments *c.* 4 mm long, slender, glabrous; disc obscure. Styles 3–4 mm long, slender; stigmas simple. Berries ovoid-globose.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: March-June.

Specimen examined: Arjunankotta, 06.04.1995, *Sasidharan* 14916 (KFRI).

Syzygium hemisphericum (Wight) Alston in Trimen, Handb. Fl. Ceylon 6(Suppl.) 115. 1931; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 362. 2016. *Eugenia hemispherica* Wight, Ill. Ind. Bot. 2: 14. 1841; Hook.f., Fl. Brit. India 2: 477. 1878. *Jambosa hemispherica* (Wight) Walp., Repert. Bot. Syst. 2: 191. 1843; Gamble, Fl. Madras 1: 474. 1919.

Trees, up to 27 m tall. Branchlets woody, terete, smooth, glabrous; bark dark-brown, smooth. Leaves simple, opposite; lamina elliptic, 4–14 × 2.5–5 cm, acute at apex, attenuate at base, entire, glabrous, coriaceous; petioles *c.* 1 cm long, stout, grooved above, glabrous. Flowers in axillary cymes; peduncles 0.4–0.7 cm long, glabrous; pedicels 1–1.5 cm long, not jointed at middle, stout, glabrous. Hypanthium obconic. Calyx campanulate; lobes 4, ovate, *c.* 3 × 5 mm, acute at apex, entire, glabrous. Petals 4, free, orbicular, 5–6 × 3–4 mm, rounded at apex and base, entire, glabrous. Stamens many; filaments 12–15 mm long, slender, glabrous; disc thick. Styles slender; stigmas acute, sticky. Berries globose.

Distribution: The native range of this species is W. India, Sri Lanka and Indo-China (POWO, 2023); *Habitat*: Evergreen and shola forests: *Fl. & Ft.*: March-June.

Specimen examined: Parunthanpara, 29.04.2018, *Vishnu Mohan & Santhosh Nampy* 159233 (CALI).

Syzygium jambos (L.) Alston in Trimen, Handb. Fl. Ceylon 6(Suppl.) 115. 1931; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 363. 2016. *Eugenia jambos* L., Sp. Pl. 470. 1753; Hook.f., Fl. Brit. India 2: 474. 1878. *Jambosa vulgaris* DC., Prodr. 3: 286. 1828, *nom. illeg.*; Gamble, Fl. Madras 1: 474. 1919. Trees, up to 10 m tall. Branchlets woody, terete, glabrous; bark grey, smooth. Leaves simple opposite; lamina linear-lanceolate, 5–15 × 3–6 cm, acuminate at apex, attenuate at base, entire, glabrous, leathery; petioles 0.5–1 cm long, glabrous. Flowers in terminal cymes; peduncle 1–3 cm long, slender, glabrous; pedicels 3–4 cm long narrow, slender, glabrous. Hypanthium obconic. Calyx campanulate; lobes 4, orbicular, 5–6 × 6–7 mm, rounded at apex, entire, glabrous. Petals 4, free, broadly ovate, 1–1.5 × 1–1.7 mm, rounded at apex and base, entire, glabrous. Stamens many; filaments 1.5–1.8 mm long, slender, glabrous; disc thick. Styles *c.* 1.5 mm long, slender; stigmas sticky. Berries globose.

Distribution: The native range of this species is China (S. Yunnan) and W. Malesia (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: September-January.

Specimens examined: Mankulam, 19.09.2017, *Vishnu Mohan & Santhosh Nampy* 184526; Devikulam, 12.12.1970, *M.K. Sreedharan Nambiar* 175 (CALI).

Syzygium laetum (Buch.-Ham.) Gandhi in C.J.Saldanha & D.H.Nicolson, Fl. Hassan Distr. 282. 1976; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 363. 2016. *Eugenia laeta* Buch.-Ham., Mem. Wern. Nat. Hist. Soc. 5: 338. 1826; Hook.f., Fl. Brit. India 2: 479. 1878. *Jambosa laeta* (Buch.-Ham.) Blume, Mus. Bot. 1: 101. 1850; Gamble, Fl. Madras 1: 474. 1919.





Trees, up to 10 m tall. Branchlets woody, terete, glabrous; bark greyish-white, smooth. Leaves simple, opposite; lamina ovate, 6–12 × 2.5–6 cm, acuminate at apex, attenuate at base, entire, glabrous; petioles 1–1.4 cm long, glabrous, grooved above. Flowers 2–5 together in axillary or terminal cymes; peduncles 1–2 cm long, drooping, glabrous; pedicel 2–3 cm long, jointed at middle, glabrous. Hypanthium slenderly funnel shaped below, suddenly broadening above. Calyx campanulate; lobes 4, orbicular, 6–8 × 6–8 mm, rounded at apex, entire, glabrous. Petals 4, free, orbicular, 8–10 × 8–10 mm, rounded at apex and base, entire, glabrous. Stamens numerous; filaments 20–25 mm long, slender, glabrous; disc thick. Styles 3–4 cm long, slender, glabrous; stigmas slightly acute, sticky. Berries oblong, crowned by calyx lobes.

Distribution: The native range of this species is W. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: December-July.

Specimens examined: Banglavuthara, 21.12.2019, *Vishnu Mohan & Santhosh Nampy* 164839; Ezhuthupara, 04.12.2018 *Vishnu Mohan & Santhosh Nampy* 168879; Mankulam, 04.12.2018, *Vishnu Mohan & Santhosh Nampy* 168854; Nakshathrakuthu water falls, 04.12.2018, *Vishnu Mohan & Santhosh Nampy* 168838; Tiger cave-Mankulam 21.05.2018 *Vishnu Mohan & Santhosh Nampy* 174102; Valara, 28.12.2017, *Vishnu Mohan & Santhosh Nampy* 156562 (CALI).

Syzygium lanceolatum (Lam.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 330. 1834; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 364. 2016. *Eugenia lanceolata* Lam., Encycl. 3: 200. 1789.

Trees, up to 12 m high. Branchlets woody, terete, glabrous; bark greyish-brown, smooth. Leaves simple, opposite; lamina elliptic-oblong, or elliptic-lanceolate, 7–10 × 2–3 cm, obliquely acuminate at apex, cuneate at base, entire, glabrous; petioles 0.4–0.6 cm long, slender, grooved above, glabrous. Flowers in axillary and terminal racemes; pedicels 0.2–0.5 cm long, stout, glabrous. Hypanthium bulb shaped, glabrous. Calyx tube 10–12 mm long; lobes 4, obscure. Petal 4, orbicular, *c.* 3 × 3 mm, rounded at apex, entire, glabrous. Stamens many; filaments 5–6 mm long, bent inwards; disc obscure.

Styles 5–7 mm long, slender, glabrous; stigmas simple. Berries ovoid-turbinate, bright scarlet.

Distribution: The native range of this species is W. India (POWO, 2023);

Habitat: Evergreen and shola forests; *Fl. & Ft.*: March-July.

Specimen examined: Chinnar, 17.07.1995, *K.K.Sajeev* 18749 (KFRI).

Syzygium malabaricum (Bedd.) Gamble, Fl. Madras 1: 481. 1919; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 365. 2016. *Eugenia malabarica* Bedd., Fl. Sylv. S. India t. 199. 1872; Hook.f., Fl. Brit. India 2: 497. 1879.

Trees, up to 12 m tall. Branchlets woody, angular, glabrous; bark greyish-brown, smooth. Leaves simple, opposite; lamina obovate or obcordate, 6–13 × 2–6 cm, obtuse or retuse at apex, cuneate at base, entire, glabrous, coriaceous; petioles 0.6–2.5 cm long, stout, grooved above, glabrous. Flowers in short branching axillary or lateral ramiflorous cyme, not divaricating right angle; pedicels short. Hypanthium obconic, glabrous. Calyx tube turbinate, 3–4 mm long, glabrous; lobes 4, triangular, minute. Petals 4, free, orbicular, 4–5 × *c.* 4 mm, rounded at apex, entire, glabrous. Stamens numerous; filaments 4–5 mm long, bent inwards at the middle when in bud; disc thin. Styles *c.* 4 mm long, slender, glabrous; stigmas simple. Berries globose.

Distribution: The native range of this species is S. India (POWO, 2023);

Habitat: Semi-evergreen forests; *Fl. & Ft.*: april-August.

Specimen examined: PTR, 26.04.1995, *Sasidharan* 15176 (KFRI).

Syzygium mundagam (Bourd.) Chithra, N.C.Nair & A.N.Henry, Fl. Tamil Nadu 1: 157. 1983; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 365. 2016. *Eugenia mundagam* Bourd., Forest Trees Travancore 182. 1908. *Jambosa mundagam* (Bourd.) Gamble, Fl. Madras 1: 473. 1919.



Small trees, up to 10 m tall. Branchlets woody, terete, smooth, glabrous; bark grey. Leaves simple, opposite; lamina elliptic, 6–16 × 3–6.5 cm, acute

at apex, cordate at base, entire, glabrous, coriaceous; petioles 0.5–0.7 cm long, stout, glabrous. Flowers in terminal many-flowered corymbs; peduncles 1–2 cm long, glabrous; pedicel *c.* 0.5 cm long, glabro us. Hypanthium funnel-shaped, glabrous. Calyx campanulate; lobes 4, orbicular, *c.* 5 × 6 mm, rounded at apex, entire, glabrous. Petals 4, free, sub-orbicular, 10–12 × 8–10 mm, rounded at apex, spathulate at base, entire, glabrous. Stamens many, free; filaments 14–16 mm long, glabrous; disc thick. Styles *c.* 20 mm long, slender; stigmas capitate, sticky. Berries ovoid.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: February-July.

Specimens examined: Anakkulam, 18.07.2018, *Vishnu Mohan & Santhosh Nampy* 172002; Vallakkadavu, 07.03.1994, *Jomy Agustine* 13429 (CALI).

Syzygium munroi (Wight) Chandrab., Biol. Mem. 2(1-2): 58. 1977; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 366. 2016.

Eugenia munroi Wight, Ill. Ind. Bot. 2: 1.4 1841; Hook.f., Fl. Brit. India 2: 472. 1878.

Jambosa munroi (Wight) Walp., in Repert. Bot. Syst. 2: 191. 1843; Gamble, Fl. Madras 1: 473. 1919.



Small trees, up to 10 m tall. Branchlets quadrangular, glabrous; bark greyish black. Leaves simple, opposite; lamina lanceolate, 10–22 × 4–7 cm, acuminate at apex, cordate at base, entire, glabrous; petioles *c.* 0.3 cm long, grooved above. Flowers in terminal few-flowered cymes; peduncles 1–3 cm long, slender, glabrous; pedicels *c.* 1 cm long slender, narrow, glabrous. Hypanthium turbinate, glabrous. Calyx campanulate; lobes 4, orbicular,

c. 8 × 7 mm, rounded at apex, entire, glabrous. Petals 4, sub-orbicular, 10–15 × 10–15 mm, rounded at apex and base, entire, glabrous. Stamens numerous; filaments *c.* 20 mm long, slender, glabrous; disc thick white. Styles *c.* 25 mm long, glabrous, white; stigmas capitate, sticky. Berries ellipsoid, glabrous.

Distribution: The native range of this species is SW. India and Assam (Khasi Hills). (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: August-May.

Specimens examined: Chokkampetti, 20.02.1994, *Jomy Agustine* 13350; Nakshathrakutthu, 06.08.2017, *Vishnu Mohan & Santhosh Nampy* 175302 (CALI).

Syzygium occidentale (Bourd.) Gandhi in C.J.Saldanha & D.H.Nicolson, Fl. Hassan Distr.: 282. 1976; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 367. 2016. *Jambosa occidentalis* (Bourd.) Gamble Fl. Madras: 474. 1919.

Small trees, up to 10 m tall. Branchlets terete, smooth, glabrous; bark brown, smooth. Leaves simple, opposite; lamina narrowly lanceolate, 8–12 × *c.* 2 cm, acuminate at apex, attenuate at base, entire, glabrous; petioles 0.5–0.9 c m long, glabrous, grooved above. Flowers in terminal drooping cymes; peduncles 1–2 cm long, drooping, glabrous; pedicels 0.3–0.5 cm long, slender, narrow, glabrous. Hypanthium funnel-shaped, glabrous. Calyx campanulate; lobes 4, ovate, *c.* 6 × 6 mm, rounded at apex, entire, glabrous. Petals 4, free, orbicular, 6–7 × 8–9 mm, rounded at apex, clawed at base, entire, glabrous, membranous. Stamens numerous; filaments *c.* 20 mm long, slender, glabrous; disc thick. Styles *c.* 3 cm long, erect, slender, glabrous; stigmas globose. Berries globose.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests along banks of rivers; *Fl. & Ft.*: March-October.

Specimen examined: Uppupara, 09.10.2018, *Vishnu Mohan & Santhosh Nampy* 185426 (CALI).

Syzygium parameswaranii M.Mohanan & A.N.Henry, J. Bombay Nat. Hist. Soc. 84: 409. 1988; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 368. 2016.

Trees, to 6 m tall. Branchlets woody, tetragonous, glabrous; bark brown. Leaves simple, opposite; lamina ovate, 2–3 × 2–3.5 cm, acute-obtuse at apex, round at base, entire, recurved, glabrous, coriaceous; petioles 0.1–0.3 cm long, stout, glabrous. Flowers in dense terminal panicles; pedicels 0.8–1.8 cm long, slender, glabrous. Hypanthium bulb-shaped, glabrous. Calyx tube 1−2 mm long; lobes 4, ovate, *c.* 1 × 1.5 mm, obtuse at apex, entire, glabrous. Petals 4, orbicular, *c.* 3 × 2.5 mm, obtuse at apex, entire, glabrous. Stamens many; filaments 2.5–3 mm long, dilated at base; disc thin. Styles 9–12 mm long, slender, glabrous; stigmas simple. Berry, orbicular.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-April.

Specimen examined: PTR, 03.05.1995, *K.P. Rajesh* 15205 (KFRI).

Syzygium rama-varmae (Bourd.) Chithra in N.C.Nair & A.N.Henry, Fl. Tamil Nadu 1: 157. 1983; Rathakr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 369. 2016. *Eugenia rama-varmae* Bourd., Indian Forester 30: 147. 1904. *Jambosa rama-varmae* (Bourd.) Gamble, Fl. Madras 474. 1919.

Trees, up to 20 m tall. Branchlets quadrangular, glabrous; bark brown, smooth. Leaves simple, opposite; lamina elliptic, 8–18 × 4–8 cm, acuminate at apex, acute at base, entire, glabrous, coriaceous; petioles *c.* 0.5 cm long, grooved above, glabrous. Cymes few-flowered, ramiflorous; peduncles 2–3 cm long, glabrous; pedicels *c.* 0. 8 cm long, glabrous. Hypanthium turbinate, glabrous. Calyx campanulate; lobes 4, orbicular, *c.* 5 × 5 mm, rounded at apex, entire, glabrous; disc thick. Petals 4, free, ovate, *c.* 10 × 8 mm, acute-rounded at apex, entire, glabrous. Stamens many; filaments *c.* 15 mm long, slender, erect, glabrous; disc thick, glabrous; styles *c.* 15 mm long, glabrous; stigmas acute. Berries orbicular.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: December-June.

Specimen examined: way to Kanketty, Mankulam, 20.12.2019, *Vishnu Mohan & Santhosh Nampy* 164807 (CALI).

LECYTHIDACEAE A.Rich.

Dict. Class. Hist. Nat. 9: 269. 1825, *nom. cons.*

Evergreen trees or shrubs. Leaves alternate, usually crowded toward apices of branchlets, shortly petiolate; stipules usually absent. Flowers showy, borne in short, bracteate racemes or spikes, actinomorphic or zygomorphic, bisexual. Calyx with a campanulate tube adnate to ovaries; lobes 4–6, thick. Petals 4–6, free, rarely absent. Stamens many, united at base into several whorls, often several sterile, either monadelphous and equally arranged around disk, or diadelphous in 2 unequal bundles. Disk sometimes lobed. Ovaries inferior or semi-inferior; styles terminal, simple; stigmas capitate. Fruit an indehiscent berry or operculate capsule. Seed1-many.

The family includes 24 accepted genera (POWO; 2023); two species in the study area.

Key to the genera

1. Flowers solitary, sessile ……..…….... *Careya*
1. Flowers in racemes, stalked……. *Couroupita*

Careya Roxb.

Fl. Ind., ed. 1832. 2: 636. 1832.

Careya arborea Roxb., Pl. Coromandel 3: 14. 1819; Hook.f., Fl. Brit. India 2: 511. 1879; Gamble, Fl. Madras 488. 1919; N.C.Nair in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 375. 2016.

Deciduous trees, to 12 m tall. Branchlets woody, terete, rough, pubescent. Leaves simple, alternate, clustered at the tips of branchlets; lamina obovate or oblong-obovate, 12–30 × 5–15 cm, shortly acuminate at apex, cuneate at base, crenate-serrate, glabrous, membranous; petioles 1–1.5 cm long, stout, pubescent. Flowers solitary, sessile. Bracts 3, unequal, orbicular, 6–9 × *c.* 4 mm, rounded at apex, entire, glabrous. Calyx tube 7–15 mm long, glabrous; lobes 4, ovate, 6–8 × 5–6 mm, rounded at apex, entire, glabrous. Petals 4, elliptic-oblong, 5–10 × 3–4 cm, acute-rounded at apex, revolute, caducous; disc annular. Stamens many in several rows; filaments 5–7 cm long, exserted. Ovaries inferior; styles 5–6 cm long, slender, filiform; stigmas capitate. Berries globose.

Distribution: The native range of this species is Afghanistan to NW. Peninsula Malaysia (POWO, 2023); *Habitat*: Moist and dry deciduous forests, also in the plains; *Fl.* & *Ft.*: February-June.

Specimen examined: Painavu, 26.04.2019 *Vishnu Mohan & Santhosh Nampy* 156543 (CALI).

Couroupita Aubl.

Hist. Pl. Guiane 2: 708. 1775.

Couroupita guianensis Aubl., Hist. Pl. Guiane 2: 708. 1775; N.C.Nair in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 376. 2016.



Trees, up to 35 m tall. Branchlets woody, terete, smooth. Leaves simple, alternate, spiral, crowed at the apices of branchlets; lamina oblong-ovate, 10–18 × 5–10 cm, acute at apex, obtuse at base, entire-crenate, glabrous, coriaceous; petioles 2–4 cm long, stout, swollen at base, glabrous. Flowers in racemes on trunk of lower branches; peduncles 30–50 cm long; pedicels 4–7 cm long, slender, glabrous. Sepals 5, widely orbicular, 7–9 × 14–17 mm, rounded at apex, entire, glabrous. Petals 5, orbicular, 5–6 × 2.5 cm, rounded at apex, entire, glabrous, spongy. Stamens many, fused into a curved spathulate androphore. Ovaries half inferior; stigmas capitate, sticky. Berries globose.

Distribution: The native range of this species is Panama to S. Tropical America (POWO, 2023); *Habitat*: Grown in gardens and temple premises; *Fl.* & *Ft.*: January-October.

Specimen examined: Thodupuzha, 17.08.2019 *Vishnu Mohan & Santhosh Nampy* 158654 (CALI)

MELASTOMACEAE Juss.

Gen. Pl. 328 1789, *nom. cons.*

Herbs, shrubs, trees, rarely climbers, or epiphytes. Leaves decussate.

Inflorescences various, sometimes bracteates. Calyx tubular or campanulate, free or partially adnate to the ovaries. Petals 4 or 5, free or rarely united at the base, imbricate or convolute. Stamens usually twice as many as petals and in 2 whorls, rarely as many as the petals. Ovaries 1-locular with basal placentation (*Memecylon*) to several-locular with axile placentation. Fruit a loculicidal capsule or a berry.

This family includes 164 genera (POWO, 2023); 30 species in six genera in the study area.

Key to the genera

1. Plant epiphytic shrubs ..... *Medinilla*
1. Plant terrestrial herbs, shrubs, or sub-shrubs 2
2. Leaves penninerved; anthers longitudinally dehiscent .....*Memecylon*
2. Leaves palmately 3–7 nerved; anthers dehiscent by apical pore.. 3
3. Inflorescence scorpioid; flowers 3-merous ..... *Sonerila*
3. Infloresence a cyme; flowers 4 or 5-merous 4
4. Stems and bracts scaly; stamens unequal ..... *Melastoma*
4. Stems and bracts bristly; stamens equal 5
5. Ovaries apically with hairs or bristles ..... *Osbeckia*
5. Ovaries apically with collar around stylar base .....*Miconia*

Medinilla Gaudich. ex DC.

Prodr. 3: 167. 1828.

1. Leaves orbicular, 3-ribbed; flowers white ..... *M. beddomei*
1. Leaves ovate, 5–7-ribbed; flowers orange ..... *M. malabarica*

Medinilla beddomei C.B.Clarke in Hook.f., Fl. Brit. India 2: 548. 1879; Gamble, Fl. Madras 1: 496. 1919. Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 379. 2016.

Epiphytic drooping shrubs. Branchlets woody, terete, glabrous, smooth. Leaves simple, opposite, orbicular, 1.8–3 × 1–3 cm, rounded at apex and base, entire, glabrous, fleshy, 3-ribbed; petioles 0.2–0.5 cm long, glabrous, stout.



Flowers in axillary few-flowered cymes; peduncles 1–1.5 cm long, slender, glabrous; pedicels *c.* 2 cm long, glabrous, slender, drooping. Hypanthium turbinate, 9–10 × 2–3 mm, glabrous. Calyx campanulate, lobes obscure. Petals 4, free, narrowly elliptic, 10–15 × 8–12 mm, white, rounded-acuminate at apex, acuminate at base, entire, glabrous, membranous. Stamens 10; anthers *c.* 8 mm long, acuminate at apex, sickle-shaped; filaments 5–6 mm long, slender, glabrous, white. Styles erect, glabrous, slender, white; stigmas sticky. Berries globose.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Moist deciduous, semi-evergreen and evergreen forests; *Fl.* & *Ft.*: September-May.

Specimens examined: Cheruthoni, 21.09.2018, *Vishnu Mohan & Santhosh Nampy* 165231; Onnamthodu (Mathikettan Shola National Park), 08.05.2015, *Syam Radh S.* 137974; Painavu, 04.04.2018, *Vishnu Mohan & Santhosh Nampy* 158430; Vallakkadavu, 12.05.1994, *Jomy Agustine* 13712 (CALI).

Medinilla malabarica Bedd. & C.E.C.Fisch., Bull. Misc. Inform. Kew 1938: 124. 1938; Hook.f., Fl. Brit. India 2: 548. 1879; Gamble, Fl. Madras 1: 496. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 380. 2016.



Epiphytic shrubs. Branchlets woody, terete, stout, glabrous, lenticellate when mature. Leaves simple, opposite; lamina ovate, 5–8 × 2.5–4 cm, acute-rounded at apex, rounded at base, entire, glabrous, thi ck, fleshy, 5–7-

ribbed; petioles 0.5–0.7 cm long, thick, glabrous, stout. Flowers in few-flowered axillary cymes; peduncles 1–2 cm long, slender, glabrous, red; pedicels 1.5–2 cm long, slender, glabrous, red. Hypanthium obovate, 4–5.5 × 3–4 mm, glabrous, red. Calyx campanulate, lobes obscure. Petals 4, free, ovate, 10–12 × 5–7 mm, orange, acuminate at apex, rounded at base, entire, glabrous. Stamens 10; filaments *c.* 15 mm long, slender, glabrous, red. Styles 14–17 mm long, slender, glabrous, red; stigmas sticky. Berries globose.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Evergreen and shola forests; *Fl.* & *Ft.*: May-December.

Specimens examined: way to Anamudi peak, 26.04.2019, *Vishnu Mohan & Santhosh Nampy* 159125; Mannankudi (Mathikettan Shola National Park), 09.05.2015, *Syam Radh S.* 137981; Meesappulimala, 06.07.2018, *Vishnu Mohan & Santhosh Nampy* 174521; near stream, on the way to Chinna Anamudi, 31.08.2019, *Vishnu Mohan & Santhosh Nampy* 170263 (CALI).

Melastoma L.

Sp. Pl. 1: 389. 1753.

Melastoma malabathricum L., Sp. Pl. 390. 1753; Hook.f., Fl. Brit. India 2: 523. 1879; Gamble, Fl. Madras 1: 495. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 381. 2016.



Erect shrubs, up to 1 m tall. Branchlets woody, quadrangular, densely covered with appressed scales. Leaves simple, opposite; lamina ovate-elliptic, 4–8 × 3–5 cm, acute at apex, rounded at base, entire, strigose and puberulous below, densely strigose above; petioles 5–10 cm long, stout, strigose. Flowers in terminal few-flowered cymes; peduncles *c.* 1 cm long, terete; pedicel 0.2–0.8 cm long, strigose. Bracts ovate, *c.* 8 × 5 mm, acute at apex, scaly; bracteoles elliptic-ovate, *c.* 5 × 3 mm, acute at apex,

ciliate. Hypanthium globular, 7–9 × *c.* 5 mm, densely compressed strigose. Calyx lobes 5, lanceolate, *c.* 3 × 2 mm, acuminate at apex, entire. Petals 5, free, obovate, 20–30 × 15–20 mm, violet, rounded at apex, ciliate. Stamens 5 + 5, free, unequal; filaments 20–30 mm long, slender, curved; anthers sagittate. Styles *c.* 3 cm long, slender, glabrous; stigmas sticky. Berries urceolate-globular, strigose. Seeds numerous.

Distribution: The native range of this species is Seychelles, Tropical & Subtropical Asia to N. & E. Australia (POWO, 2023); *Habitat*: Stream banks and marshy areas; *Fl.* & *Ft.*: Throughout the year.

Specimen examined: Nakarampara, 19.07.2017, *Vishnu Mohan & Santhosh Nampy* 175692 (CALI).

Memecylon L.

Sp. Pl. 1: 349. 1753.

1. Flowers white ……*M. idukkianum*
1. Flowers blue …… 2
2. Ultimate branches rectangular …… 3
2. Ultimate branches terete …… 4
3. Hypanthium tubular; filaments *c.* 1.5 mm long…….. *M. wightii*
3. Hypanthium obovate; filaments *c.* 3 mm long ……..…. *M. flavescens*
4. Leaves cordate at base …… *M. sessile*
4. Leaves acute at base …… 5
5. Flowers sessile …… 6
5. Flowers pedicellate ……..…. *M. intermedium*
6. Leaves elliptic …… *M. talbotianum*
6. Leaves lanceolate …… *M. lawsonii*

Memecylon flavescens Gamble, Bull. Misc. Inform. Kew 1919: 226. 1919, Fl. Pres. Madras 1: 503. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 388. 2016.

Shrubs, up to 2 m tall. Branchlets woody, rectangular, smooth, glabrous; bark brownish grey. Leaves simple, opposite; lamina obovate, 3–4 × *c.* 2 cm, acute at apex and base, entire, glabrous, coriaceous; petioles 0.3–0.5 cm long, stout, glabrous. Flowers in axillary cymes; peduncles compressed, stout, glabrous;

pedicels 0.3–0.5 cm long, slender, narrow, glabrous. Hypanthium obovate, glabrous. Calyx lobes triangular, *c.* 3 × 3 mm, acute at apex, entire. Petals 4, free, ovate-orbicular, 1.5–2 × *c.* 1 mm, blue, acute at apex, entire, glabrous, membranous. Stamens 8, free; filaments *c.* 3 mm long, glabrous, blue. Styles *c.* 3 mm long, filiform; stigmas sticky. Berries globose, yellow.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl.* & *Ft.*: March-April.

Specimen examined: Umiyamala shola, 11.04.2018, *Vishnu Mohan & Santhosh Nampy* 179639 (CALI).

Memecylon idukkianum Nampy & Syam Radh, Kew Bull. 74(1)-6: 1. 2019. Shrubs, up to 1.5 m tall. Branchlets woody, terete, glabrous. Leaves simple, opposite; lamina obovate, 4–6 × 2–3 cm, acute at apex, cuneate at base, revolute, glabrous, coriaceous; petioles 0.5–0.9 cm long, glabrous. Stipules absent. Flowers in axillary cymes; peduncles reduced; pedicels compressed. Bracts ovate, 1–1.5 × *c.* 1 mm, acute at apex, entire, fleshy, glabrous; bracteoles, triangular, 1–1.5 × *c.* 1 mm, acute at apex, fleshy, glabrous. Hypanthium cup-shaped, *c.* 1.5 × 2 mm, papillose, glabrous. Calyx lobes 4, ovate, *c.* 1 × 1 mm, acute at apex glabrous. Petals 4, free, spathulate, 2–2.5 × 1.4–1.6 mm, white, acute at apex, glabrous. Stamens 8; filaments terete, 4–5 mm long, glabrous. Styles *c.* 6 mm long, straight, glabrous; stigmas pointed. Berries globose.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl.* & *Ft.*: December-June.

Specimens examined: Mathikettan Shola National Park, Vattappara, 16.02.2017, *S. Syam Radh & Santhosh Nampy* 191170; Perattakkalam, 29.12.2014, *S. Syam Radh & Santhosh Nampy* 137895; Thalam Check Post, 09.05.2015, *Santhosh Nampy & Syam Radh S.* 145015 (CALI).

Memecylon intermedium Blume, Mus. Bot. 1: 358. 1851.

Memecylon umbellatum Blume, Bijdr. Fl. Ned. Ind. 1094. 1826, *nom. illeg.*; Gamble, Fl. Madras 1: 504 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 395. 2016.

Memecylon edule Roxb. *sensu*; Hook.f., Fl. Brit. India 2:563.1879; Gamble, Fl. Madras 504(356).1919.

Shrubs, up to 3 m tall. Branchlets woody, terete, glabrous, smooth. Leaves simple, opposite; lamina ovate-lanceolate, 3–5 × 2–3 cm, acute at apex and base, entire, glabrous, coriaceous; petioles *c.* 0.5 cm long, slender, glabrous. Flowers in axillary many-flowered compact cymes; peduncles very much compressed; pedicels *c.* 0.2 cm long, glabrous. Bracts ovate, *c.* 2 × 1 mm, acute at apex, glabrous. Hypanthium globose, glabrous. Calyx lobes triangular, *c.* 3 × 3 mm, acute at apex, entire, glabrous. Petals 4, free, orbicular, *c.* 5 × 3 mm, blue, rounded at apex, acuminate at base, entire, glabrous. Stamens 8; filaments 5–8 mm long, slender, glabrous. Styles slender, glabrous; stigmas white. Berries globose.

Distribution: The native range of this species is Andaman Islands to W. Malesia (POWO, 2023); *Habitat:* Semi-evergreen, shola and moist deciduous forests, also in the plains; *Fl.* & *Ft.*: January-March.

Specimen examined: Malayalippara, 04.01.2017, *Vishnu Mohan & Santhosh Nampy* 151500 (CALI).

Memecylon lawsonii Gamble, Bull. Misc. Inform. Kew 1919: 226. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 390. 2016.

Shrubs, up to 2 m tall. Branchlets woody, terete, smooth. Leaves simple, opposite; lanceolate, 7–14 × 4–6 cm, acuminate at apex, acute at base, entire, glabrous; petioles reduced. Flowers sessile, in axillary cymes; peduncles compressed. Hypanthium globose, glabrous. Calyx lobes triangular, *c.* 2 × 2 mm, acute at apex, entire, glabrous. Petals 4, free, obovate-oblong, 5–6 × *c.* 4 mm, blue, rounded-acute at apex, narrowed at base, entire, glabrous. Stamens 8; filaments erect, slender, glabrous, blue. Styles *c.* 4 mm long, narrow, slender, glabrous; stigmas sticky, acute. Berries globose.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft.*: November-April.

Specimens examined: way to Kanketty, Mankulam, 20.12.2019, *Vishnu Mohan & Santhosh Nampy* 164589; Meenuliyanpara, 12.12.2016, *Vishnu*

Mohan & Santhosh Nampy 151417; *Ibid.,* 29.11.2019, *Vishnu Mohan & Santhosh Nampy* 164632 (CALI).

Memecylon sessile Benth. ex Wight & Arn. Prodr. Fl. Ind. Orient. 1: 320 1834.

Memecylon randerianum S.M.Almeida & M.R.Almeida, J. Bombay Nat. Hist. Soc. 85: 521. 1989; *Memecylon malabaricum* Cogn. in A.DC. & CDC., Monogr. Phan. 7: 1148. 1891; Gamble, Fl. Madras 1: 505. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 391. 2016.

Bushy shrubs, up to 1.5 m tall. Branchlets woody, terete, smooth, glabrous. Leaves simple, opposite; lamina ovate-lanceolate, 5–12 × 1.5–4 cm, acute at apex, cordate at base, entire, glabrous, coriaceous, sessile. Flowers in many-flowered axillary cymes; peduncles 0.1–0.2 cm long, glabrous, stout; pedicels *c.* 0.3 cm long, slender, glabrous. Bracts ovate *c.* 3 × 2 mm, acute at apex, entire, glabrous. Hypanthium globose, glabrous. Calyx lobes 4, triangular, *c.* 3 × 2 mm, acute at apex, glabrous. Petals 4, free, obovate, *c.* 5 × 3 mm, rounded at apex, entire, glabrous. Stamens 8; filaments *c.* 6 mm long, erect, glabrous. Styles 5–6 mm long, subulate; stigmas acute, sticky. Berries globose.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests, and also in sacred groves; *Fl.* & *Ft.*: February-May.

Specimen examined: Meesappulimala, 11.04.2018, *Vishnu Mohan & Santhosh Nampy* 174526 (CALI).

Memecylon talbotianum D.Brandis, Indian Trees 336. 1906; Gamble, Fl. Pres. Pres. Madras 1: 503. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 394. 2016.

Shrubs, up to 4 m tall. Branchlets woody, terete, smooth, glabrous. Leaves simple opposite; lamina elliptic, 7–12 × 4–5 cm, obtusely acuminate at apex, acute at base, entire, glabrous, coriaceous; petioles *c.* 0.8 cm long, glabrous, grooved above. Flowers sessile, in many-flowered axillary cymes; peduncles *c.* 0.5 cm long, glabrous; pedicels *c.* 0.3 cm long, glabrous. Bracts ovate, 2.7–3 × 2–2.3 mm, acute at apex, entire, glabrous. Hypanthium orbicular, glabrous. Calyx lobes triangular, 3–4 × 1.5–2 mm, acute at apex, entire, glabrous. Petals

4, free, spathulate, *c.* 6 × 4 mm, blue, rounded-acute at apex, acute at base, entire, glabrous. stamens 8; filaments *c.* 8 mm long, erect, slender, glabrous. Styles erect, *c.* 7 mm long; stigmas sticky. Berries orbicular.

Distribution: The native range of this species is W. India (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests, also in sacred groves; *Fl.* & *Ft.*: February-August.

Specimens examined: Meesappulimala, 11.04.2018, *Vishnu Mohan & Santhosh Nampy* 174526; Thekkady, 14.07.2017, *Vishnu Mohan & Santhosh Nampy* 152853; Vallakkadavu, 06.08.1994, *Jomy Augustine* 14081 (CALI).

Memecylon wightii Thwaites, Enum. Pl. Zeyl. 113. 1859. *Memecylon depressum* Benth. ex Triana, Trans. Linn. Soc. London 28: 158. 1871, publ. 1872), *nom. superfl*; Gamble, Fl. Madras 1: 505. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 397. 2016.



Shrubs, up to 1.5 m tall. Branchlets woody, rectangular, smooth; branchlets ghabrous. Leaves simple, opposite; lamina elliptic-lanceolate, 8–12 × 3–4 cm, acute at apex, cordate at base, entire and recurved, glabrous, leathery; petioles sub-sessile, glabrous, grooved above. Flowers in axillary cymes; peduncles compressed; pedicels *c.* 0.3 cm long, narrow, glabrous. Hypanthium tubular, glabrous. Calyx lobes, obscure, acute, glabrous. Petals 4, free, ovate, 3–5 × 3–5 mm, acute at apex, entire, glabrous. Stamens 8; filaments *c.* 1.5 mm long, blue, glabrous. Styles *c.* 3 mm long, erect; stigmas acute, sticky. Berries orbicular.

Distribution: The native range of this species is W. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft.*: January-July.

Specimens examined: Chottupara, 16.07.2018, *Vishnu Mohan & Santhosh Nampy* 175692; Parunthanpara, 29.04.2018, *Vishnu Mohan &*

Santhosh Nampy 159239; Thekkady, 13.04.1994, *Jomy Agustine* 13692 (CALI).

Miconia Ruiz & Pav.

Fl. Peruv. Prodr. 60. 1794, *nom. cons.*

Miconia crenata (Vahl) Michelang., Mabberley's Pl.-Book 1102. 2017. *Melastoma crenatum* Vahl, Eclog. Amer. 1: 41. 1797.

Clidemia hirta (L.) D.Don, Mem. Wern. Nat. Hist. Soc. 4: 309. 1823; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 377. 2016.



Shrubs, up to 1.5 m tall. Branchlets terete, hirsute. Leaves simple, opposite; lamina ovate-lanceolate, 5–12 × 2.5–6 cm, acuminate at apex, rounded at base, crenulate, hispid; petioles 0.5–1.5 cm long, hirsute. Flowers in axillary cymes; peduncles 0.5–1 cm long, hirsute; pedicels 0.05–0.4 cm long, hirsute. Hypanthium ovate, 3–5 × *c.* 2 mm, sparsely bristly. Calyx lobes broadly ovate, *c.* 0.5 × 3 mm long, acute at apex, entire, hispid. Petals 5, free, ovate, 8–10 × 4–5 mm, white, rounded at apex, entire, glabrous, membraneous. Staminal filaments *c.* 2.5 mm long, white, glabrous. Ovaries apically with collar around stylar base; styles *c.* 2.5 mm long, glabrous, erect; stigmas capitate, sticky, yellow. Berries globose hispid. Seeds numerous.

Distribution: The native range of this species is Mexico to Tropical America (POWO, 2023); *Habitat*: Degraded forest areas; *Fl.* & *Ft.*: August-April.

Specimens examined: Kalvari mount, 06.09.2017, *Vishnu Mohan & Santhosh Nampy* 154393; Kulamavu, 13.11.2016, *Vishnu Mohan & Santhosh Nampy* 141220; Pachakkanam, 07.08.1993, *Jomy Augustine* 12329; Peerumedu, 27.04.2018, *Vishnu Mohan & Santhosh Nampy* 159214; Vagamon, 15.11.2014, *V. Aswanidas* 140402 (CALI)

Osbeckia L.

Sp. Pl. 1: 345. 1753.

Key to the species

1. Flowers tetramerous 10
1. Flowers pentamerous 2
2. Hypanthium with simple hairs only ..... *O. gracilis*
2. Hypanthium with simple hairs, emergences and bristles 3
3. Hypanthium clothed with large scale-like emergences only……
…… *O. wynaadensis*
3. Hypanthium clothed with stellate headed emergences 4
4. Branchlets pilose; leaves sessile, ascending; bracts orbicular……..
……*O. leschenaultiana*
4. Branchlets pilose; leaves petiolate; bracts ovate to cordate 5
5. Leaves 7-nerved 6
5. Leaves 3–5-nerved 7
6. Lamina bullate, densely hairy; base sub-cordate; venation acrodromous
..... ……*O. reticulata*
6. Lamina not bullate; sparsely hairy; base obtuse; venation non-acrodromous ……*O. wightiana*
7. Inflorescence a terminal cluster of cymes; lamina lanceolate ..... *O. virgata*
7. Inflorescence a terminal panicle; lamina ovate to elliptic ……..... 8
8. Bracts ovate, woolly dorsally; sepals triangular ..... *O. mehrana*
8. Bracts cordate, sparsely hairy; sepals subulate 9
9. Calyx lobes symmetrical; branches sparsely hirsute .....*O. travancorica*
9. Calyx lobes asymmetrical; branches densely strigose ..... *O. abrahamii*
10. Anthers truncate at apex 11
10. Anthers acute……..... *O. parvifolia*
11. Petals purple; bracts ciliate ..... *O. muralis*
11. Petals white, tinged with pink; bracts densely hairy ..... *O. brachystemon*

Osbeckia abrahamii G.S.Giri & M.P.Nayar, J. Bombay Nat. Hist. Soc. 81: 434. 1984; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 399. 2016; Prashob & Sibichen, Rheedea 29(4): 248. 2019.

Erect shrubs, up to 1 m tall. Stems quadrangular; densely strigose. Leaves simple, opposite; lamina elliptic-lanceolate, 10–16 × 3–5 cm, acute at apex, attenuate at base, entire, hairy; nerves 3; petioles 0.5–1 cm long, hispid; nerves 5. Flowers pentamerous, on terminal or axillary panicles; pedicels *c.* 0.3 cm long, slender, hispid. Bracts cordate, 1.5–3 × 2–5 mm, acute at apex, ciliate, appressed hairy above, glabrous beneath. Hypanthium 4.5–6 × 3.5–4 mm, with stellate headed emergences. Calyx lobes 5, asymmetrical, subulate, 1.5–3.5 × 2.5–4.5 mm, acute at apex, ciliate. Petals 5, free, obovate, 15–20 × 10–15 mm, truncate at apex, attenuate at base, entire, glabrous. Stamens 10; filaments *c.* 8 mm long, glabrous; anthers twisted, glabrous. Ovaries united with hypanthium; styles *c.* 2 cm long, glabrous, curved; stigmas slightly swollen. Capsules urceolate. Seeds numerous.

Distribution: The native range of this species is India (S. Kerala) (POWO, 2023); *Habitat* Evergreen forests; *Fl.* & *Ft.*: July-December.

Specimen examined: Vagamon, 16.07.2018, *Vishnu Mohan & Santhosh Nampy* 156745 (CALI).

Osbeckia brachystemon Naudin, Ann. Sci. Nat. Bot. sér. 3, 14: 57. 1850; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 401. 2016; Prashob & Sibichen, Rheedea 29(4): 239. 2019.



O. cupularis D.Don ex Wight & Arn., Prodr. 323. 1834; C.B.Clarke in Hook.f., Fl. Brit. India 2: 514. 1879; Gamble, Fl. Madras 1: 494. 1919.

Annual erect herbs, up to 20 cm tall. Stems terete, covered with appressed hairs. Leaves simple, opposite; lamina ovate, 2–4 × 1.5– 2.5 cm, acute at apex, obtuse at base, ciliate, hispid; nerves 5; petioles 0.1–0.4 cm long, hispid, terete. Flowers tetramerous, in terminal panicles; pedicels 0.1–0.15 cm long; nerves 5. Bracts ovate, 1–2.5

× 0.5–1.5 mm, densely hairy. Hypanthium campanulate, 3–7 × 2–5 mm, with stellate headed emergences. Calyx lobes 4, attenuate, 1–3 × *c.* 2 mm, attenuate at apex, ciliate. Petals 4, free, obovate, 4–8 × 2–4 mm, acute at apex, entire, hispid at apex, white with pink. Stamens 8; filaments 2–3 mm long, white, glabrous; anthers, not twisted, truncate at apex. Ovaries united with hypanthium for about half of its length, styles 1–3 cm long, glabrous. Capsules campanulate, slightly ribbed. Seeds minute.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat:* Moist deciduous forests and grasslands; *Fl.* & *Ft.*: August-December.

Specimen examined: Mangaladevi, 16.08.1994, *Jomy Augustine* 14194 (CALI).

Osbeckia gracilis Bedd., Madras J. Lit. Sci. ser. 3, 1: 45. 1864; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 402. 2016; Prashob & Sibichen, Rheedea 29(4): 253. 2019.

Osbeckia sublaevia Cogn. in A.DC. & C.DC., Monogr. Phan. 7: 321. 1891; Gamble, Fl. Madras 1: 492. 1919.

Perennial shrubs, up to 1 m tall. Stems quadrangular, winged, sparsely hairy. Leaves simple, opposite; lamina lanceolate, 3–6 × 1–2 cm, attenuate at apex and base, entire. Flowers pentamerous, in terminal axillary cymes; pedicels *c.* 0.2 cm long. Bracts ovate, 5–10 × 4–5 mm, acute at apex, rounded at base, ciliate, sparsely. Hypanthium campanulate, 3.5–5 × 3–4 mm, sparsely simple hairy. Calyx lobes 5, triangular, 2–5 × *c.* 3 mm, acute at apex, ciliate, caducous. Petals 5, broadly obovate, 20–25 × 12–15 mm, truncate at apex, entire, glabrous. Stamens 10; filaments 7–10 mm long; anthers, twisted. Ovaries partially fused with hypanthium, usually exceeding hypanthium; styles *c.* 3 cm long, glabrous; stigmas sticky. Capsules campanulate. Seeds numerous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat:* Moist deciduous and shola forests; *Fl.* & *Ft.*: January-September.

Specimens examined: Kalvari mount, 06.09.2017, *Vishnu Mohan & Santhosh Nampy* 154335; Mangaladevi, 15.07.2017, *Vishnu Mohan & Santhosh Nampy* 152879; Perattakalam, 04.01.2017, *Vishnu Mohan & Santhosh Nampy* 04.01.2017; Pius Nagar, 22.06.2018, *Vishnu Mohan & Santhosh Nampy* 159351 (CALI).

Osbeckia leschenaultiana DC., Prodr. 3: 142. 1828; C.B.Clarke in Hook.f., Fl. Brit. India 2: 520. 1879; Gamble, Fl. Madras 1: 493. 1919 Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 403. 2016; Prashob & Sibichen, Rheedea 29(4): 255. 2019.

Osbeckia gardneriana Wight, Icon. Pl. Ind. Orient. t. 997. 1845.



Perennial shrubs, up to 1 m tall. Stems quadrangular, pilose. Leaves simple, opposite; lamina ovate, 1–3 × 0.8–2 cm, acute at apex, cordate at base, entire, hirsute, sessile. Flowers pentamerous, in terminal, dense panicles; pedicels 0.2–0.5 cm long, hirsute. Bracts orbicular, 3–6 × 2–4 mm, acute at apex, ciliate, appressed-hairy dorsally. Hypanthium 8–13 × 5–9 mm, with stellate headed emergences. Calyx lobes triangular, 4–5 × 0.5–2 mm, acute at apex, ciliate. Petals 5, free, obovate, 12–20 × 10–15 mm, truncate at apex, ciliate. Stamens 10; filaments 5–8 mm long; anthers twisted. Ovaries united with hypanthium, sparsely hairy; styles *c.* 15 mm long, erect, glabrous, pink; stigmas sticky. Capsules ovate, hispid. Seeds numerous, minute.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl.* & *Ft.*: November-January.

Specimens examined: Anamudi shola, 25.01.2018, *Vishnu Mohan & Santhosh Nampy* 158251; way to Meesappulimala, 21.11.2018; *Vishnu Mohan & Santhosh Nampy* 167773; Mesthirikettu, 30.12.2017, *Vishnu Mohan & Santhosh Nampy* 158073 (CALI).

Osbeckia mehrana G.S.Giri & M.P.Nayar, Kew Bull. 41: 429. 1986; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 403. 2016; Prashob & Sibichen, Rheedea 29(4): 257. 2019.



Perennial woody shrubs, up to 3 m tall. Stems quadrangular, densely hairy. Leaves simple, opposite; lamina ovate, 1.5–4.5 × 0.8–3 cm, acute at apex, obtuse at base, entire; petioles 0.7–1.3 cm long, densely hairy; nerves 5. Flowers pentamerous, in terminal and axillary panicles; pedicels 0.2–0.5 cm long. Bracts ovate, 2.5–4.5 × 1–2.5 mm, acute at apex, ciliate, wooly, caducous. Hypanthium campanulate, 4–6 × 3–5 mm, with stellate headed emergences. Calyx lobes 5, triangular, 3–5 × 1.5–2 mm, acute at apex, ciliate, hairy. Petals 5, free, obovate, 10–20 × 6–8 mm, rounded-acute at apex, ciliate. Stamens 10; filaments 4–6 mm long, glabrous; anthers narrowly ovate, not twisted, tip curved. Ovaries united with hypanthium; styles 12–17 mm long, glabrous, curved; stigmas capitate, papillose. Capsules obovate, 6–10 × 6–8 mm. Seeds minute, numerous.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft.*: January-July.

Specimen examined: Mankulam, 16.07.2018, *Vishnu Mohan & Santhosh Nampy* 167543 (CALI).

Osbeckia muralis Naudin, Ann. Sci. Nat. Bot. sér. 3, 14: 56. 1850; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 404. 2016. Prashob & Sibichen, Rheedea 29(4): 241. 2019.

Osbeckia truncata D.Don ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 322. 1834; Hook.f., Fl. Brit. India 2: 514. 1879; Gamble, Fl. Madras 1: 494. 1919.



Annual erect herbs, up to 20 cm tall. Stems quadrangular, sparsely villous. Leaves simple, opposite; lamina ovate, 1–3 × 0.8–2 cm, acute at apex, obtuse at base, ciliate, hispid hairy; nerves 5; petioles *c.* 0.6 cm long, terete, sparsely hairy. Flowers tetramerous, in terminal panicles; pedicels *c.* 0.3 cm long, sparsely hairy; nerves 5. Bracts cordate, *c.* 3 × 2 mm, acute at apex, ciliate. Hypanthium 3–4 × 2–3 mm, with stellate headed emergences. Calyx lobes 4, broadly triangular, 0.5–2 mm long, acute at apex, ciliate. Petals 4, broadly ovate, 4–6 × 3–4 mm, sparsely ciliate at apex and margins, purple. Stamens 8; filaments 1–2 mm long; anthers not twisted, truncate at apex. Ovaries united with hypanthium; styles 2–4 mm long, glabrous; stigmas slightly widened. Capsules campanulate. Seeds numerous, minute.

Distribution: The native range of this species is Indian Subcontinent (POWO, 2023); *Habitat*: Rocky areas in moist deciduous forests, also in the plains; *Fl.* & *Ft.*: September-December.

Specimen examined: Kattadikadavu, 07.12.2018, *Vishnu Mohan & Santhosh Nampy* 167822 (CALI).

Osbeckia parvifolia Arn., Companion Bot. Mag. 2: 308. 1837; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 405. 2016; Prashob & Sibichen, Rheedea 29(4): 243. 2019.

Osbeckia cupularis var. *erythrocephala* (Naudin) C.B.Clarke in Hook.f., Fl. Brit. India 2: 514. 1879.

Osbeckia rosea Fyson, *sensu* Gamble, Fl. Madras 1873. 1936.



Erect sub-shrubs, up to 50 cm tall. Stems quadrangular, brownish, hairy. Leaves simple, opposite; lamina ovate, 1.5–5 × 1–3 cm, acuminate at apex, acute at base, entire, hairy; petioles 0.3–0.6 cm long; nerves 5. Flowers tetramerous, in terminal panicles; pedicels 0.1–0.5 cm long, hispid. Bracts ovate, 1.5–4 × 0.5–1.5 mm, acute at apex, ciliate. Hypanthium globose, 2–5 × 1.5–4 mm, with stellate headed emergences. Calyx lobes 4, triangular, 2–4 × 0.5–2 mm, acute at apex, entire, hispid, persistent. Petals 4, broadly obovate, 5–10 × 4–8 mm, ciliate at apex, entire. Stamens 8; filaments 2–5 mm long; anthers narrowly ovate, not twisted, anthers acute at apex. Ovaries united with hypanthium; styles 5–9 mm long, glabrous; stigmas sticky. Capsules globose, 5–7 × 4.5–6.5 mm. Seeds minute, numerous.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Moist deciduous forests, also in the plains; *Fl.* & *Ft.*: November-March.

Specimens examined: Devikulam, 07.02.2017, *Vishnu Mohan & Santhosh Nampy* 151648; Edamalakkudi, 17.03.2019, *Vishnu Mohan & Santhosh Nampy* 168976; Edathattu, 13.03.2018, *Vishnu Mohan & Santhosh Nampy* 159489 (CALI).

Osbeckia reticulata Bedd., Trans. Linn. Soc. London 25: 216. 1865; Hook.f., Fl. Brit. India 2: 520. 1879; Gamble, Fl. Madras 493. 1919 Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 405. 2016; Prashob & Sibichen, Rheedea 29(4): 266. 2019.

Osbeckia alveolata Bedd., Icon. Pl. Ind. Orient. 37. 1872.

Small trees, up to 5 m tall. Stems woody, quadrangular with dense cover of patent hairs. Leaves simple, opposite; lamina bullate, 5–10 × 2.5–6 cm, acute at apex, sub-cordate at base, densely covered with ascending bristly hairs; nerves 7, acrodromous; petioles 0.7–1.8 cm long. Flowers pentamerous, in

terminal cluster of cymes; pedicels *c.* 0.5 cm long. Bracts cordate, 4–6 × 5–7 mm, acute at apex, ciliate. Hypanthium campanulate, 9–13 × 8–9 mm, with stellate headed emergences. Calyx lobes 5, triangular, 4–7 × 1.5–3 mm, acute at apex, ciliate, caducous. Petals 5, free, obovate, 2–3 × 1.5–2 cm, ciliate at apex and margins, glabrous. Stamens 10; filaments 7–12 mm long; anthers narrowly ovate, not twisted, beak absent. Ovaries united with hypanthium, about half of its length; styles glabrous; stigmas capitate. Capsules orbicular, 9–12 × 8–11 mm, ribbed. Seeds numerous.



Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: High altitude grasslands; *Fl.* & *Ft.*: December-August.

Specimens examined: Anamudi Shola National Park, 05.04.2017, *Vishnu Mohan & Santhosh Nampy* 152093; Eravikulam, 02.05.2017, *Vishnu Mohan & Santhosh Nampy* 152115; way to Marayoor, 24.02.2003, *N. Shylaja* 88316 (CALI).

Osbeckia travancorica Bedd. ex Gamble, Bull. Misc. Inform. Kew 1919: 404. 1919; Gamble, Fl. Madras 493. 1919; Prashob & Sibichen, Rheedea 29(4): 1: 270. 2019.

Shrubs, up to 1 m tall. Stems quadrangular; sparsely hirsute. Leaves simple, opposite; lamina ovate, 5–10 × 1–4 cm, acute at apex, obtuse at base, patent hairy; petioles 0.2–0.6 cm long, sparsely hairy; nerves 5. Flowers pentamerous, in terminal panicles; pedicels *c.* 0.5 cm long. Bracts cordate, *c.* 5 × 4 mm, acute at apex, ciliate, sparsely appressed-hairy. Hypanthium campanulate, 5–10 × 3–6 mm, with stellate headed emergences. Calyx lobes 5, symmetrical, subulate, 2–5 × 1–4 mm, acuminate at apex, entire. Petals 5, free, obovate, 15–20 × 10–15 mm, rounded-truncate at apex, ciliate. Stamens 10; filaments 6–10 mm long; anthers narrowly ovate, twisted. Ovaries united with

hypanthium; styles *c.* 10 mm long, glabrous. Capsules ovate, 6–10 × 4–8 mm. Seeds minute, numerous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat* Evergreen forest margins; *Fl.* & *Ft.*: November-March.

Specimens examined: Above Valara waterfalls, 27.12.2017, *Vishnu Mohan & Santhosh Nampy* 156506; Athimoola, 15.11.2000, *M.K. Ratheesh Narayanan* 2187 (CALI).

Osbeckia virgata D.Don ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 323. 1834; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 406. 2016; Prashob & Sibichen, Rheedea 29(4): 272. 2019.

O. cupularis D. Don ex Wight & Arn., sensu C.B.Clarke in Hook.f., Fl. Brit. India 2(6): 514. 1879; Gamble, Fl. Madras 1: 494. 1919.



Shrubs, up to 50 cm tall. Stems quadrangular, appressed short hairy. Leaves simple, opposite; lamina lanceolate, 2–4 × 0.5–1.5 cm, acuminate at apex, attenuate at base, entire, hairy; nerves 5; petioles *c.* 0.2 cm long; nerves 5. Flowers pentamerous, in terminal cymes; pedicels *c.* 0.2 cm long, hispid. Bracts ovate, 1–2 × 0.5–1 mm, acuminate at apex, entire, glabrous. Hypanthium campanulate, 3–5 × 2–3.5 mm, with stellate headed emergences. Calyx lobes 5, triangular, 2–4 × 1–2 mm, acuminate at apex, ciliate, caducous. Petals 5, free, obovate, 10–15 × 7–12 mm, rounded at apex, entire, glabrous. Stamens 10; filaments 4–6 mm long, glabrous; anthers narrowly ovate, yellow, twisted. Ovaries united with hypanthium; styles 7–10 mm long. Capsules, orbicular, 4–6 × *c.* 4.5 mm. Seeds minute, numerous.

Distribution: The native range of this species is SW. India, Bangladesh to Peninsula Malaysia (POWO, 2023); *Habitat*: Grassy areas in evergreen and moist deciduous forests, also in the plains; *Fl.* & *Ft.*: November-April.

Specimens examined: Ezhuthupara, Mankulam, 05.12.2018, *Vishnu Mohan & Santhosh Nampy* 168873; Pachakkanam, 11.12.1993, *Jomy*

Augustine 12652; Kuttikkanam, 28.04.2018, *Vishnu Mohan & Santhosh Nampy* 159219 (CALI).

Osbeckia wightiana Benth. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 323. 1834; C.B.Clarke in Hook.f., Fl. Brit. India 2: 519. 1879; Gamble, Fl. Madras 1: 493. 1919; Prashob & Sibichen, Rheedea 29(4): 275. 2019.



Shrubs, up to 1 m tall. Stems quadrangular, hispid. Leaves simple; lamina ovate, 5–7 × 2–3 cm, acute at apex, obtuse at base, entire, sparsely hairy; nerves 7; petioles 0.4–0.8 cm long. Flowers pentamerous, in terminal cymes; pedicels *c.* 0.3 cm long, hispid; nerves 7. Bracts ovate, 6–10 × 12 mm, acute at apex, ciliate, densely. Hypanthium campanulate, 7–13 × 7–12 mm, with stellate headed emergences. Calyx tube 5, subulate, 2.5–4 × 1.5–3 mm long, acute at apex, ciliate, sparsely hairy. Petals 5, free, obovate, 15–20 × 10–13 mm; truncate-rounded at apex, ciliate. Stamens 10; filaments *c.* 10 mm long, glabrous; anthers narrowly oblong, twisted. Ovaries united with hypanthium, sparsely hairy; styles 10–15 mm long, glabrous, curved; stigmas swollen, sticky. Capsules campanulate, glabrous. Seeds numerous, minute.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat* Evergreen forests; *Fl.* & *Ft.*: November-March.

Specimen examined: Aduvizhunthankudi, Mathikettan Shola National Park, 22.11.2014, *Syam Radh S.* 137817 (CALI).

Osbeckia wynaadensis C.B.Clarke in Hook.f., Fl. Brit. India 2: 521. 1879; Gamble, Fl. Madras 1: 493. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 407. 2016; Prashob & Sibichen, Rheedea 29(4): 278. 2019.

Shrubs, up to 2 m tall. Stems quadrangular, densely hairy, woody. Leaves simple, opposite; lamina ovate, 10–20 × 2.5–5 cm, acute at apex, obtuse at base, entire, shaggy hairy above, short hairy below; petioles *c.* 1 cm long.

Flowers pentamerous, in terminal panicles; pedicels 0.05–0.15 cm long; nerves 5. Bracts ovate, 10–15 × 5–8 mm, acute at apex, entire, appressed hairy along the dorsal side. Hypanthium campanulate, 6–9 × 3–5 mm, with scale like emergences. Sepals 5, triangular, 7–12 × 3–6 mm, acute at apex, entire, glabrous, caducous. Petals 5, free, broadly obovate, 15–20 × 8–12 mm long, ciliate, glabrous. Stamens 10; filaments *c.* 10 mm long, glabrous; anthers narrow, ovate, not twisted. Ovaries united with hypanthium; styles *c.* 15 mm long. Capsules ovate, 7–8 × 5–6 mm. Seeds minute, numerous.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Marshy areas in semi-evergreen and evergreen forests; *Fl.* & *Ft.*: January-April.

Specimen examined: Medicinal Plant Conservation Authority, Vairamani, Kulamavu, 22.01.2019, *Vishnu Mohan & Santhosh Nampy* 168906 (CALI).

Sonerila Roxb.

Fl. Ind. 1: 180. 1820, *nom. cons.*

Key to the species

1. Plants acaulescent 2
1. Plants caulescent 3
2. Leaves rotundus type ..... *S. rotundifolia*
2. Leaves not rotundus ..... *S. wallichi*
3. Flowers glabrous 4
3. Flowers hairy 7
4. Stems quadrangular .....*S. ponmudiana*
4. Stems terete 5
5. Leaf base auricled .....*S. grandiflora*
5. Leaf base not auricled..... 6
6 Leaves widely ovate .....*S. nemakkadensis*
6. Leaves elliptic .....*S. devikolamensis*
7. Plants with bulbils .....*S. tenella*
7. Plants without bulbils 8
8. Stems not branching 9
8. Stems branching 10

9. Leaves apex acute; cymes 5–8-flowered .....*S. rheedei*

9. Leaves apex acuminate; cymes more than 10-flowered .....
.....*S. sreenarayaniyana*

10. Leaves 1.5–2.5 cm long.....*S. brunonis*

10. Leaves 3–5 cm long.....*S. cannonarensis*

Sonerila brunonis Wight & Arn., Prodr. Fl. Ind. Orient. 1: 321. 1834; Hook.f., Fl. Brit. Ind. 2: 531. 1876; Gamble, Fl. Madras 1: 499. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 409. 2016.

Perennial caulescent erect herbs, up to 50 cm tall. Stems quadrangular, glandular hairy. Leaves simple opposite; lamina ovate, 1.5–2.5 × 1–1.5 cm, acute at both ends, serrulate, pilose above, glabrous below; petioles 3–5 cm long, sparsely pilose, grooved above. Flowers pale pink, in terminal scorpioid cymes; peduncles 3–5 cm long, slender; pedicels 0.2–0.4 cm long, glabrous. Bracts absent. Hypanthium campanulate, truncate, angular, ribbed, sparsely hairy. Calyx lobes triangular, 3–3.3 × 1–1.2 mm, acute at apex, entire, puberulus out, glabrous within. Petals 3, free, ovate, lanceolate, 7–8 × 3–4 mm, acuminate at apex, rounded at base, entire, glabrous. Stamens 3; filaments 5 mm long, glabrous; anthers *c.* 2 mm long. Capsules oblong. Seeds curved, glabrous.



Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Grasslands; *Fl.* & *Ft.*: January-September.

Specimens examined: Kattappana, 27.09.1981, *C.N. Mohanan* & *B.Ramanujan* 74040 (MH); Mankulam, 23.08.2018, *Vishnu Mohan* & *Santhosh Nampy* 164526; way to Viripara, near to Tea Estate, 13.09.2018, *Vishnu Mohan* & *Santhosh Nampy* 159470 (CALI).

Sonerila cannanorensis G.S.Giri & M.P.Nayar, Bull. Bot. Surv. India 27: 86. 1985, publ. 1987; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 410. 2016.

Perennial caulescent erect herbs, up to 30 cm tall. Stems quadrangular, glabrous. Leaves simple, opposite; lamina lanceolate, 3–5 × 2–3 cm, acuminate at apex, distinctly unequal at base, entire, densely strong hairy above, glabrous below; petioles 0.5–1.5 cm long, glabrous. Flowers pale pink, hairy, in terminal many-flowered scorioid cymes; peduncles short, compressed; petioles 0.2–0.4 cm long, glabrous. Hypanthium obovate, 5–6 × 3–3.5 mm, hairy out. Calyx lobes 3, triangular, *c.* 2 × 2 mm, acute at apex, entire, glabrous. Petals 3, free, ovate-lanceolate, 5–5.5 × 2–3 mm, acuminate at apex, rounded at base, entire, sparsely hairy below, glabrous within. Stamens 3, free; anthers broadly ovate, apex acute, not beaked; filaments erect, glabrous, stout. Capsules campanulate, indistinctly 6-ribbed. Seeds numerous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat:* Grasslands; *Fl.* & *Ft.*: January-August.

Specimens examined: Edamalakkudi, 16.03.2018, *Vishnu Moahan & Santhosh Nampy* 168970; Mankulam, 23.08.2018, *Vishnu Moahan & Santhosh Nampy* 164526; Neymakkad, 24.01.2018, *Vishnu Moahan & Santhosh Nampy* 168877 (CALI).

Sonerila devicolamensis M.P.Nayar, J. Bombay Nat. Hist. Soc. 71: 632. 1976; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 411. 2016.



Perennial caulescent herbs, up to 40 cm tall. Stems terete, reddish, glabrous, fleshy. Leaves simple opposite; lamina elliptic, 3–6 × 1.5–3 cm, acute at apex, obtuse at base, conspicuously serrate, glabrous, fleshy; petioles 1–2 cm long, thick and reddish, glabrous. Flowers glabrous, in terminal or axillary scorpioid cymes; peduncles

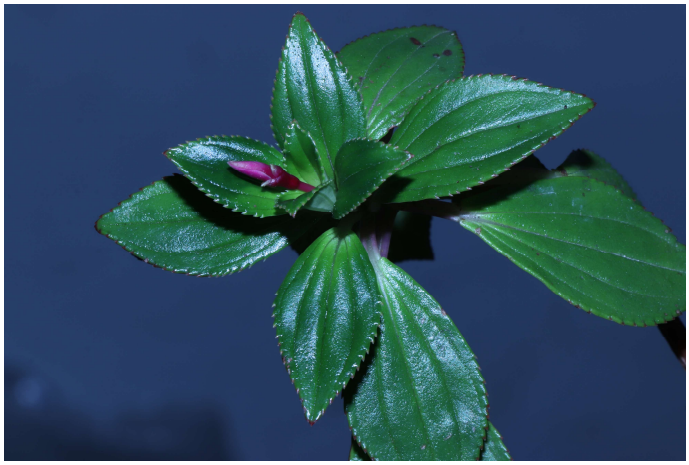
0.2–1 cm long, deep red, glabrous; pedicel *c.* 0.8 cm long, glabrous. Hypanthium campanulate, truncate, glabrous, smooth. Calyx lobes small, triangular, *c.* 3 × 3 mm long, glabrous, reddish. Petals 3, free, elliptic, 13–15 × 9–10 mm, apiculate at apex, rounded at base, entire, glabrous. Stamens 3, free; filaments erect, 6–7 mm long, glabrous; anthers lanceolate, acuminate at apex. Ovaries inferior, glabrous; styles filiform, 12–15 mm long, glabrous, erect. Capsules obconical, 1–1.5 cm long, glabrous. Seeds cuneate, *c.* 1 mm long, numerous.

Distribution: The native range of this species is SW. India (POWO, 2021);

Habitat: Grasslands; *Fl.* & *Ft.*: January-July.

Specimens examined: Meesappulimala, 06.07.2018, *Vishnu Mohan & Santhosh Nampy* 156428; Pettimudi, 18.03.2019, *Vishnu Mohan & Santhosh Nampy* 168991 (CALI).

Sonerila grandiflora R.Br. ex Wight & Arn., Prodr. Fl. Ind. Orient. 322. 1834; Hook.f., Fl. Brit. Ind. 2: 535. 1879; Gamble, Fl. Madras 1: 499. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 412. 2016.



Perennial caulescent large shrubs, up to 1.5 m tall. Stems terete, woody at base, glabrous, fleshy towards apex. Leaves simple, opposite; lamina ovate-lanceolate, 3–5 × 2–3 cm, acute at apex, auricled at base, serrate, glabrous, fleshy, shining above; petioles 1–2 cm long, pale green, glabrous. Stipules absent. Flowers in terminal-axillary scorpioid cyme, glabrous, non-fragrant; pedicles *c.* 1 cm long, glabrous; pedicels 0.6–1 cm long, glabrous. Hypanthium obovate, glabrous, 6–9 × 4–4.5 mm, glabrous. Calyx lobes triangular, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Petals 3, free, obovate-elliptic, 13–15 × 4–6 mm, acute at apex, attenuate at base, entire, bright pink, glabrous. Stamens 3, free; filaments erect, glabrous, 9–10 mm long; anthers 5–7 mm long, bottle-shaped,

acuminate. Ovaries inferior, glabrous; styles erect, glabrous, pink; stigmas sticky. Capsules obovoid. Seeds numerous.

Distribution: The native range of this species is SW. India (POWO, 2023);

Habitat: Shola forests and grasslands; *Fl.* & *Ft.*: November-May.

Specimen examined: Meesappulimala, 06.05.2019, *Vishnu Mohnam* & *Santhosh Nampy* 159138 (CALI).

Sonerila nemakadensis C.E.C.Fisch., Bull. Misc. Inform. Kew 1935: 157, 1935; Gamble, Fl. Madras 1874. 1936; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 412. 2016.



Perennial caulescent succulent herbs, up to 40 cm tall. Stems terete, glabrous, fleshy. Leaves simple, decussate; lamina widely ovate, 3–5 × 2–1 cm, acute at apex, rounded at base, serrate, glabrous, fleshy; petioles *c.* 0.5 cm long, glabrous, fleshy. Flowers in axillary scorpioid cymes, glabrous; peduncles terete, glabrous *c.* 2 cm long; pedicel 0.3–0.5 cm long, glabrous, red. Hypanthium turbinate, glabrous, shining. Calyx lobes 3, triangular, *c.* 2 × 3 mm, acute at apex, entire, glabrous. Petals 3, free, widely elliptic-orbicular, 1–1.5 × 1–1.5 cm, acute at apex, rounded at base, entire, pink, glabrous. Stamens 3, free; filaments erect, *c.* 6 mm long, glabrous, white; anthers narrowly ovate, acuminate at apex. Ovaries inferior, glabrous; styles erect, glabrous; stigmas sticky. Capsules urceolate.

Distribution: The native range of this species is S. India (POWO, 2023);

Habitat: Evergreen forests; *Fl.* & *Ft.*: November-January.

Specimens examined: way to Anamudi base camp, 10.12.2019, *Vishnu Mohan* & *Santhosh Nampy* 170041; Pettimudi, 29.12.2019, *Vishnu Mohan* & *Santhosh Nampy* 164881; near Subran shed, Pettimudi, 30.12.2019, *Vishnu Mohan* & *Santhosh Nampy* 170049; waterfalls near Rhodovally, Silent vallyy, Munnar, 22.11.2018, *Vishnu Mohan* & *Santhosh Nampy* 168822 (CALI).

Sonerila ponmudiana Deepthikum. & Pandur., Int. J. Curr. Sci. Technol. 4(3): 166–168. 2016.



Perennial caulescent erect herbs, up to 30 cm tall. Stems quadrangular, highly branching, glabrous. Leaves simple, decussate; lamina elliptic-lanceolate, 2–3 × 1–1.5 cm, acute at apex, rounded at base, serrate, hairy on young leaves, glabrous when old; petioles 0.8–1.5 cm long, glabrous. Flowers in terminal or axillary scorpioid cymes, glabrous; peduncles *c.* 2 mm long, glabrous; pedicels 0.3–0.4 cm long, glabrous, green. Bracts absent. Hypanthium turbinate, glabrous, terete. Calyx lobes 3, triangular, *c.* 3 × 3 mm, acute at apex, entire, glabrous. Petals 3, free, ovate-elliptic, *c.* 5 × 3 mm, acute at apex, rounded at base, entire, pink, glabrous. Stamens 3; filaments *c.* 4 mm long, erect, glabrous; anthers narrowly ovate, acute at apex with a prolonged connective. Ovaries inferior; styles 8–13 mm long, erect, glabrous. Capsules obovate. Seeds numerous.

Distribution: The native range is S. India (POWO, 2023); *Habitat:* Grasslands; *Fl.* & *Ft.*: December-January.

Specimen examined: Kattadikkadvu, 04.12.2018, *Vishnu Mohan & Santhosh Nampy* 161562 (CALI).

Sonerila rheedei Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 321. 1834; Gamble, Fl. Madras 500. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 413. 2016.

Sonerila wallichii sensu Clarke in Hook.f., Fl. Brit. India 2: 538. 1879.

Tuberous caulescent herbs, up to 25 cm tall. Stems quadrangular, hispid, fleshy, not branching. Leaves simple, opposite; lamina ovate, 5–12 × 4–8 cm, acute at apex, cordate at base, entire, hirsute, pale green or dark green or green with white spots; petioles 4–6 cm long, glabrous, fleshy. Stipules absent.



Flowers 5–8 in terminal scorpioid cymes, hairy; peduncles 5–7 cm long, sparsely hirsute; pedicels *c.* 0.8 cm long, glabrous. Hypanthium obovate, ribbed, sparsely hairy. Calyx lobes triangular 2–2.5 × 2–2.2 mm, acute at apex, entire, glandular hairy. Petals 3, free, elliptic, 4–5 × 2.5–3 mm, acuminate at apex, entire, pink, glabrous. Stamens 3, free; filaments 5–6 mm long, erect, glabrous; anthers lanceolate, acute-rostrate at apex. Capsules glandular hairy. Seeds obovoid, brown, glandular.

Distribution: The native range of this species is SW. India and NE. Thailand (POWO, 2023); *Habitat:* Evergreen and semi-evergreen forests; *Fl.* & *Ft.*: September-December.

Specimens examined: Devikulam, 12.12.1970, *M. Sivadasan* 614; way side Neriamangalam, 11.09.2018, *Vishnu Mohan & Santhosh Nampy* 159467 (CALI).

Sonerila rotundifolia Bedd., Madras J. Lit. Sci. ser. 2, 22: 74. 1861; Hook.f., Fl. Brit. India 2: 538. 1879; Gamble, Fl. Madras 1: 500. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 413. 2016.

Tuberous acaulescent scapigerous herbs, up to 20 cm long. Leaves a few, simple, radical; lamina rotundus, 6–8 × 6.5–8 cm rounded at apex, deeply cordate at base, entire, glabrous; petioles 8–12 cm long, glabrous, fleshy. Flowers in scorpiodial cymes, non-fragrant; peduncles 8–15 cm long, glabrous, fleshy; pedicels *c.* 0.2 cm long, glabrous. Hypanthium conical, 5–6 × 2.5–3 mm, glabrous. Calyx lobes 3, triangular, *c.* 1.5 × 3 mm, acute at apex, entire, glabrous. Petals 3, free, obovate, 8–12 × 6–9 mm, acute at apex, rounded at base, entire, pink, glabrous. Stamens 3; filaments 5–6 mm long, glabrous; anthers narrowly ovate, acute at apex, deeply cleft at base. Ovaries inferior, truncate, glabrous; styles *c.* 11 mm long; stigmas sticky. Capsules truncate.

Seeds numerous.

Distribution: The native range is SW. India (POWO, 2023); *Habitat:* Evergreen forests; *Fl.* & *Ft.*: July-August.

Specimen examined: Kumily, 20.07.2018, *Vishnu Mohan & Santhosh Nampy* 145267 (CALI).

Sonerila sreenarayaniana Sunil, Naveen Kum. & Rajeev, Int. J. Advanced Res. 2: 701. 2014.



Perennial cauulescent annual herbs, up to 40 cm tall. Stems quadrangular, glabrous, not branching. Leaves simple, decussate; lamina ovate, 4–7 × 3–5 cm, acuminate at apex, rounded-acute at base, serrate, sparsely hairy; petioles 5–8 cm long, quadrangular, glabrous, pink. Flowers in terminal many-flowered (more than 10) compact scorpioid cymes, hairy; peduncles 6–10 cm long, quadrangular, glabrous, pink; pedicels *c.* 0.2 cm long, glabrous. Hypanthium conical, 5–7 × 2–3 mm, glabrous. Calyx lobes triangular, *c.* 3 × 3 mm, acute at apex, entire, glabrous. Petals 3, free, orbicular, 7–9 × 3–4 mm, rounded-acute at apex, entire, bright pink, hairy out, glabrous within. Stamens 3, free; filaments 4–5 mm long, glabrous; anthers narrowly ovate, acute at apex. Ovaries inferior; styles erect, 4–5 mm long, pink, glabrous; stigmas sticky. Capsules truncate.

Distribution: The native range is India (Kerala) (POWO, 2023); *Habitat:* Evergreen forests; *Fl.* & *Ft.*: July-August.

Specimen examined: Anakkulam, 10.07.2018, *Vishnu Mohan & Santhosh Nampy* 175623 (CALI).

Sonerila tenella Bedd., Madras J. Lit. Sci. Ser. 3(1):46. 1864. *S. arnotiana* Thwaites var. *tenella* (Bedd.) C.B.Clarke in Hook.f., Fl. Brit. Ind. 2: 532. 1879. Perennial caulescent succulent erect bulbous herbs, up to 50 cm tall. Stems quadrangular, glabrous. Leaves simple opposite, decussate; lamina elliptic,

1.5–3 × 1–2 cm, acute at apex and base, slightly serrate, hairy above, glabrous below; petioles *c.* 0.6 cm long, glabrous, slender. Flowers in terminal-axillary scorpioid cymes, hairy; peduncles 1–4 cm long, glabrous; pedicels 0.2–0.4 cm long, glabrous. Hypanthium obconical, 5–7 × 3–3.5 mm, ribbed, glabrous. Calyx lobes triangular, 2.8–3 × 2 mm, acute at apex, entire, glabrous. Petals 3, free, elliptic, 5–5.5 × 2–2.3 mm, acuminate at apex, rounded at base, entire, pink, glabrous. Stamens 3, free; filaments erect, 4.5–5 mm long, glabrous; anthers lanceolate, pointed at tip. Ovaries inferior, glabrous; styles 4.8–52 mm long; stigmas sticky. Capsules obconical ribbed. Seeds numerous.

Distribution: The native range is S. India (POWO, 2023); *Habitat:* Evergreen forests; *Fl.* & *Ft.*: September-December.

Specimen examined: Kattadikkadavu, 18.09.2018, *Vishnu Mohan & Santhosh Nampy* 164520 (CALI).

Sonerila wallichii Benn., Pl. Jav. Rar. 215. 1844; Hook.f., Fl. Brit. India 2: 538. 1879; Gamble, Fl. Madras 1: 500. 1919; Swamin. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 2: 418. 2016.

Acaulescent scapigerous tuberous herbs, up to 20 cm tall. Leaves one or a very few; lamina ovate, 3–5 × 2–3 cm, acute at apex, cordate at base, serrulate, crispate hairy above, glabrous below, membranous; petioles 3–7 cm long, glabrous. Flowers in scorpioid cymes; peduncles 5–9 cm long, glandular hairy; pedicels *c.* 0.2 cm long, glandular hairy. Hypanthium widely conical, *c.* 4 × 3 mm, glabrous. Calyx lobes 3, triangular, *c.* 3 × 2, acute at apex, hairy below, glabrous above. Petals 3, free, elliptic, *c.* 5 × 3 mm, acute at apex, entire, pale pink, glandular hairy out, glabrous within. Stamens 3, free; filaments erect, *c.* 6 mm long, glabrous, white; anthers lanceolate, acuminate at apex. Ovaries inferior, glabrous; styles glabrous, erect; stigmas sticky. Capsules hemispheric, glandular hairy.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat:* Wet rocks in grasslands; *Fl.* & *Ft.*: August-November.

Specimen examined: Edathattu, Mankulam, 13.09.2018, *Vishnu Mohan & Santhosh Nampy* 161901 (CALI).

LYTHRACEAE J.St.-Hil.

Expos. Fam. Nat. 2: 175. 1805, *nom. cons.*

Annual or perennial herbs, sub-shrubs, shrubs or trees. Leaves simple, opposite or verticillate, rarely alternate. Flowers regular or slightly irregular, hermaphrodite. Sepals united into a tube (hypanthium); lobes valvate. Petals free, inserted towards the top of calyx-tube, alternating with sepals. Stamens usually 4 or 8. Ovaries superior, sessile or shortly stipitate, completely or incompletely 2–6-locular, rarely unilocular or multilocular. Fruit capsular or baccate, opening by a transverse slit or valves or bursting irregularly or ± indehiscent.

This family consists of 28 genera in the world (POWO 2023); two genera and seven species in the study area.

Key to the genera

1. Flowers axillary, solitary…… *Rotala*

1. Flowers in axillary dichasia or in groups……..……..*Ammannia*

Ammannia L.

Sp. Pl. 1: 119. 1753

Key to the species

1. Calyx lobes incurved at anthesis; stamens inserted at the base of calyx tube …..……..……..……... *A. cordata*

1. Calyx lobes erect at anthesis; stamens inserted on the rim or middle of calyx tube……..……..……..……..*2*

2. Leaf base attenuate; petals absent …… *A. baccifera*

2. Leaf base semi-amplexicaule; petals present ……... …*A. multiflora*

Ammannia baccifera L., Sp. Pl. 1: 120. 1753; Hook.f., Fl. Brit. India 2: 569. 1879; Gamble, Fl. Madras 1: 510. 1919.

Annual erect herbs, up to 30 cm tall. Stem moderately branched, terete, glabrous. Leaves simple, opposite-alternate towards apex; lamina narrowly elliptic, 0.5–1.5 × 0.3–0.6 cm, acuminate at apex, attenuate at base, entire at margins, glabrous, non-coriaceous; petioles *c.* 0.2 cm long, pubescent, grooved above, slightly pulvinate at base. Stipules absent. Flowers in axillary cymes, non-fragrant; peduncles reduced, glabrous; pedicels *c.* 0.1 cm long, stout,

glabrous. Bracteoles ovate, *c.* 2 × 1 mm, acute at apex, rounded at base, entire at margins, glabrous. Sepals 4, ovate, *c.* 0.5 × 3 mm, acute at apex, entire at margins, glabrous, membranous; epicalyx absent. Petals absent. Stamens 4, free; filaments *c.* 3 mm long, erect, glabrous. Ovaries superior, ovate; styles *c.* 0.3 mm long, erect, glabrous; stigmas capitate. Capsules globose, glabrous. Seeds brownish.

Distribution: The native range of this species is Africa, Tropical and Subtropical Asia to Australia (POWO, 2023); *Habitat*: Paddy fields and other wet lands: *Fl. & Ft.*: June-December.

Specimen examined: Chinnar, 25.06.2018, *Vishnu Mohan & Santhosh Nampy* 176235 (CALI).

Ammannia cordata Wight & Arn., Prodr. Fl. Ind. Orient. 1: 304. 1834.

Nesaea brevipes Koehne in Engl., Bot. Jahrb. Syst. 3: 326. 1882; Gamble, Fl. Madras 1: 510. 1919.

Annual erect herbs, up to 30 cm tall. Stem moderately branched, 4-angled, glabrous. Leaves simple, opposite; lamina elliptic-oblanceolate, 1–1.5 × 0.7–1 cm, rounded at apex, cordate at base, entire at margins, glabrous, membranous; petioles obscure. Stipules absent. Flowers in axillary cymes; non-fragrant; peduncles reduced; pedicels *c.* 0.3 cm long, stout, glabrous. Bracetoles ovate, *c.* 3 × 1 mm, acute at apex, rounded at base, entire at margins, glabrous, membranous. Calyx-tube *c.* 2 mm long, broadly campanulate; lobes 4, triangular, *c.* 1 × 1 mm, acute at apex, entire at margins, glabrous, membranous, incurved at anthesis. Petals absent. Stamens 4, inserted at the base of calyx tube; filaments *c.* 2 mm long, erect, glabrous. Ovaries superior, ovate; styles *c.* 2 mm long, erect, glabrous; stigmas capitate. Capsules globose, glabrous. Seeds many, ovoid.

Distribution: The native range of this species is Indian Subcontinent (POWO, 2023); *Habitat*: Dry and moist deciduous forests, also in the plains: *Fl. & Ft.*: July-November.

Specimen examined: Periyar Tiger Reserve, 01.08.2018, *Vishnu Mohan & Santhosh Nampy* 174563 (CALI).

Ammannia multiflora Roxb., Fl. Ind. 1: 447. 1820; Hook.f., Fl. Brit. India 2: 570. 1879; Gamble, Fl. Madras 1: 509. 1919.

Annual erect herbs, up to 40 cm tall. Stems terete, branching from base, rigid, glabrous. Leaves simple, opposite; lamina narrowly elliptic, 0.8–1.5 × 0.3–1.2 cm, acute at apex, semi-amplexicaule at base, entire at margins, glabrous on both sides, coriaceous; petioles *c.* 0.1 cm long, glabrous, terete, not pulvinate at base. Stipules absent. Flowers in axillary cymes, non-fragrant; peduncles 0.1–0.2 cm long, stout, glabrous; pedicels 0.1–0.2 cm long, narrow, glabrous. Bracteoles linear, *c.* 6 × 2 mm, acute at apex and base, entire at margins, glabrous on both sides. Sepals 4, deltate, *c.* 4 × 2 mm, acute at apex, entire at margins, glabrous. Petals 4, free, obovate, *c.* 5 × 3 mm, rounded at apex, entire at margins, glabrous, membranous. Stamens 4; filaments 4 mm long, erect, glabrous. Ovaries superior, ovate; styles 2 mm long, erect, glabrous; stigmas capitate. Capsules globose, glabrous. Seeds numerous, obovate.

Distribution: The native range of this species is Africa, Tropical & Subtropical Asia to Australia (POWO, 2023); *Habitat*: Marshy areas in dry deciduous forests: *Fl. & Ft.*: September-March.

Specimen examined: Chinnar, 09.03.2019, *Vishnu Mohan & Santhosh Nampy* 18456 (CALI).

Rotala L.

Mant. Pl. Altera 143, 175. 1771.

Key to the species

1. Flowers 5-merous…….. *R. rosea*
1. Flowers 4-merous……2
2. Flowers axillay, solitary……..……*R. ritchiei*
2. Flowers in terminal or axillary racemes……3
3. Bracts cordate……...*R. rotundifolia*
3. Bracts linear……..……*R. indica*

Rotala indica (Willd.) Koehne, Bot. Jahrb. Syst. 1: 172. 1880; Gamble, Fl. Madras 1: 508. 1919.

Amphibious annual herbs, up to 40 cm tall. Stems terete, creeping, branched at base, glabrous. Leaves simple, decussate; lamina obovate-elliptic, 0.5–1.2 ×

0.3–0.8 cm, obtuse at apex, cuneate at base, entire at margins, glabrous on both sides, non-coriaceous; petioles *c.* 0.3 cm long, glabrous, grooved above, not pulvinate. Stipules absent. Flowers in axillary spikes; peduncles 0.5–3 cm long, slender, glabrous; pedicels reduced. Bracts linear, *c.* 5 × 2 mm, acuminate at apex and base, entire at margins, glabrous. Sepals 4, lanceolate-deltate, *c.* 5 × 2 mm, acuminate at apex, entire at margins, glabrous, non-coriaceous. Petals 4, obovate, *c.* 3 × 2 mm, rounded at apex, entire at margins, glabrous, membranous. Stamens 4; filaments *c.* 3 mm long, glabrous. Ovaries superior, ellipsoidal; styles reduced; stigmas capitate. Capsules ellipsoidal, glabrous. Seeds numerous, ovate.

Distribution: The native range of this species is Asia (POWO, 2023); *Habitat*: Waterlogged areas and rock crevices: *Fl. & Ft.*: July-December.

Specimens examined: PTR, 08.12.2017, *Vishnu Mohan & Santhosh Nampy* 156218 (CALI); PTR, 29.12.1994, *Jomy Augustine* 14506 (KFRI).

Rotala ritchiei Koehne, Bot. Jahrb. Syst. 4: 386. 1883.

Ammannia ritchiei C.B.Clarke in Hook.f., Fl. Brit. India 2: 566 1879.

Aquatic herbs, up to 40 cm tall. Stems, terete, wiry, glabrous. Leaves simple, decussate; lamina oblong, 1–2 × 0.5–1.5 cm, obtuse at apex, sub-cordate at base, entire at margins, glabrous; submerged leaves membranous, emergent leaves thick; petioles *c.* 0.2 cm long, glabrous, not grooved, not pulvinate. Stipules absent. Flowers non-fragrant, axillary, solitary; peduncles absent; pedicel *c.* 0.1 cm long, stout, glabrous. Calyx tube 4-angled; lobes 4, triangular *c.* 2 × 2 mm, acuminate at apex, entire at margins, glabrous, membranous. Petals 4, orbicular, *c.* 5 × 4 mm, rounded at apex and base, entire at margins, glabrous, membranous. Stamens 4; filaments *c.* 3 mm long, stout,



glabrous. Ovaries superior, ovate; styles *c.* 3 mm long, erect, glabrous; stigmas capitate. Capsules valved, glabrous. Seeds numerous, oblong.

Distribution: The native range of this species is India (POWO, 2023); *Habitat*: Seasonal ponds in grasslands: *Fl. & Ft.*: November-March.

Specimens examined: Kumarikulam, 02.03.2021, *Vishnu Mohan & Santhosh Nampy* 184526 (CALI);*Ibid*., 12.03.1995, *Jomy Augustine* 14877 (KFRI).

Rotala rosea (Poir.) C.D.K.Cook, Boissiera 29: 86. 1979. *Ammannia rosea* Poir. in J.B.A.M.de Lamarck, Encycl., Suppl. 1: 329 1810.

Rotala leptopetala (Blume) Koehne, Bot. Jahrb. Syst. 1: 162. 1880; Gamble, Fl. Madras 1: 508. 1919.

Ammannia pentandra Roxb., Fl. Ind. 1: 427. 1820; Hook.f., Fl. Brit. India 2: 568. 1879.

Amphibious annual herbs, up to 30 cm tall. Stems terete, mostly unbranched, glabrous. Leaves simple, decussate; lamina linear-lanceolate 0.7–2 × 0.3–0.5 cm, obtuse at apex and base, entire at margins, glabrous; petioles *c.* 0.1 cm long, glabrous, not pulvinate. Stipules absent. Flowers axillary, solitary, sessile. Bracts ovate, *c.* 5 × 3 mm, acute at apex, rounded at base, entire at margins, glabrous; bracteoles linear, *c. 6* × 3 mm, acute at apex, rounded at base, entire at margins, glabrous. Sepals 5, ovate, *c.* 3 × 2 mm, acute at apex, entire at margins, glabrous, membranous. Petals absent. Stamens 5; filaments *c.* 4 mm long, slender, glabrous. Ovaries superior, globose; styles *c.* 2 mm long, glabrous; stigmas capitate. Capsules globose, glabrous. Seeds numerous, ovate.

Distribution: The native range of this species is S. China to Tropical Asia, N. Australia (POWO, 2023); *Habitat*: Along streams and marshy areas in grasslands: *Fl. & Ft.*: August-February.

Specimen examined: Thannikkudy, 06.11.1996, *Jomy Agustine* 17033 (CALI).

Rotala rotundifolia (Buch.-Ham. ex Roxb.) Koehne, Bot. Jahrb. Syst. 1: 175. 1880; Gamble, Fl. Madras 1: 509. 1919. *Ammannia rotundifolia* Buch.-Ham. ex Roxb., Fl. Ind. 1: 446. 1820; Hook.f., Fl. Brit. India 2: 566. 1879.

Annual erect amphibious herbs, up to 30 cm tall. Stem terete, branching from base, glabrous. Leaves simple, decussate; lamina obovate-elliptic, 0.5–1 × 0.3–

1 cm, obtuse at apex and base, entire at margins, glabrous, coriaceous; petioles *c.* 0.2 cm long, glabrous, not pulvinate. Bracts cordate, *c.* 3 × 1.5 mm, acute at apex, entire at margins, glabrous. Flowers in terminal emergent spikes, non-fragrant; peduncles 3–7 mm long, narrow, glabrous; pedicels reduced. Bractoles ovate *c.* 3 × 2 mm, acute at apex, rounded at base, entire at margins, glabrous. Sepals 4, ovate, *c.* 4 × 2 mm, acute at apex, entire at margins, glabrous; epicalyx absent. Petals 4, obovate, *c.* 5 × 3 mm, rounded at apex, entire at margins, glabrous, membranous. Stamens 4; filaments erect, *c.* 3 mm long, stout, glabrous. Ovaries superior, pyriform, glabrous; styles shorter than ovaries, glabrous; stigmas discoid. Capsules globose, glabrous. Seeds many, ovoid.

Distribution: The native range of this species is India to Temp. E. Asia (POWO, 2023); *Habitat*: Along streams and marshy areas in grasslands: *Fl. & Ft.*: September-March.

Specimen examined: Thannikkudy, 02.03.2017, *Vishnu Mohan & Santhosh Nampy* 181546 (CALI).

ONAGRACEAE Juss.

Gen. Pl. 317. 1789, *nom. cons.*

Herbs, sometimes shrubs, very rarely trees. Leaves alternate, opposite or rarely whorled, simple; petioles not inflated in middle. Stipules absent or small. Flowers solitary and axillary, sometimes aggregated into racemes or panicles, normally hermaphrodite, regular or rarely irregular. Sepals valvate, mostly 4, sometimes 5, rarely 2, 3, 6 or 7. Petals free, as many as sepals, contorted or imbricate, rarely absent. Stamens as many or twice as many as sepals, very rarely fewer. Ovaries inferior, mostly 4-celled, rarely 1–7-celled; ovules axile, one to many per cell; styles simple. Fruit a capsule, rarely a nut or a berry. Seeds without endosperm.

This family includes 22 genera (POWO, 2023); two genera and six species in study area.

Key to the genera

1. Stamens as many as calyx lobes; ovaries 3–6-celled…….. *Ludwigia*
1. Stamens twice as many as calyx lobes; ovaries 4-celled…… *Oenothera*

Ludwigia L.

Sp. Pl. 1: 118. 1753.

Key to the species

1. Plants aquatic……..……..*L. adscendens*

1. Plants terrestrial ……..……...2

2. Stamens 4……...*L. perennis*

2. Stamens 8…..……..……3

3. Seeds pluriseriate, free……..……4

3. Seeds uniseriate, embedded in endocarp…… *L. hyssopifolia*

4. Capsules terete……..……*L. octavalvis*

4. Capsules strongly 4-angled……*L. peruviana*

Ludwigia adscendens (L.) H.Hara, J. Jap. Bot. 28: 291. 1953. *Jussiaea adscendens* L. in Mant. Pl.: 69 1767.

Jussiaea repens L., Sp. Pl. 1: 388. 1753, non Ludwigia repens Forst. 1771; Hook. f., Fl. Brit. India 2: 587. 1879; Gamble, Fl. Madras 516(365). 1919.Gopalan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 445. 2016. I.C.Barua. The Genus *Ludwigia* (Onagraceae) in India Rheedea 20 (1): 60. 2010.



Aquatic creeping herbs. Stems terete, glabrous, hollow with white floating spongy structures. Leaves simple alternate; lamina spatulate-oblong, 0.5–7 × 1–3 cm, rounded-acute at apex, attenuate at base, entire, recurved, glabrous, shining above; petioles 0.5–2 cm long, glabrous. Flowers solitary, axillary; pedicels 2–5 cm long, erect, slender, glabrous. Sepals 5, free, deltoid-acuminate, 5–11 × 3–6 mm, acuminate at apex, entire, glabrous. Petals creamy-white with yellow base, 4, free, obovate, 6–15 × 5–10 mm, rounded at apex, attenuate at base, entire, glabrous, membranous. Stamens 10; filaments *c.* 4 mm long, white, glabrous, stout. Styles white, *c.* 8 mm long, erect, glabrous;

stigmas discoid, sticky. Capsules cylindric, glabrous. Seeds uniseriate, embedded in endocarp.

Distribution: The native range of this species is Tropics & Subtropics (POWO 2023); *Habitat*: Ponds and ditches; *Fl. & Ft.:* Throughout the year.

Specimens examined: Kattappana, 26.08.2018, *Vishnu Mohan & Santhosh Nampy* 164608; Thekkady, 08.09.1994, *Jomy Augustine & K.P. Rajesh* 14590 (CALI).

Ludwigia hyssopifolia (G.Don) Exell, Garcia de Orta 5: 471. 1957; Gopalan. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 445. 2016. *Jussiaea hyssopifolia* G.Don, Gen. Hist. 2: 693. 1832.

Jussiaea linifolia Vahl, Eclog. Amer. 2: 32. 1798; Fischer in Gamble, Fl. Madras 1875. 1936.



Erect annual herbs, up to 40 cm tall. Stems angular-terete, glabrous. Leaves simple, alternate; lamina lanceolate, 2–9 × 0.5–2 cm, acuminate at apex, attenuate at base, puberulous below, glabrous above; petioles 0.5–1 cm long, glabrous, grooved above, stout. Flowers solitary, axillary; pedicels 0.1–0.4 cm long, glabrous, stout. Sepals 4, free, lanceolate, 3–5 × 2–3 mm, acuminate at apex, entire, glabrous. Petals 4, yellow, elliptic-orbicular, 2–3 × 1–2 mm, rounded at apex, attenuate at base, entire, glabrous. Stamens 8; filaments *c.* 5 mm long, glabrous, erect. Ovaries inferior; styles *c.* 1.5 mm long, glabrous; stigmas depressed-globose, sticky. Capsules cylindric. Seeds uniseriate, embedded in endocarp.

Distribution: The native range of this species is S. Mexico to Tropical America and N. Australia (POWO 2023); *Habitat*: Marshy places; *Fl. & Ft.:* August-December.

Specimens examined: way to Karimutty, 29.12.2017, *Vishnu Mohan & Santhosh Nampy* 158029; Meenuliyanpara, 12.12.2016, *Vishnu Mohan & Santhosh Nampy* 151427 (CALI).

Ludwigia octovalvis (Jacq.) P.H.Raven, Kew Bull. 15: 476. 1961, publ. 1962; Gopalan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 446. 2016. *Oenothera octovalvis* Jacq., Enum. Syst. Pl. 19. 1760.

Erect herbs, up to 80 cm tall. Stems angular-terete, pubescent, smooth. Leaves simple, alternate; lamina linear-sub-ovate-lanceolate, 3–6 × 0.5–3 cm, acuminate at apex, attenuate at base, entire, hispid, smooth; petioles 1–1.3 cm long, hispid. Flowers solitary, terminal-axillary; pedicels 0.5–1 cm long, hispid, angular, stout. Sepals 4, free, ovate, 6–12 × 3–8 mm, acute at apex, entire, pubescent. Petals yellow, broadly obovate, 6–17 × 5–17 mm, rounded at apex, entire, glabrous, membranous. Stamens 8; filaments *c.* 4 mm long, glabrous. Ovaries inferior, truncate; styles 3–3.5 mm long; stigmas sub-globose, shallowly 4-lobed. Capsules turbinate, terete, hispid. Seeds pluriseriate, free.

Distribution: The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat*: Marshy areas in grasslands; *Fl. & Ft.:* February-November.

Specimen examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175902 (CALI).

Ludwigia perennis L., Sp. Pl. 119. 1753. *Jussiaea perennis* (L.) Brenan, Kew Bull. 8: 163. 1953. I.C.Barua. The Genus *Ludwigia* (Onagraceae) in India Rheedea 20 (1): 65. 2010.

Ludwigia parviflora Roxb., Fl. Ind. 1: 440. 1820; Hook.f., Fl. Brit. India 2: 588. 1879; Gamble, Fl. Madras 1: 517. 1919; Gopalan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 447. 2016.

Erect annual herbs, up to 30 cm long. Stems terete-angular, glabrous. Leaves simple, opposite; lamina narrowly elliptic-lanceolate, 1–8 × 0.3–2.5 cm, acuminate at apex and base, entire, glabrous, smooth; petioles 2–15 mm long, winged, glabrous. Flowers solitary, axillary; pedicels erect, stout, 0.3–0.6 cm long, glabrous. Sepals 4, fused at base; lobes ovate, dentate, 2–3.5 × *c.* 2 mm, acute at apex, entire, glabrous. Petals yellow, elliptic-orbicular, 1–3 × 0.7–2

mm, rounded at apex, acute at base, entire, glabrous, membranous. Stamens 4; filaments 0.3–0.5 mm long, glabrous, stout. Ovaries inferior, turbinate; styles 0.7–1.5 mm long, glabrous; stigmas globose, sticky. Capsules often nodding, pale brown, oblanceolate, hispid. Seeds multiseriate, rounded.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Waterlogged areas in grasslands; *Fl. & Ft.:* Throughout the year.

Specimens examined: Kumarikulam, 08.03.2021, *Vishnu Mohan & Santhosh Nampy* 186723; Thekkady, 10.09.1996, *Jomy Augustine* 16820 (CALI).

Ludwigia peruviana (L.) H.Hara, J. Jap. Bot. 28: 293. 1953; Gopalan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 447. 2016. *Jussiaea peruviana* L., Sp. Pl. 388. 1753; I.C.Barua. The Genus *Ludwigia* (Onagraceae) in India Rheedea 20 (1): 66. 2010.

Jussiaea speciosa Ridl. in J. Bot. 59: 259. 1921; Fischer in Gamble, Fl. Madras 3: 1875. 1936.



Shrubs, up to 1 m tall. Stems terete, hispid, soft, rigid towards base. Leaves simple, alternate; lamina lanceolate-broadly lanceolate, 5–8 × 0.5–1.5 cm, acuminate at apex, attenuate at base, entire, hispid; petioles 0.1–0.2 cm long, hispid. Stipules absent. Flowers solitary, axillary, non-fragrant, yellow; pedicels 0.5–1.4 cm long, erect, hispid. Sepals 4, lanceolate, 5–8 × 3–5 mm, acuminate at apex, entire, villous. Petals 4, free, orbicular to widely orbicular, 18–28 × 15–24 mm, rounded at apex and base, entire, recurved, glabrous, membranous. Stamens 8; filaments *c.* 8 mm long, glabrous, erect. Ovaries inferior; stigmas elongate-hemispherical. Capsules villous, strongly 4-angled. Seeds pluriseriate, free.

Distribution: The native range of this species is S. Mexico to Tropical America (POWO, 2023); *Habitat*: Marshy areas; *Fl. & Ft.:* March-June.

Specimens examined: Chinnar, 09.06.2017, *Vishnu Mohan & Santhosh Nampy* 152807; Karimutty, 29.02.2017, *Vishnu Mohan & Santhosh Nampy* 158003; Koymanchola, 09.02.2019, *Vishnu Mohan & Santhosh Nampy* 188797 (CALI).

Oenothera L.

Sp. Pl. 1: 346. 1753.

Oenothera laciniata Hill, Hort. Kew. 172/4. 1768.



Erect herbs, up to 30 cm tall. Stems terete, highly branching, strigose. Leaves simple, alternate; lamina narrowly oblanceolate to lanceolate, 2–10 × 0.5–3 cm, acute at apex, narrowly cuneate at base, deeply lobed to dentate, strigose; petioles 0.3–0.7 cm long, sparsely strigose. Flowers solitary, axillary; pedicels 1.2–1.8 cm long, glabrous. Sepals 4, ovate-lanceolate, 12–15 × 4–6 mm, acuminate at apex, entire, hispid. Petals yellow fading to orange, orbicular, 18–20 × 16–18 mm, rounded at apex, entire, glabrous, membranous. Stamens 8; filaments *c.* 5 mm long, glabrous, erect. Ovaries truncate, strigose; styles *c.* 6 mm long, glabrous; stigmas capitate, sticky. Capsules cylindric, sessile.

Distribution: The native range of this species is Central & E. U.S.A. to Guatemala (POWO, 2023); *Habitat*: Degraded forests and wastelands in the high ranges; *Fl.& Ft.*: August-January.

Specimen examined: way to 8th plot-Meesappulimala, 20.11.2018, *Vishnu Mohan & Santhosh Nampy* 167713 (CALI).

PASSIFLORACEAE Juss. ex Roussel

Fl. Calvados 2: 334. 1806, *nom. cons.*

Herbaceous climbers bearing tendrils, or erect trees or shrubs. Leaves alternate, entire or lobed, often with a glandular petioles; stipules usually small and deciduous. Flowers hermaphrodite or unisexual. Sepals 5,

imbricate, persistent, free or partially united. Petals 5, rarely absent, free or shortly united, imbricate. Stamens 5 or more, hypogynous or perigynous, shortly united or in bundles, sometimes springing from the gynophore; anthers 2-celled, opening lengthwise. Ovaries superior, 1-celled, with 3 or rarely 4–5 parietal placentas; ovules usually numerous; styles free or united; stigmas often capitate. Fruits capsule or berry, indehiscent or loculicidally 3-valved.

The family includes 30 accepted genera in the world (POWO, 2023); three species in Idukki district.

Key to the genera

1. Flowers many in cymes, unisexual ..... *Adenia*
1. Flowers usually solitary or in pairs, bisexual ..... *Passiflora*

Adenia Forssk.

Fl. Aegypt.-Arab. 77. 1775.

Adenia hondala (Gaertn.) W.J.deWilde, Blumea 15: 265. 1967. *Granadilla hondala* Gaertn., Fruct. Sem. Pl. 2: 480. 1791.

Adenia palmata Engl., Bot. Jahrb. Syst. 14(4): 375. 1891 Gamble, Fl. Madras 525. 1919.

Modecca palmata Lam., Encycl. 4(1): 209. 1797; Hook.f., Fl. Brit. India 2: 603. 1879.

Tuberous climbing shrubs. Stems terete, glabrous, slender, wiry; bark grey, smooth; tendrils simple, glabrous. Leaves simple, alternate, palmately 3–5-lobed; lobes oblong, 5–12 × 3–6 cm, acuminate at apex, cordate-truncate at base, entire at margins, glabrous above, glaucous below; petioles 3–8 cm long, glabrous, slender, glaucous. Stipules absent. Flowers many, unisexual, in axillary cymes, non-fragrant; peduncles 2–4 cm long, glabrous, slender; pedicels *c.* 4 cm long, slender, narrow, glabrous. Bracts absent. Male flowers: Calyx campanulate; lobes 5, ovate, 4–5 × 2–3 mm, acute at apex, entire at margins, glabrous. Petals 5, free, linear-oblong, 8–12 × 2–3 mm, acuminate at apex and base, ciliate, glabrous, thin. Stamens 5, free; filaments 4–8 mm long, erect, dichotomously branching, glabrous. Female flowers as same as male flowers. Ovaries stipitate, globular, glabrous; styles *c.* 3 mm long, erect, glabrous, 3-fid at apex. Capsules globose, 3-valved, glabrous, glaucous.

Distribution: The native range of this species is India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests, also in the sacred groves and plains; *Fl. & Ft.*: August-February.

Specimen examined: Vallakkadavu, 16.02.1994, *Jomy Agustine* 13381 (CALI).

Passiflora L.

Sp. Pl. 955. 1753.

Key to the species

1. Stipules and bracts present ……..… *P. foetida*

1. Stipules and bracts absent……. ……..… *P. lechnaultii*

Passiflora foetida L., Sp. Pl. 959. 1753; Gamble, Fl. Madras 524. 1919.

Herbaceous vines. Stems terete, slender, glandular-hispid hairy. Leaves simple, alternate; lamina sub-orbicular, 5–7 × 4–5 cm, deeply 3–5-lobed at apex, cordate at base, entire at margins, adpressed glandular-pubescent, thin; petioles *c.* 1.5 cm long, glabrous, slender. Stipules narrowly ovate, 3–5 × 2 mm, deeply dissected at apex, entire at margins, glandular appendaged out, glabrous within. Flowers solitary, axillary, non-fragrant; pedicels, 1–2 cm long, slender, narrow, glandular hairy. Bracts and bracteoles deeply pinnatisect, 3–6 × 2 mm, acuminate at apex, entire at margins, glandular-pubescent. Calyx lobes 5, broadly ovate, 1–1.5 × 0.6–0.8 cm, spurred at apex, entire at margins, glabrous within, thick. Petals white, ovate, 6–10 × 3 mm, acute at apex, entire at margins, glabrous, thick. Coronal segments in 2 whorls; outer coronal hairs many, *c.* 1 cm long; inner ones 2–3 mm long. Gynandrophore *c.* 5 mm long. Stamens 5; filaments 3 mm long, erect, glabrous. Ovaries 1-celled, glabrous; styles 3 mm long, glabrous; stigmas capitate. Berries sub-globose, yellow, subtended by bracts and bracteoles. Seeds many, ovate, laterally compressed, pitted.

Distribution: The native range of this species is Tropical & Subtropical America (POWO, 2023); *Habitat*: Degraded forests and wastelands; *Fl. & Ft.*: July-February.

Specimens examined: Thekkady, 28.09.1972, *B.D. Sharma* 42092 (MH); Vazhathoppe, 18.02.1982, C.*N. Mohanan* 73367 (MH).

Passiflora leschenaultii DC., Prodr. 3: 326. 1828. *Decaloba leschenaultii* M.Roem., Fam. Nat. Syn. Monogr. 2: 160. 1846; Hook.f., Fl. Brit. India 2: 599. 1879; Gamble, Fl. Madras 2: 524. 1919.



Slender climbing herbs. Stems terete, glabrous. Leaves simple, alternate; lamina sub-orbicular, 4–6 × 8–12 cm, 3-tipped at apex, rounded at base, entire at margins, glabrous, shining above, glaucous below; petioles 2–4 cm long, glabrous, slender. Stipules absent. Flowers solitary, axillary, non-fragrant; pedicels 2–4 cm long, slender, glabrous. Bracts absent. Calyx campanulate; lobes 5, deeply lobed to the base, lanceolate, 1–2 × *c.* 0.5 cm, acuminate at apex, entire at margins, glabrous, thick. Petals ovate-elliptic, 1–2.5 × 5–1 cm, acuminate at apex, entire at margins, glabrous, thick, white. Coronal hairs many, *c.* 1 cm long. Gynandrophore *c.* 1 cm long. Stamens 5; filaments *c.* 1 cm long, erect, curved towards tip, glandular hairy. Ovaries 1-celled, glabrous; styles 3 mm long, erect, glabrous; stigmas capitate. Berries oblong, reddish, smooth, 3-valved.

Distribution: The native range of this species is Assam to Myanmar (POWO, 2023); *Habitat*: Evergreen forests, also in the sacred groves and plains; *Fl. & Ft.*: August-January.

Specimens examined: Anamudishola National Park, 25.01.2018, *Vishnu Mohan* & *Santhosh Nampy* 158243; way to Mannan Shola from Kanthallur, 23.11.2005, *Jisha E.S* 111241 (CALI).

CUCURBITACEAE Juss.

Gen. Pl. 393. 1789, *nom. cons.*

Climbing or scrambling vines, sometimes woody lianas, rarely decumbent shrubs. Leaves generally petiolate,

sometimes scabrous. Inflorescences axillary, racemose or paniculate,

rarely sub-umbellate (*Gurania* Cogn.), often reduced to a showy, solitary flower. Flowers unisexual in dioecious or monoecious plants, radially symmetric, epigynous; calyx (3–)5-merous, lobes fused or free; corolla (3–)5-merous, lobes fused or free, white, cream, yellow, orange, rarely red or pink; stamens (1–)3–5, fused to hypanthium. Fruit normally a pepo.

The family includes 101 genera in the world (POWO, 2023); five genera and nine species in the study area.

Key to the genera

1. Tendrils simple……2
1. Tendrils 2 to many-fid……4
2. Anthers cells conduplicate …… *Cucumis*
2. Anthers cells not conduplicate, straight……3
3. Flowers white; all anthers 2-locular; fruits smooth…….. *Zehneria*
3.Flowers yellow; two anthers 2-locular, one 1-locular; fruits spinose…….. *Momordica*
4. Male flowers in fascicles…….. *Diplocyclos*
4. Male flowers in racemes…….. *Trichosan*

Cucumis L.
Sp. Pl. 2: 1011. 1753.

Key to the species

1. Anther cells conduplicate ……..2
1. Anther cells straight…….. *C. maderaspatanus*
2. Fruits fusiform …….. *C. silentvalleyi*
2. Fruits globose…….. *C. leiospermus*

Cucumis leiospermus (Wight & Arn.) Ghebret. & Thulin, Novon 17: 177. 2007. *Bryonia leiosperma* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 345. 1834. *Melothria leiosperma* (Wight & Arn.) Cogn., in A.DC. & C.DC., Monogr. Phan. 3: 622. 1881; Gamble, Fl. Madras 2: 539. 1919.

Slender climbing herbs. Stems angular, wiry, densely pilose. Leaves simple, alternate; lamina widely ovate-cordate, 4–6 × 4–7 cm, shallowly 5-lobed; lobes obtuse, rounded-acute at apex, cordate at base, serrate,

cuspidate, coarsely scabrous above, densely tomentose below, rough; petioles 2–3 cm long, densely villous, fleshy. Tendrils undivided. Flowers solitary, axillary. Male flowers in axillary fascicles; pedicels 1–3 cm long, villous, slender. Sepals fused; tube *c.* 5 mm long; lobes linear-lanceolate, *c.* 6 × 2 mm, acuminate at apex, entire, villous out, glabrous within, ciliate. Petals yellow, campanulate; lobes 5, ovate, 6–7 × 3–4 mm, acute at apex, recurved, pubescent out, glabrous within. Stamens synandrous; filaments *c.* 2 mm long, erect, glabrous; anther cells conduplicate. Female flowers as same as male. Ovaries inferior, villous; styles *c.* 3 mm long, erect; stigmas recurved, velvetish. Berries globose, glabrous. Seeds a few, obovate.

Distribution: The native range of this species is Indian Subcontinent (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl & Ft.:* December-March.

Specimen examined: Swamikkayaam, 15.01.1994, *Jomy Augustine* 13133 (CALI).

Cucumis maderaspatanus L., Sp. Pl. 1012. 1753. *Mukia maderaspatana* (L.) M.Roem., Fam. Nat. Syn. Monogr. 2: 47. 1846; V.P.Prasad in G.V.S.Murthy & VJ.Nair (ed.), Fl. Kerala 495. 2016. *Melothria maderaspatana* (L.) Cogn. in A.DC. & C.DC., Monogr. Phan. 3: 623. 1881; Gamble, Fl. Madras 2: 539. 1919.

Mukia scabrella (L.f.) Arn., Hooker's J. Bot. 3: 276. 1841; Hook.f., Fl. Brit. India 2: 623. 1879.

Climbing herbs. Stem coarsely scabrous. Leaves simple, alternate; lamina 3-lobed, 8–9 × 6–7 cm, acute at apex, deeply cordate at base, spinous serrate, densely scabrous; petioles 4–7 cm long, scabrous. Tendrils undivided. Male flowers 8–12 together in axillary fascicles; pedicels 0.5–0.6 cm long, stout. Sepal campanulate, densely hirsute out, lobes linear, acute at apex. Petal lobes obovate, 1.5–2 × 2.5–4 mm, obtuse at apex, bristly hairy out. Staminal tube *c.* 1 mm long; anther cells straight. Female flowers solitary or 2–3 together. Sepals and petal same as male flowers. Ovaries ellipsoid, scabrous; styles *c.* 1 mm long; stigmas oblong. Berries globose. Seeds obovate, marginate, yellowish white, rugose.

Distribution: The native range of this species is India to Nansei-shoto and Australia (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl & Ft.:* October-March.

Specimen examined: Pooyamkutty, 02.10.1990, *C.N. Mohanan* 71654 (MH).

Cucumis silentvalleyi (Manilal, T.Sabu & P.Mathew) Ghebret. & Thulin, Novon 17(2):178. 2007. *Cucumella silentvalleyii* Manilal, T.Sabu & P.Mathew, Acta. Bot. India 13: 283. 1985; V.P.Prasad in G.V.S.Murthy & VJ.Nair (ed.), Fl. Kerala 473. 2016.



Creeping slender herbs. Stems angular, scabrid, spreading. Leaves simple, alternate; lamina cordate, 3–4.5 × 3.5–4 cm, rounded-acute at apex, cordate at base crenate, scabrid, rough; petioles erect, fleshy, angular, 4–6 cm long, scabrid. Tendrils undivided. Flowers axillary, solitary; pedicels slender, wiry. Male flower sepals fused; tube 7–9 mm long; lobes ovate, 3–2 × *c.* 2 mm, acuminate at apex, scabrid out, glabrous within, membranous. Petals 5, free, obovate, 8–10 × 5–6 mm, rounded at apex, entire, glabrous, yellow. Stamens 3; filaments erect, glabrous; anther cell conduplicate. Female flowers as similar to male flowers. Ovaries fusiform, hispid; styles *c.* 2 mm long; stigmas trilobed, recurved, sticky. Fruit fusiform, hispid. Seeds obovate, compressed, smooth.

Distribution: The native range of this species is SW. India (Kerala) (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl & Ft.:* September-March.

Specimen examined: Anakkulam, 18.09.2018, *Vishnu Mohan & Santhosh Nampy* 161974 (CALI).

Diplocyclos (Endl.) T.Post & Kuntze

Lex. Gen. Phan. 178. 1903.

Diplocyclos palmatus (L.) C.Jeffrey, Kew Bull. 15: 352. 1962; V.P.Prasad in G.V.S.Murthy & VJ.Nair (ed.), Fl. Kerala 480. 2016. *Bryonia palmata* L. in Sp. Pl.: 1012 1753.

Bryonia laciniosa L.; Wight, Ic. t. 500. 1841; Hook.f., Fl. Brit. India 2: 622. 1879.

Bryonopsis laciniosa sensu Naud.; Gamble, Fl. Madras 534. 1919.

Slender climbing herbs. Stems terete, glabrous, shallowly angular, wiry. Leaves palmately lobed, alternate; lamina cordate; lobes narrowly lanceolate, 4–6 × 0.7–1 cm, acuminate at apex, shallowly serrate, glabrous, shining above; petioles slender, terete, 4–7 cm long, glabrous. Tendrils 2-fid. Flowers in axillary solitary cymes; pedicels 2–3 mm long, glabrous, glaucous. Male flower sepals campanulate; lobes 5, linear-ovate, 2–3 × 1–2 mm, acuminate at apex, glabrous. Petals ovate, 5–6 × *c.* 3 mm, greenish-yellow, acute at apex, entire, glabrous. Stamens 3, free, inserted at the middle of calyx-tube; filaments stout, glabrous. Female flower as same as the male flowers. Ovaries globose, glabrous; styles erect, *c.* 1 mm long; stigmas 3-fid, papillose. Fruits globose, with vertical greenish and white patches.

Distribution: The native range of this species is Tropical & S. Africa, S. Arabian Peninsula, Tropical & Subtropical Asia (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl & Ft.:* December-March.

Specimens examined: Chinnar, 27.01.2018, *Vishnu Mohan & Santhosh Nampy* 158341; Munnar, 23.01.2018, *Vishnu Mohan & Santhosh Nampy* 158118 (CALI).

Momordica L.

Sp. Pl. 2: 1009. 1753.

Momordica dioica Roxb. ex Willd., Sp. Pl. ed. 4., 4(1): 605. 1805; Hook.f., Fl. Brit. India 2: 617. 1879; Gamble, Fl. Madras 1: 531. 1919; V.P.Prasad in G.V.S.Murthy & VJ.Nair (ed.), Fl. Kerala 492. 2016.

Climbing herbs with tuberous roots. Stems angular, slender, scabrid. Leaves simple, alternate, narrowly cordate, 3–6 × 2–4 cm, shallowly 5-lobed, cordate at base, denticulate, glabrous, membranous; petioles slender, 2–2.5 cm long. Tendrils undivided. Flowers solitary, axillary. Male peduncles slender, glabrous, 3–4 cm long. Sepals campanulate; tube *c.* 1 cm long; lobes lanceolate-linear, 4–5 × 1–2 mm, acuminate at apex, entire, villous out, glabrous within. Petals 5, free, oblong, 6–10 × 4–6 mm, rounded-acute at apex, entire, sparsely pubescent out, glabrous within, membranous. Stamens 3, inserted at the mouth of calyx tube; 1-celled. Female flowers as same as male flowers. Ovaries oblong; styles reduced, stout; stigmas trilobed, sticky. Fruits ovoid, softly echinate. Seeds ovoid, emarginate, pale yellow.

Distribution: The native range of this species is Indian Subcontinent to Myanmar (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl & Ft.:* September-March.

Specimen examined: Uppupara, 06.09.1994, *Jomy Augustine* 14135 (CALI).

Trichosanthes L.

Sp. Pl. 2: 1008. 1753.

Key to the species

1. Tendrils undivided……*T. tubiflora*
1. Tendrils 2–5-fid……2
2. Leaves lobed; tendril 3–5-fid……*T. lobata*
2. Leaves entire; tendril 2-fid……*T. nervifolia*

Trichosanthes lobata Roxb., Fl. Ind. 3: 703. 1832; Hook.f., Fl. Brit.

India 2: 610. 1879; V.P.Prasad in G.V.S.Murthy & VJ.Nair (ed.), Fl. Kerala 503. 2016.

Trichosanthes perrottetiana Cogn.; Gamble, Fl. Madras 529. 1919.

Climbing shrubs. Stem angular, glandular. Leaves simple, alternate, lamina 5-lobed; lobes cuspidate, serrate, densely pubescent beneath, sparsely pubescent above; petioles 3–5 cm long, densely hispid, stout. Tendrils 3–5-fid, rigid. Male flowers in axillary racemes; peduncles 5–10 cm long, glandular pubescent, slender; pedicels 1–3 cm long, stout, glandular hairy. Bracts oblanceolate, 5–6 × *c.* 3 mm, acute at apex, entire. Calyx tube 20–25 mm long, pubescent out; lobes linear, 6–6.7 × 1.5–2 mm, pubescent out, glabrous within. Petals 5, free, ovate, 3–4 × *c.* 0.7 cm, deeply fimbriate, sparsely pubescent inside, glabrous out. Stamens 3; filaments erect, stout. Female flowers solitary, axillary, as same as to male flowers. Ovaries glabrous; styles *c.* 2 mm long, glabrous; stigmas tri-lobed. Berries glabrous, green with white lines. Seeds oblong, rugose along margins.

Distribution: The native range of this subspecies is Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl. & Ft.:* December-March.

Specimens examined: Lakkam, 24.01.2017, *Vishnu Mohan & Santhosh Nampy* 158207; Udumbupura (Mathikettan Shola National Park), Vellimala, 12.03.1997, *Jomy Agustine* 17793; *Ibid*., 09.05.2015, *Syam Radh S.* 138000 (CALI).

Trichosanthes nervifolia L., Sp. Pl. 1008. 1753; V.P.Prasad in G.V.S.Murthy & VJ.Nair (ed.), Fl. Kerala 503. 2016.

Trichosanthes caudata Willd., Sp. Pl. ed. 4, 4: 600. 1805; Gamble, Fl. Madras 2: 529. 1919.

Scandant herbs. Stems sulcate; tendrils bifid. Leaves simple, opposite; lamina ovate 6–14 × 5–7 cm, gradually acute at apex, cordate at base, denticulate, glabrous, membranous; petioles *c.* 3 cm long, slender. Tendril 2-fid. Male flowers in racemes; peduncle 2–5 cm long, slender; pedicels *c.* 1.5 cm long, slender. Sepals campanulate to form a tube *c.* 1.2 cm long,

lobes 5, oblong, acuminate at apex, entire; lobes filiform. Petals 5-lobed; lobes oblong, fimbriate. Stamens 5; filaments *c.* 3 mm long; pistillodes 3. Female flowers solitary. Sepals and petals as same as male flowers. Ovaries 1-locular, ovoid; styles slender; stigmas entire or lobed. Berries ellipsoid, red on ripening. Seeds semi-ellipsoid, compressed, rugulose.

Distribution: The native range of this species is Indian Subcontinent (POWO, 2023); *Habitat:* Semi-evergreen forests, also in the plains; *Fl & Ft.:* September-January.

Specimen examined: Kulamavu, 03.10.1983, *C.N. Mohanan* 79954 (MH).

Trichosanthes tubiflora (Wight & Arn.) H.J.de Boer, PhytoKeys 12: 31. 2012. *Bryonia tubiflora* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 347. 1834.



Climbing slender herbs. Stems very slender, angular, sparsely scabrid. Leaves simple, alternate; lamina cordate, 3–6 × 2.5–6 cm, shallowly lobed, acuminate, acute, cordate at base, dentate, scabrid above, white simple hairy beneath; petioles 2–4 cm long, softly pubescent, stout. Tendrils undivided. Flowers in axillary racemes; peduncles 1–4 cm long, erect, stout; pedicels erect, slender, glabrous. Bracts linear, *c.* 2 × 1 mm, acuminate at apex, entire, glabrous. Sepals campanulate; lobes linear, 1–1.5 × *c.* 0.15 mm, minutely pubescent, sparsely long hirsute. Petals fused; tube 1–1.5 cm long; lobes ovate, 7–8 × 3.5–4 mm, obtuse at apex, entire, narrowed at base, sparsely pubescent within, glabrous out. Stigmas 3; filaments glabrous, stout. Female flowers as same as male flowers. Ovaries densely hairy; styles reduced, glabrous; stigmas 3-lobed, sticky. Fruits fusiform.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl. & Ft.:* December-April.

Specimen examined: Peerumedu, 27.04.2018, *Vishnu Mohan & Santhosh Nampy* 159212 (CALI).

Zehneria Endl.

Prodr. Fl. Norfolk. 69. 1833.

Zehneria thwaitesii (Schweinf.) C.Jeffrey, Kew Bull. 15: 371, 1961, publ. 1962. *Melothria thwaitesii* Schweinf., Reliq. Kotschy. 44. 1868.

Melothria zeylanica C.B.Clarke in Hook.f., Fl. Brit. India 2: 626. 1879; Gamble, Fl. Madras 1: 538. 1919.

Slender climbers. Stems glabrous, wiry. Leaves simple, alternate, cordate, 3–6 × 2.5–5 cm, acute-acuminate at apex, cordate at base, dentate, sub-glabrous to pubescent beneath, glabrous above; petioles 1–2.5 cm long, scabrid, slender. Tendrils undivided. Flowers in axillary cymes. Male flower pedicels reduced, stout. Sepals fused; tube *c.* 4 mm long, glabrous; lobes 5, acute, 4–5 × *c.* 2 mm, glabrous within, pubescent out. Corolla lobes ovate-lanceolate, *c.* 5 × 3 mm, acute at apex, entire, glabrous, membranous. Stamens 3; filaments erect, stout. Female flowers in axillary cymes; peduncles 3–5 cm long, glabrous. Sepals and petals similar to male flowers. Ovaries ovoid, glabrous; styles erect, *c.* 1 mm long. Stigmas recurved, sticky. Fruits ellipsoid, tapering at both ends. Seeds compressed, white.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat:* Dry deciduous forests; *Fl & Ft.:* December-March.

Specimens examined: Kanthalloor, way to Mannavan Shola, 25.02.2003, *Ligimol* 89858; Naduthottam, 01.01.1970, *Jomy Augustine* 12149 (CALI).

BEGONIACEAE C.Agardh

Aphor. Bot. 200. 1824, *nom cons.*

Annual or perennial herbs, shrubs or subshrubs, frequently succulent. Stems erect or creeping. Leaves alternate, simple, entire or lobed; petiolate; stipules caducous or persistent. Inflorescence cymose or thyrsoid. Flowers unisexual, white, pink or reddish. Male flowers actinomorphic. Female flowers slightly zygomorphic. Tepals (2–)3–5(6–8). Ovaries inferior, locules (1–2), 3, (4–6), 1–3, (–6) winged, placentation axile or parietal; styles usually 3. Tepals 2–4(–8). Stamens usually numerous; filaments free or fused. Fruits usually loculicidal capsules, rarely a berry, wings well-developed or rudimentary, seeds numerous.

This family have two genera and 2045 species (POWO, 2023); seven species under one genera in the study area.

Begonia L.

Sp. Pl. 2: 1056. 1753.

Key to the species

1. Leaves peltate……*B. albococcinea*

1. Leaves not peltate……2

2. Plants acaulescent……3

2. Plants caulescent……5

3. Leaves rounded at base……*B. crenata*

3. Leaves cordate at base…… 4

4. Leaves pubescent below……*B. floccifera*

4 Leaves hispid……6

5. Flowers a few on scapes; leaves glabrous below……*B. cordifolia*

5. Flowers numerous on umbel; leaves glabrous……*B. fallax*

6. Tepals in male flowers 2…… *B. trichocarpa*

6. Tepals in male flowers 4……*B. dipetala*

Begonia albococcinea Hook., Bot. Mag. 71: t. 4172. 1845; Hook.f., Fl. Brit. India 2: 654. 1879; Gamble, Fl. Madras 2: 546. 1919; V.Chandras. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 513. 2016.

Begonia grahamiana Wight, Icon. Pl. Ind. Orient. 5: t. 1811. 1852.

Acaulescent scapigerous succulent rhizomatous herbs. Leaves simple, peltate; lamina orbicular, 6–10 × 8–12 cm, entire, glabrous, fleshy; petioles 8–20 cm long, densely pubescent, fleshy. Stipules linear-lanceolate, 2–3.5 × *c.* 2 cm, acuminate at apex, crenate, glabrous. Flowers in terminal cymes; peduncles erect, 10–20 cm long, pubescent, fleshy, slender; pedicels dichotomous, slender, thin, glabrous, red, shining. Bracts linear-lanceolate, 5–6 × 3–3.5 mm, acuminate at apex, entire, glabrous. Male flower tepals 4, free, ovate-cordate, 5–9 × 4–6 mm, acute-rounded at apex, entire, glabrous. Stamens numerous, truncate; filaments *c.* 2 mm long, glabrous. Female flower tepals 4, cordate, 5–9 × 4–6 mm, acute-rounded at apex, cordate at base, entire, glabrous. Ovary inferior, 3 winged; styles reduced; stigmas velvetish, sticky. Capsule glabrous, red, winged.

Distribution: The native range of this species is SW. & S. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: Throughout the year.

Specimen examined: Munnar way side, 19.08.2017, *Vishnu Mohan & Santhosh Nampy* 176314 (CALI).

Begonia crenata Dryand., Trans. Linn. Soc. London 1: 162 1791; V.Chandras. in G.V.S.Murty and V.J.Nair, (ed.) Fl. Kerala 515. 2016.

Begonia aliciae C.E.C.Fisch. in Bull. Misc. Inform. Kew 1939: 247 1939; V.Chandras. in G.V.S.Murty and V.J.Nair, (ed.) Fl. Kerala 514. 2016.



Acaulescent scapigerous tuberous herbs. Leaves radical; lamina ovate, 2–8 × 1.5–5 cm, acuminate at apex, rounded at base, crenate, sparsely hairy; petioles 4–5 cm long, terete, glabrous. Stipules triangular. Flowers on long peduncled cymes; peduncles 7–15 cm long; pedicels slender, 5–9 mm long, glabrous, thin. Bracts and bracteoles elliptic, 3–4 × 1.5–2 mm, acute at apex, entire, glabrous. Male flower tepals 4, elliptic-

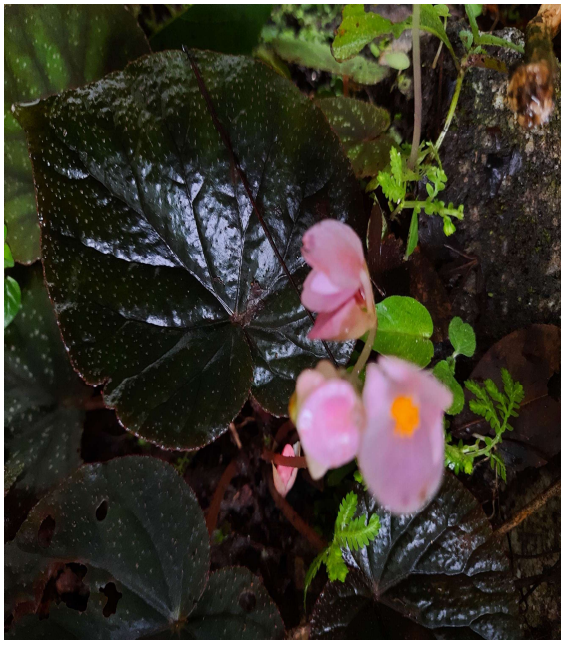
obovate, 4–6 × 3–5 mm, rounded at apex, cordate at base, entire, glabrous. Stamens Monadelphous, numerous, truncate; filaments reduced, *c.* 1 mm long, stout, glabrous. Female flower tepals 6, obovate, 4–8 × 4–7 mm, rounded at apex, cordate at base, entire, glabrous. Ovary sub-globose; styles 3, glabrous; stigmas broad, sticky. Capsules with the wings united and acute at the base.

Distribution: The native range of this species is SW. & S. India (POWO, 2023); *Habitat*: Banks of streams; *Fl. & Ft.*: August-February.

Specimen examined: Mankulam, 10.02.2021, *Vishnu Mohan & Santhosh Nampy* 188743 (CALI).

Begonia cordifolia (Wight) Thwaites, Enum. Pl. Zeyl. 129. 1859; Hook.f., Fl. Brit. India 2: 641. 1879; Gamble, Fl. Madras 2: 546. 1919; V.Chandras. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 515. 2016. *Diploclinium cordifolium* Wight, Icon. Pl. Ind. Orient. 5: t. 1816. 1852.

Perennial acaulescent creeping rhizomatous herbs. Leaves simple; lamina ovate, 6–20 × 4–18 cm, acuminate at apex, deeply obliquely cordate at base, crenate-dentate, sparsely pilose and blotched above, glabrous below; petioles 5–35 cm long, glabrous. Stipules elliptic-ovate, 3–4 × *c.* 2 mm, acute at apex. Flowers a few on scapes; peduncles 7–20 cm long, terete, glabrous; pedicels 0.5–0.8 cm long, slender, glabrous. Male flower tepals 4, orbicular-ovate, 5–12 × 8–15 mm, rounded at apex, cordate at base, entire, glabrous. Stamens numerous, connate at base; filaments reduced, *c.* 1 mm long, glabrous. Female flower tepals 5, orbicular, 5–12 × 8–15 mm, rounded at apex, cordate at base, entire, glabrous. Ovary winged; styles 3, *c.* 2 mm long, glabrous, connate at base; stigmas papillose. Capsules thick, whitish.



Distribution: The native range of this species is S India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: June-March.

Specimen examined: Venmony, 02.03.2021, *Vishnu Mohan & Santhosh Nampy* 176024 (CALI)

Begonia fallax A.DC., Prodr. 15: 329. 1864; Hook.f., Fl. Brit. India 2: 643. 1879.

Diploclinium lindleyanum Wight, Icon. Pl. Ind. Orient. t. 1817. 1852.



Caulescent glabrous erect shrubs. Stems terete, glabrous, glossy, fleshy, smooth. Leaves simple, alternate; lamina obliquely ovate, 8–20 × 4–8 cm, acuminate at apex, unequally cordate at base, entire-shallowly serrate, glabrous, membranous; petioles 1.5–2.5 cm long, glabrous, smooth. Stipules ovate, *c.* 3 × 2 mm, acuminate at apex, entire, glabrous. Flowers in axillary cymes; peduncles dichotomously branched, slender, glabrous; pedicels slender, narrow, drooping, glabrous. Male flower; tepals 4, widely orbicular, 4–6 × 5–8 mm, rounded at apex, cordate at base, entire, glabrous. Stamens numerous, truncate; filaments reduced, *c.* 1 mm long. Female flower tepals 4, widely orbicular, 4–6 × 5–8 mm, rounded at apex, cordate at base, entire, glabrous. Ovary glabrous, winged; stigmas sticky. Capsules obovate, 3-winged, glabrous.

Distribution: The native range of this species is India and Sri Lanka (POWO, 2023); *Habitat:* Evergreen forests; *Fl. & Ft.*: December-March.

Specimens examined: Banglavuthara, 21.12.2019, *Vishnu Mohan & Santhosh Nampy* 164838; Chinnar kuthu, 06.12.2018, *Vishnu Mohan & Santhosh Nampy* 168882; Edamalakkudi, 16.03.2019, *Vishnu Mohan & Santhosh Nampy* 168969; Lakshmi Estate, 09.06.2018, *Vishnu Mohan & Santhosh Nampy* 159295 (CALI).

Begonia floccifera Bedd., Icon. Pl. Ind. Or. 23. 1869; Hook.f., Fl. Brit. India 2: 654. 1879; Gamble, Fl. Madras 2: 546. 1919; V.Chandras. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 516. 2016.

Acaulescent scapigerous rhizomatous erect herbs. Leaves simple; lamina reniform-orbicular, 6–13 × 6–10 cm, acute at apex, obliquely cordate at base, entire, glabrous above, pubescent below; petioles erect, terete, glabrous, 6–15 cm long. Stipules lanceolate, *c*. 4 × 3 mm, acute at apex. Flowers in terminal umbels; peduncles 12–19 cm long, glabrous, smooth fleshy; pedicels slender, narrow, dichotomously branching, glabrous. Male flower tepals 4, orbicular, 4–6 × 4–8 mm, rounded at apex, cordate at base, entire, glabrous. Stamens many, truncate at apex; filaments reduced. Female flower tepals 2, orbicular; 4–6 × 4–8 mm, rounded at apex, cordate at base, entire, glabrous. Ovary glabrous, winged; styles 3, stigmas branched. Capsules winged, many seeded.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft*.: January-May.

Specimen examined: Chokkampetti, 12.05.1994, *Jomy Augustine* 13612 (CALI).

Begonia dipetala Graham, Bot. Mag. 55: t. 2849. 1828; Gamble, Fl. Madras 2: 546. 1919; V.Chandras. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 517. 2016. *Diploclinium dipetala* Wight, Icon. Pl. Ind. Orient. t. 1813. 1852.



Caulescent erect shrubs. Stems terete, with persistent leaf scars, glabrous, fleshy. Leaves simple, alternate; lamina ovate, 8–15 × 6–8 cm, acute-acuminate at apex, strongly unequal at bas e, toothed and serrate, hispid; petioles 2–4 cm long, terete, hispid. Stipules lanceolate-linear, 4–5 × 1.5–2 mm, acuminate at apex, entire, glabrous. Flowers in axillary cymes;

peduncles terete, dichotomous, slender; pedicels narrow, slender, glabrous. Male flower tepals 4, orbicular, 6–7 × 6–7 mm, rounded at apex, cordate at base, entire, glabrous. Stamens many, truncate; filaments reduced. Female flower tepals 2, reniform, 6–7 × 7–8 mm, rounded at apex, cordate at apex, entire, glabrous. Ovary glabrous; stigmas trilobed, sticky. Capsules winged, obtuse.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Semi-evergreen forests; *Fl. & Ft.*: June-April.

Specimens examined: Kallar, 05.01.2019, *Vishnu Mohan* & *Santhosh Nampy* 176107; Mangaladevi, 10.07.1993, *Jomy Augustine* 12041; Valara, 28.12.2017, *Vishnu Mohan* & *Santhosh Nampy* 156572 (CALI).

Begonia trichocarpa Dalzell, Hooker's J. Bot. Kew Gard. Misc. 3: 230. 1851; Hook.f., Fl. Brit. India 2: 653. 1879; Gamble, Fl. Madras 2: 546. 1919; V.Chandras. in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 518. 2016.

Caulescent erect herbs, up to 80 cm tall. Stems terete, glabrous. Leaves simple, alternate; lamina narrowly elliptic, 6–18 × 3–5 cm, acuminate at apex, obliquely cordate at base, serrulate, sparsely hairy above; petioles, hispid, terete, 2–3 cm long. Stipules lanceolate, *c.* 5 × 3 mm, acuminate at apex, glabrous. Flowers in axillary cymes; peduncles dichotomously branching, slender, glabrous; pedicels narrow, thin. Male flower; tepals 2, elliptic, *c.* 5 × 3 mm, acute at apex, cordate at base, entire, glabrous. Stamens many, truncate; filaments reduced. Female flower; tepals 2, elliptic, *c.* 5 × 3 mm, acute at apex, cordate at base, entire, glabrous. Ovary hispid, 3-locular; styles 3, each divided in to two branches at apex. Capsules obovate, truncate at apex, winged.

Distribution: The native range of this species is SW. India, E. Himalaya to Assam (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: August-December.

Specimen examined: Anakulam, 18.09.2018, *Vishnu Mohan & Santhosh Nampy* 161969 (CALI).

CACTACEAE Juss.

Gen. Pl. 310. 1789, *nom. cons.*

Herbs, shrubs or trees. Stems, succulent, thickened or angled. Leaves usually reduced to tuft of spines or small tubercles. Stipules 0. Flowers regular, solitary. Calyx tube adnate to ovary. Petals many, free or shortly united at base. Stamens numerous, free or shortly united at base of petals. Filaments filiform; anthers small. Ovary 1-celled; ovules many; styles terminal, simple, filiform, or cylindric. Fruits a 1-celled berry with pulpy placentas. Seeds many, oblong or reniform.

The family includes 150 genera (POWO 2023); two genera and three species in Idukki district.

Key to the genera

1. Stems angular; flowers white ……..……. *Cereus*

1. Stems flat; flowers other than white ……..…….. *Opuntia*

Cereus Mill.

Gard. Dict. Arb. ed 4. 308. 1754

Cereus pterogonus Lem, Cact. Gen. Sp. Nov. 59. 1839.

Succulent erect shrubs, up to 10 m tall. Stems columnar, 4–5-angled, branched from base, succulent, glabrous. Leaves reduced to golden brown spines. Stipules absent. Flowers solitary, non-fragrant. Pedicels 5–8 cm long, stout, glabrous. Perianth tube terete at base, *c.* 10 cm long, funnel-shaped with a few scales below. Tepals many, oblong, 20–30 × 15–20 mm, acute at apex, cordate at base, entire at margins, glabrous, membranous, greenish-white. Stamens many; filaments 10–20 mm long, erect, slender, narrow, thread-like, glabrous. Ovary sub-terete-angular, with scales and areoles; styles 10–20 mm long, erect, slender, glabrous; stigmas lobed. Berries globose, fleshy. Seeds many.

Distribution: Pantropical (POWO, 2023); *Habitat*: On dry rock cracks; *Fl.* & *Ft.*: June-December.

Specimen examined: Marayur, 22.12.2018, *Vishnu Mohan & Santhosh Nampy* 159172 (CALI).

Opuntia (L.) Mill.

Gard. Dict. Abr. ed. 4. 974. 1754

Key to the species

1. Areoles 1-spined; berries ovate……..……*O. monacanthos*

1. Areoles 3–7-spined; berries globose……..…..*O. stricta*

Opuntia monacanthos (Willd.) Haw., Suppl. Pl. Succ. 81. 1819. *Cactus monacanthos* Willd. in Enum. Pl. Hort. Berol., Suppl.: 33 1814.



Succulent xerophytic thorny shrubs, up to 10 m tall. Stems modified into leaves; areoles woolly 1-spined. Leaves reduced. Stipules absent. Flowers solitary, non-fragrant; peduncle absent; pedicels fleshy with spines. Bracts absent. Tepals many, free, orbicular-ovate, 15–25 × 15–20 mm, acute-rounded at apex, attenuate at base, entire at margins, glabrous, membranous, orangish red. Stamens numerous; filaments 5–12 mm long, yellow, slender, thread like, yellow, glabrous. Ovary inferior, truncate; styles 10–20 mm long, slender, glabrous; stigmas sticky, lobed. Berries ovate, glabrous, fleshy. Seeds many.

Distribution: The native range is E. & S. Brazil to Uruguay (POWO, 2023); *Habitat*: On dry rocky cracks; *Fl.* & *Ft.*: June−December.

Specimen examined: Chinnar, 23.12.2018, *Vishnu Mohan & Santhosh Nampy* 159173 (CALI).

Opuntia stricta (Haw.) Haw., Syn. Pl. Succ. 191. 1812. *Cactus strictus* Haw. in Misc. Nat.: 188 1803.

Opuntia dillenii sensu Hook.f., Fl. Brit. India 2: 657. 1879; Gamble, Fl. Madras 2: 548. 1919.




Succulent xerophytic thorny shrubs, up to 10 m tall. Stems modified to fleshy flat leaf; areoles 3–7-spined. Leaves reduced to golden brown spines. Stipules absent. Flowers solitary, non-fragrant. Peduncle absent. Pedicels fleshy with spines. Bracts absent. Tepals many, free, orbicular-ovate, 20–30 × 15–20 mm, acute-rounded at apex, attenuate at base, entire at margins, glabrous, membranous, greenish yellow. Stamens numerous; filaments 6–9 mm long, thread-like, glabrous. yellow. Ovary truncate, glabrous; styles 10–20 mm long, slender, glabrous; stigmas sticky, lobed. Berries globose, fleshy. Seeds many.

Distribution: The native range is SE. U.S.A. to E. & S. Mexico (POWO, 2023); *Habitat*: On dry rocky cracks; *Fl.* & *Ft.*: June-August.

Specimen examined: Payas Nagar, 22.06.2018, *Vishnu Mohan & Santhosh Nampy* 159356 (CALI).

AIZOACEAE Martinov

Tekhno-Bot. Slovar 15. 1820.

Succulent or sub-succulent annual or perennial herbs or sub-shrubs. Leaves simple, alternate, opposite or verticillate with membranous stipules. Inflorescences cymose, loosely dichasial to umbelliform or glomerulate (flowers sometimes solitary), axillary or terminal. Calyx 5, polysepalous or gamosepalous. Petals absent. Stamens 5-many. Ovary superior or inferior.

Fruits usually capsular, loculicidal or circumscissile, sometimes indehiscent, rarely mericarpic.

The family includes 120 genera in the world (POWO, 2023); five species in Idukki district.

Key to the genera

1. Ovary apocarpus……*Gisekia*
1. Ovary syncarpus ……2
2. Fruits circumscissile, one seeded……*Trianthema*
2. Fruits loculicidal, many seeded……3
3. Flowers in cymes……4
3. Flowers in axillary clusters……*Glinus*
4. Acaulescent herbs …… *Paramollugo*
4. Decumbent herbs…… *Trigastrotheca*

Gisekia L.

Mant. Pl. Altera 554, 562. 1771.

Gisekia pharnaceoides L., Mant. Pl. Altera 562. 1771; Hook.f., Fl. Brit. India 2: 664. 1879; Gamble, Fl. Madras 2: 553. 1919; Vajr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 524. 2016.

Prostrate and creeping herbs. Stems terete, sparsely hispid. Leaves simple, opposite; lamina unequal, obovate-spathulate, 1.5–3 × 0.5–1 cm, obtuse at apex, cuneate at base, entire, fleshy, pubescent; petioles *c.* 3 mm long, pubescent, slender. Flowers in axillary cymes; peduncles reduced; pedicels *c.* 5 mm long, filiform, pubescent, slender. Sepals 5, free, widely elliptic-lanceolate, *c.* 2 × 1.5 mm, rounded-acute at apex, rounded at base, entire, sparsely hairy out, glabrous within, concave. Stamens 5, free; filaments *c.* 3 mm long, erect, glabrous, broadening to base. Ovary apocarpus; styles 5, erect, *c.* 3 mm long; stigmas sticky. Capsules 5-celled, indehiscent. Seeds reniform.

Distribution: The native range of this species is Africa to Indo-China (POWO, 2023); *Habitat*: Forest margins; *Fl. & Ft.*: April-July.

Specimen examined: Chinnar, 19.05.1999, *P.K. Sabitha* 79134 (CALI).

Glinus Loefl. ex L.

Sp. Pl. 1: 463. 1753.

Glinus oppositifolius (L.) Aug.DC., Bull. Herb. Boissier ser. 2, 1: 559. 1901. *Mollugo oppositifolia* L., Sp. Pl. 1: 89. 1753; Gamble, Fl. Madras 552. 1919; Vajr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 525. 2016.

Diffuse creeping herbs. Stems terete, glabrous. Leaves simple, in whorls of 3–5, unequal; lamina lanceolate, 5–15 × 3–6 mm, obtuse at apex, attenuate at base, entire, glabrous; petioles reduced, *c.* 1 mm long, glabrous. Flowers in axillary, 5–8-flowered fascicles; peduncles compressed; pedicels 1–1.5 cm long, narrow, slender, glabrous. Sepals 5, free, oblong-lanceolate, 5–6 × 2–3 mm, acute at apex, attenuate at base, entire, glabrous. Stamens 5, alternating with staminodes; filaments *c.* 6 mm long, thin, narrow, slender. Ovary ellipsoid; styles 3, recurved, *c.* 2 mm long, glabrous; stigmas capitate, sticky. Capsules oblong.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Open land; *Fl. & Ft.*: February-August.

Specimen examined: way to Adimali, 06.08.2019, *Vishnu Mohan & Santhosh Nampy* 170206 (CALI).

Paramollugo Thulin

Taxon 65(4): 784. 2016.

Paramollugo nudicaulis (Lam.) Thulin, Taxon 65: 786. 2016. *Mollugo nudicaulis* Lam., Encycl. 4: 234. 1797; Hook.f., Fl. Brit. India 2: 664. 1879; Gamble, Fl. Madras 2: 553. 1919; Vajr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 527. 2016.

Acaulescent glabrous herbs, up to 10 cm tall. Leaves simple, in rosettes; lamina spathulate, 2–5 × *c.* 1 cm, obtuse-rounded at apex, attenuate at base, entire, glabrous; petioles 4–7 m long. Flowers in terminal cymes; peduncles 5–10 cm long, slender, glabrous; pedicels narrow, *c.* 4 mm long. Bracts oblong-lanceolate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Sepals 5, broadly ellipsoid-oblong, sub-equal, *c.* 2 × 1 mm, rounded at apex and base, entire, glabrous. Stamens 5, free; filaments *c.* 1.5 mm long, narrow, slender, glabrous. Ovary oblong, 3-lobed; stigmas 3, sessile, papillose. Capsules 3- valved; seeds black.

Distribution: The native range of this species is Africa to Sinai, SW. Arabian Peninsula, Afghanistan to China (Guangdong) (POWO, 2023); *Habitat*: Road sides; *Fl. & Ft.*: May-September.

Specimen examined: Adimali, 10.07.2019, *Vishnu Mohan & Santhosh Nampy* 159334 (CALI).

Trigastrotheca F.Muell.

Hooker's J. Bot. Kew Gard. Misc. 9: 16. 1857.

Trigastrotheca pentaphylla (L.) Thulin, Taxon 65: 784. 2016. *Mollugo pentaphylla* L., Sp. Pl. 1: 89. 1753; Gamble, Fl. Madras 2: 553. 1919.

Decumbent spreading herbs. Stems terete, glabrous, thin. Leaves simple, fascicled; lamina unequal, spathulate-obovate, 1.5–3 × 0.5–1 cm, rounded at apex, attenuate at bases, entire, glabrous; petioles *c.* 2 mm long, glabrous. Flowers in terminal cymes; peduncles 3–7 cm long, narrow, slender, glabrous; pedicels *c.* 5 mm long, slender. Sepals 5, free, orbicular, *c.* 4 × 2 mm, rounded at apex and base, entire, glabrous, membranous. Stamens 5, free; filaments *c.* 2 mm long, glabrous, erect. Ovary trilocular; styles *c.* 2 mm long, erect; stigmas sticky. Capsules globose; seeds obliquely reniform.

Distribution: The native range of this species is India and Sri Lanka (POWO, 2023); *Habitat*: Open areas; *Fl. & Ft.*: February-September.

Specimens examined: Chinnar Wildlife Sanctuary, 14.02.2001, *K.A. Deepa* 73755; Kallar, 12.07.2018, *Vishnu Mohan & Santhosh Nampy* 158368 (CALI).

Trianthema L.

Sp. Pl. 1: 223. 1753.

Trianthema portulacastrum L., Sp. Pl. 1: 223. 1753; Gamble, Fl. Madras. 550. 1919. *Trianthema monogynum* L., Mant. Pl. 69. 1767, *nom. superfl.*; Hook.f., Fl. Brit. India 2: 660. 1879; Vajr. in G.V.S.Murty & V.J.Nair (ed.), Fl. Kerala 521. 2016.

Prostrate succulent herbs. Stems terete, pubescent, thickened at the nodes, glabrous, slender. Leaves simple, sub-opposite, unequal; lamina orbicular, 1–3 × 1–2 cm, rounded at apex, obtuse at base, entire, glabrous above, sub-succulent; petioles sheathing with two stipule-like appendages, glabrous, reduced. Flowers axillary, solitary, sessile, sheathed by the base of petioles. Sepal campanulate, *c.* 1.5 mm long; lobes 5, oblong, *c.* 4 × 2 mm, rounded at

apex, entire, glabrous, membranous. Stamens many; filaments erect, glabrous, *c.* 4 mm long, slender, glabrous. Ovary syncarpus, ovate, glabrous; styles reduced; stigmas sticky. Capsules turbinate; seeds black.

Distribution: The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat*: Waste lands; *Fl & Ft*: March-June.

Specimen examined: Sabarimala, 16.03.1997, *Jomy Agustine* 17788 (CALI).

UMBELLIFERAE Juss.

Gen. Pl. 218. 1789.

Herbs. Leaves alternate, usually divided or dissected or simple. Petioles sheathing at base. Inflorescence an umbel. Flowers hermaphrodite or polygamous. Calyx tube adnate to the ovary, limb 0 or 5-toothed. Petals 5, epigynous, often unequal. Stamens 5, epigynous. Ovary inferior, 2-celled, disc 2-lobed; styles 2; stigmas capitate. Fruits of 2 indehiscent dorsally or laterally compressed carpels, separated by commissure.

The family includes 444 accepted genera (POWO, 2023); seven genera and eleven species in Idukki district.

Key to the genera

1. Leaves simple……2
1. Leaves compound (except basal leaves)……..……..3
2. Umbels simple……5
2. Umbels compound……..……6
3. Fruits winged……4
3. Fruits not winged……..*Pimpinella*
4. Ovary glabrous……..*Peucedanum*
4. Ovary hairy……..…… *Tetrataenium*
5. Petioles not sheathing; stipules present…… *Hydrocotyle*
5. Petioles sheathing; stipules absent……..…… *Centella*
6. Fruits echinate……..……..…… *Sanicula*
6. Fruits not echinate…….... *Bupleurum*

Bupleurum L.

Sp. Pl. 1: 236. 1753.

Bupleurum ramosissimum Wight & Arn., Prodr. Fl. Ind. Orient. 1: 370. 1834.

Bupleurum mucronatum Wight & Arn., Prodr. Fl. Ind. Orient. 1: 370. 1834; Gamble, Fl. Madras 2: 568. 1919; M.Mohanan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 534. 2016.

Bupleurum mucronatum Wight & Arn. var. *ramosissimum* (Wight & Arn.) *sensu* Clarke in Hook.f., Fl. Brit. India 2: 676. 1879.



Erect herbs, up to 50 cm tall. Stems terete, glabrous, glaucous. Leaves simple, alternate; lamina oblong-oblanceolate, 3–6 × 0.3–1 cm, mucronate at apex, attenuate at base, entire, glabrous, coriaceous; petioles reduced, sheatihng at base. Flowers in terminal and axillary umbels; peduncles up to 5 cm long, glabrous; pedicels reduced, glabrous. Bracts lanceolate-linear, 6–10 × *c.* 2 mm, mucronate at apex, entire, glabrous. Sepals absent. Petals 5, free, yellow, elliptic-obovate, 2–3 × *c.* 2 mm, mucronate at apex, attenuate at base, entire, glabrous. Stamens 5, free; filaments 2–3 mm long, erect, glabrous. Ovary oblong, terete, glabrous; stylopodium broad; styles *c.* 2 mm long; stigmas sticky. Fruits elliptic, ribs prominent, not winged.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: August-January.

Specimen examined: Umiyamala way side, 30.08.2019, *Vishnu Mohan & Santhosh Nampy* 170281 (CALI).

Centella L.

Sp. Pl. 2: 1393. 1763.

Centella asiatica (L.) Urb. in Martius, Fl. Bras. 11(1): 287. 1879; Gamble, Fl. Madras 2: 556. 1919; M.Mohanan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 536. 2016. *Hydrocotyle asiatica* L., Sp. Pl. 234. 1753.

Prostrate creeping herbs, rooting at nodes. Stems terete, glabrous, slender. Leaves simple, alternate; lamina orbicular-reniform, 1.5–2 × 3–4 cm, rounded at apex, cordate at base, crenate, glabrous; petioles 4–8 cm long, sheathing at base, glabrous. Flowers in 2–5-flowered axillary umbels; peduncles 1–2 cm long; pedicels reduced. Bracts 2, ovate, 2–3 × *c.* 2 mm, acute at apex, entire, glabrous. Sepals absent. Petals 4, free, oblong, *c.* 1 × 0.6 mm, recurved at apex, pink, entire. Stamens 5, free; filaments erect, *c.* 2 mm long, glabrous, white. Ovary 2-celled; styles erect, bilobed at apex, glabrous; stylopodium depressed. Fruits ovoid, reticulate-rugose, 7–9-ribbed.

Distribution: The native range of this species is Caucasus, Tropical & Subtropical Old World to New Zealand and W. Pacific (POWO, 2023); *Habitat*: Wet areas; *Fl. & Ft.*: Throughout the year.

Specimens examined: Chokaramudi, 04.05.2017, *Vishnu Mohan & Santhosh Nampy* 152146; Choondal, MSNP, 16.07.2015, *Syam Radh S.* 145043 (CALI).

Hydrocotyle L.

Sp. Pl. 1: 234. 1753.

Key to the species

1. Umbels solitary, sessile……*H. conferta*

1. Umbels many, clustered, peduncled……*H. sibthorpioides*

Hydrocotyle conferta Wight, Icon. Pl. Ind. Orient. 3: 1002. 1845; Gamble, Fl. Madras 2: 556. 1919; M.Mohanan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 543. 2016.

Prostrate creeping herbs, rooting at nodes. Stems terete, branchlets villous. Leaves simple, alternate; lamina orbicular-reniform, 1.5–2 × 2.5–3 cm,

rounded at apex, cordate at base, irregularly lobed; lobes triangular, glandular hairy; petioles terete, 4–8 cm long, glabrous. Stipules ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous, membranous. Flowers in axillary sessile umbels; pedicels *c.* 1 mm long. Involucral bracts obscure. Calyx lobes obscure. Petals 5, elliptic-lanceolate, *c.* 1 × 0.5 mm, acute at apex, entire, glabrous. Stamens 5; filaments stout, glabrous, erect. Styles erect, glabrous; stigmas curved, sticky; stylopodium flat. Fruits sub-orbicular, strongly flattened laterally, shortly stipitate, 1-seeded.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: January-April.

Specimen examined: Chottuppara, 11.02.2018, *Vishnu Mohan* & *Santhosh Nampy* 186706 (CALI).

Hydrocotyle sibthorpioides Lam., Encycl. 3: 153. 1789; M.Mohanan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 544. 2016. *Chondrocarpus sibthorpioides* (Lam.) Sweet, Hort. Brit. 185. 1826.

Hydrocotyle rotundifolia Roxb. ex DC *sensu*; Gamble, Fl. Madras 556. 1919.

Slender creeping herbs, rooting at nodes. Stems terete, wiry, glabrous. Leaves simple, alternate; lamina widely orbicular, *c.* 1 × 1 mm, rounded at apex, deeply cordate at base, 7–9-lobed, villous beneath, glabrous above; petioles erect, 3–6 cm long, glabrous. Flowers in axillary umbels; peduncles 1–2 cm long, terete, glabrous; pedicels reduced. Bracts ovate, *c.* 1 × 0.5 mm, bifid, entire, glabrous. Calyx absent. Petals 2, oblong, *c.* 2 × 1 mm, rounded at apex, entire, glabrous, greenish. Stamens 5; filaments *c.* 2 mm long, glabrous. Styles reduced, erect, glabrous; stigmas curved, sticky; stylopodium thick. Fruits hemispherical, compressed, muricate.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-May.

Specimen examined: way to Marayoor, 07.01.2004, *V.K. Sreenivas* 96505 (CALI).

Peucedanum L.

Sp. Pl. 1: 245. 1753.

Peucedanum anamallayense C.B.Clarke in Hook.f., Fl. Brit. India 2: 710. 1879; Gamble, Fl. Madras 2: 563. 1919; M.Mohanan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 545. 2016.

Erect foetid tuberous herbs, up to 50 cm tall. Stems terete, angled, glabrous, highly branching. Leaves alternate, compound; leaflets oblong-lanceolate, 2–4 × 0.5–0.8 cm, acute at apex, attenuate at base, entire, glabrous; rachis widely sheathing at base. Flowers in terminal-axillary umbels; peduncles 5–15 cm long, glabrous; pedicels *c.* 0.3 cm long, narrow, slender. Bracts linear *c.* 3 × 1 mm, acuminate at apex, entire, glabrous. Calyx shortly 5-toothed, ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Petals yellowish white, ovate, *c.* 3 × 1.5 mm, acute-rounded at apex, attenuate at base, entire, glabrous. Stamens 5, free; filaments *c.* 1 mm long, glabrous, erect; pistillode bi-globose, sticky. Ovary glabrous, 2-celled, compressed. Mericarps orbicular biconvex, striate, winged.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: October-May.

Specimen examined: Vakavanam, 14.09.2019, *Vishnu Mohan & Santhosh Nampy* 170298 (CALI).

Pimpinella L.

Sp. Pl. 1: 263. 1753.

Pimpinella candolleana Wight & Arn., Prodr. Fl. Ind. Orient. 1: 369. 1834; Gamble, Fl. Madras 2: 560. 1919; M.Mohanan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 547. 2016. *Carum candolleanum* (Wight & Arn.) Franch., Bull. Annual Soc. Philom. Paris sér. 8, 6: 128. 1894.

Erect tuberous herbs, up to 50 cm tall. Stems terete, silky pubescent. Leaves simple, alternate; lamina ovate, 4–5 × 5–7 cm, acute at apex, cordate at base, dentate, hispid; petioles 3–5 cm long, sheathing at base, grooved above, pubescent. Flowers in terminal umbels; peduncles 10–20 cm long, pubescent;

pedicels *c.* 0.5 cm long slender, pubescent. Bracts caducous. Calyx campanulate; lobes obscure. Petals 5, free, orbicular-obovate, 3–4 × 3–4.5 mm, rounded at apex, attenuate at base, entire, glabrous. Stamens 5; filaments *c.* 2 mm long, glabrous. Styles *c.* 3 mm long, glabrous; stigmas sticky; stylopodium flat. Fruits ovate, densely villous, rugose.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.:* August-January.

Specimens examined: way to Anamudi base camp, 10.12.2019, *Vishnu Mohan* & *Santhosh Nampy* 170026; Meesappulimala, 21.11.2018, *Vishnu Mohan* & *Santhosh Nampy* 167765; Thannikkudy, 07.01.1994, *Jomy Agustine* 13069; Vattachola, Mathikettan Shola National Park, 05.11.2015, *Syam Radh S.* 145106 (CALI).

Sanicula L.

Sp. Pl. 1: 235. 1753.

Sanicula elata Buch.-Ham. ex D.Don, Prodr. Fl. Nepal. 183. 1825; M.Mohanan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 551. 2016.

Erect herbs, up to 50 cm tall. Stems terete, glabrous, slender. Leaves palmately 3-foliolate, alternate; leaflets ovate, 1–2 × *c.* 2 cm, acute at apex, dentate, sparsely hairy; petioles 4–8 cm long. Flowers in terminal umbels; peduncles 10–15 cm long, sparsely pubescent. Involucral bracts lanceolate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Sepals 5, free, ovate-lanceolate, *c.* 1.5 × 1 mm, acute at apex, entire, glabrous. Petals 5, free, white, elliptic-obovate, *c.* 2 × 1 mm, rounded at apex, attenuate at base, entire. Stamens 5; filaments *c.* 2 mm long. Stigmas sticky; stylopodium thick. Fruits ovoid-oblong, densely covered with uncinate bristles, 1-seeded.

Distribution: The native range of this species is Eritrea to S. Africa, W. Indian Ocean, SW. Arabian Peninsula, Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: April-October.

Specimen examined: Anamudi Shola, 22.07.2018, *Vishnu Mohan & Santhosh Nampy* 188991 (CALI).

Tetrataenium (DC.) Manden.

Trudy Tbilis. Bot. Inst. 20: 16. 1959.

Key to the species

1. Umbel rays less than 15……..2

1. Umbel rays more than 15……...*T. sprengelianum*

2. Petals equal ……*T. rigens*

2. Petals unequal…… *T. ceylanicum*

Tetrataenium ceylanicum (Gardner ex C.B.Clarke) Manden., Zametki Sist. Geogr. Rast. 41: 46. 1986. *Heracleum ceylanicum* Gardner ex C.B.Clarke in Hook.f, Fl. Brit. India 2: 716. 1879; Gamble, Fl. Madras 2: 565. 1919; M.Mohanan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 541. 2016.



Erect foetid herbs, up to 1 m tall. Stems terete, glandular hairy. Leaves alternate, pinnately compound; leaflets oblong-ovate, 5–15 × 3–8 cm, acuminate at apex, truncate at base, crenate, glandular hairy; rachis 10–20 cm long, broadly sheathing. Flowers in terminal compound umbels; umbel rays 10; peduncles 8–25 cm long, glandular hairy; pedicels 0.5–1.5 cm long, slender. Bracteoles lanceolate, 2–6 × 2–4 mm, reflexed, acuminate at apex, entire. Calyx lobes lanceolate, minute, *c.* 2 × 1 mm, acute at apex, entire, glandular hairy out, glabrous within. Petals white, free, unequal, oblong-ovate, unequal, 2–3 × 2–3 mm, emarginate at apex, attenuate at base, entire, glabrous. Stamens 5, free; filaments *c.* 2 mm long, erect, glabrous. Ovary hirsute; styles *c.* 2 mm long; stigmas capitate, sticky; stylopodium broad. Fruits ovoid-obovate.

Distribution: The native range of this species is Central Sri Lanka (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: March-November.

Specimens examined: Chinna Ananmudi, 30.08.2019, *Vishnu Mohan & Santhosh Nampy* 170272; Meesappulimala, 14.10.2019, *Vishnu Mohan & Santhosh Nampy* 170373 (CALI).

Tetrataenium rigens (Wall. ex DC.) Manden., Trudy Tbilis. Bot. Inst. 20: 17. 1959. *Heracleum rigens* Wall. ex DC., Prodr. 4: 191 1830; M.Mohanan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 541. 2016.

Heracleum candolleanum (Wight & Arn.) Gamble, Fl. Madras 2: 565. 1919.

Heracleum courtallense Gamble, Fl. Madras 2: 565. 1919.

Large erect tuberous herbs, up to 1 m tall. Stems terete, glandular hairy. Leaves tri-pinnate; leaflets variously lobed, ovate-widely orbicular, 2–4 × 3–4 cm, rounded at apex, cordate-truncate at base, serrate, hairy; rachis 10–20 cm long, sheathed at base. Flowers in erect compound umbels; umbel rays 12; peduncles 2–4 cm long, narrow, slender; pedicels slender, thread-like, hairy. Involucral bracts ovate, 3–6 × 2–4 mm, acuminate at apex, entire, glabrous. Calyx tube very short; lobes 5, lanceolate, *c.* 2 × 1 mm, acuminate at apex, entire, glabrous. Petals 5, free, equal sized, ovate, 2–3 × *c.* 2 mm, emarginate at apex, attenuate at base, entire, glabrous. Stamens 5; filaments *c.* 3 mm long, glabrous. Ovary ovate; disc 2-lobed; lobes orbicular; styles 2, recurved. Fruits elliptic, laterally compressed, 3-ridged.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.:* April-October.

Specimens examined: Kalvari mount, 06.09.2017, *Vishnu Mohan & Santhosh Nampy* 154334; Survikal para, MSNP, 17.07.2015, *Syam Radh S.* 145062 (CALI).

Tetrataenium sprengelianum (Wight & Arn.) Manden., Trudy Tbilis. Bot. Inst. 20: 17. 1959. *Heracleum sprengelianum* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 372. 1834; Gamble, Fl. Madras 2: 565. 1919; M.Mohanan in G.V.S.Murthy & V.J.Nair (ed.), Fl. Kerala 542. 2016. *Pastinaca sprengeliana* (Wight & Arn.) Wight, Icon. Pl. Ind. Orient. 3: t. 1008. 1845.

Erect foetid herbs, up to 1 m tall. Stems terete, grooved, glandular hairy, sticky, glaucous. Leaves alternate, tripinnately lobed; leaflets ovate, 2–4 × 2–3 cm, acute at apex, serrate, glandular hairy; petioles 8–19 cm long, glandular

hairy, sheathed at base. Flowers in terminal many-flowered umbels; umbel rays 18; peduncles 10–20 cm long, terete, grooved, glandular hairy; pedicels narrow, slender, glandular hairy. Involucre bracts lanceolate, *c.* 2 × 1 mm, acute at apex, entire. Calyx lobes obscure. Petals 5, free, unequal, widely elliptic, *c.* 3 × 2 mm, emarginate at apex, attenuate at base, entire, glabrous. Stamens 5; filaments *c.* 2 mm long. Ovary hairy; styles curved; stylopodium conical. Fruits compressed.

Distribution: The native range of this species is W. India (POWO, 2023); *Habitat*: Grasslands; *Fl. & Ft.*: January-April.

Specimen examined: Anamudi, 20.08.1997, *Bobby Thomas* 51322 (CALI).

ARALIACEAE Juss.

Gen. Pl. 217. 1789, *nom. cons.*

Small shrubs to large trees. Leaves alternate; lamina simple to ternately, palmately or pinnately lobed or compound; petioles often sheathing at base. Inflorescences terminal, paniculate, compound-umbellate or simple-umbellate, sometimes racemose. Flowers hermaphroditic, staminate, or pistillate. Calyx lobes simple, minute or obscure. Petals valvate or imbricate, sometimes calyptrate. Stamens isomerous. Ovary syncarpous; stigmas on a styles or sessile; styles free or connate. Fruits simple or sometimes multiple, fleshy, usually drupaceous or baccate.

The family consists of 46 genera (POWO, 2023); four genera and six species in the study area.

Key to the genera

1. Leaves simple, lobed ..... *Tetrapanax*

1. Leaves compound 2

2. Leaves pinnately compound 3

2. Leaves palmately compound .....*Heptapleurum*

3. Leaves unipinnate .....*Polyscias*

3. Leaves bipinnate ..... *Aralia*

Aralia L.

Sp. Pl. 1: 273. 1753.

Aralia malabarica Bedd. Fl. Sylv. S. India: 121. 1872; Hook.f., Fl. Brit. India 2: 722. 1879; Gamble, Fl. Madras 2: 567. 1919.

Small trees, up to 8 m tall. Branchlets woody, terete, glabrous. Leaves bipinnate, alternate; leaflets opposite, ovate, 8–15 × 5–7 cm, acuminate at apex, oblique at base, serrate, sparsely pubescent; rachis up to 1 m long, prickly, sheathing at base. Flowers in axillary umbels; peduncles 30–50 cm long, slender, glabrous; pedicels *c.* 2–4 cm long, slender, glabrous. Bracts ovate, *c.* 4 × 3 mm, acuminate at apex, entire, glabrous. Sepals 5, free, ovate, 5–6 × 3–3.5 mm, acute at apex, rounded at base, entire, glabrous. Petals 5, free, ovate-oblong, *c.* 6 × 3–4 mm, obtuse at apex, attenuate at base, yellow. Stamens 5; filaments 4–5 mm long, glabrous. Ovary inferior, 5-celled, globose; styles 5, free. Berries 5-angled, rugose. Seeds 5.

Distribution: The native range of this species is S. India (Kerala, Tamil Nadu) (POWO, 2023); *Habitat*: Semi evergreen forests; *Fl.* & *Ft.*: June-September.

Specimen examined: Thekkady, 08.07.1993, *Jomy Augustine* 12017 (CALI).

Polyscias J.R.Forst. & G.Forst.

Char. Gen. Pl., ed. 2. 63. 1776.

Polyscias acuminata (Wight) Seem., J. Bot. 3: 181. 1865; Hook.f., Fl. Brit. India 2: 727. 1879; Gamble, Fl. Madras 2: 568. 1919.

Erect shrubs, up to 5 m tall. Branchlets woody, terete, glabrous. Leaves unipinnate, alternate; leaflets opposite, elliptic, 6–10 × *c.* 3 cm, acuminate at apex, rounded at base, entire, glabrous; petiolules 0.3–0.35 cm long, stout, glabrous; petioles up to 30 cm long, sheathing at base, glabrous. Flowers in axillary or terminal panicles, non-fragrant; peduncles 6–10 cm long, glabrous; pedicels 0.3–0.35 cm long, slender, narrow, glabrous. Bracts lanceolate, 3–4 × *c.* 2 mm, acuminate at apex, entire, glabrous. Calyx campanulate; lobes 5, ovate, 5–6 × *c.* 3 mm, acute at apex, entire, glabrous. Petals 5, free, ovate, 3–4 × 2–3 mm, acute at apex, attenuate at base, entire, glabrous. Stamens 5;

filaments *c.* 2 mm long, erect, slender, glabrous. Ovary 5-celled, inferior; styles 5, free, erect, glabrous; stigmas sticky. Berries 5-angled, globose, glabrous.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-February. *Specimen examined*: Mathikettan Shola National Park, 17.02.2017, *Syam Radh S.* 191196 (CALI).

Heptapleurum Gaertn.

Fruct. Sem. Pl. 2: 472 1791.

Key to the species

1. Panicles racemose…….…..… *H. racemosum*

1. Panicles umbellate……..…….……2

2. Nerves 6–8 pairs in leaflets ……..…….…… *H. venulosa*

2. Nerves 15–17 pairs in leaflets ……..... *H. wallichianum*

Heptapleurum racemosum (Wight) Bedd., Fl. Sylv. S. India 214. 1872; Hook.f., Fl. Brit. India 2: 729. 1879. *Schefflera racemosa* (Wight) Harms in H.G.A.Engler & K.A.E.Prantl, Nat. Pflanzenfam. 3(8): 38. 1894; Gamble, Fl. Madras 2: 570. 1919.

Trees, up to 10 m tall. Branchlets woody, terete, rusty tomentose; bark grey. Leaves digitately compound, alternate; leaflets 4–8, lanceolate, 7–14 × 3–6 cm, acuminate at apex, attenuate at base, entire, glabrous above, glaucous beneath; petiolules 2.5–5 cm long, slender, grooved above, glabrous; rachis 10–20 cm long, sheathing at base, glabrous. Stipules lanceolate, 8–10 × 3–4 mm, acuminate at apex, entire, glabrous. Flowers in paniculate racemes; peduncles 10–15 cm long, woody, glabrous; pedicels 0.5–0.8 cm long, slender, glabrous. Bracts ovate, *c.* 5 × 3 mm, acuminate at apex, entire, rusty pubescent. Calyx campanulate; lobes 5, ovate, 3–4 × 2–2.5 mm, obtuse at apex, entire, pubescent out, glabrous within. Petals free, 5, ovate, *c.* 6 × 3 mm, acute at apex, entire, glabrous. Stamens 10; filaments *c.* 5 mm long, erect, glabrous. Ovary inferior, glabrous; styles 5, short. Berries 5-angled, ovoid.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: February-April.

Specimens examined: MSNP, 22.04.2016, *Syam Radh S.* 145200; Udumbatheri, 14.02.1994, *Jomy Agustine* 13326 (CALI).

Heptapleurum venulosum (Wight & Arn.) Seem., J. Bot. 3: 80. 1865. *Schefflera venulosa* (Wight & Arn.) Harms, Nat. Pflanzenfam. 39. 1894; Hook.f., Fl. Brit. India 2: 729. 1879; Gamble, Fl. Madras 570. 1919.

Trees, up to 20 m tall. Branchlets terete, glabrous; bark grey, smooth. Leaves digitately compound, alternate; leaflets 6–8, oblong, 8–14 × 5–8 cm, acuminate-rounded at apex, rounded at base, entire, glabrous; nerves 6–8 pairs; petiolules 3–6 cm long, slender, glabrous; petioles 10–20 cm long, terete, glabrous. Stipules ovate, *c.* 8 × 5 mm, acute at apex, entire, glabrous. Flowers in axillary umbels; peduncles 8–14 cm long, glabrous; pedicels 0.5–0.8 cm long, glabrous. Calyx 5, ovate, 5–6 × 2–3 mm, acute at apex, attenuate at base, glabrous. Petals 5, free, *c.* 2 × 2.5 mm, truncate at apex, attenuate at base, entire, glabrous. Stamens 10; filaments *c.* 5 mm long, glabrous. Ovary glabrous; styles erect, glabrous; stigmas sticky. Drupes globose, 5-angled.

Distribution: The native range of this species is India to Bangladesh (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: March-June.

Specimen examined: Sabarimala, 06.06.1995, *Jomy Augustine & K.P. Rajesh* 15470 (CALI).

Heptapleurum wallichianum (Wight & Arn.) Seem., J. Bot. 3: 80 1865. *Schefflera wallichiana* (Wight & Arn.) Harms, Notizbl. Bot. Gart. Berlin-Dahlem 13: 449. 1937; Gamble, Fl. Madras 2: 570. 1919

Trees, up to 15 m tall. Branchlets woody, terete, glabrous; bark grey, rough. Leaves digitately compound, alternate; leaflets 6–8, oblong, 10–20 × 5–8 cm, acuminate at apex, sub-cordate at base, entire, coriaceous, glabrous; nerves 15–17 pairs; petiolules 0.3–0.5 cm long, slender, glabrous; petioles 10–15 cm long, glabrous, sheathing at base. Stipules ovate 5–6 × 3–3.5 mm, acute at apex, entire, glabrous. Flowers in umbels; peduncles 10–20 cm long, glabrous; pedicels 0.7–0.9 cm long, slender, glabrous. Calyx campanulate, lobes 5, obscure. Petals 5, ovate, *c.* 5 × 3 mm, acute at apex, entire, glabrous. Stamens 5, free; filaments erect, *c.* 3 mm long, glabrous. Ovary syncarpous; stigmas sessile. Berries globose, 5-angled; 1-seeded.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: April-May.

Specimens examined: Choondal, Mathikettan Shola National Park, 22.04.2016, *Syam Radh S. & Arunkumar P.G.* 145186 (CALI); Meenmutty, 28.05.1982, *C.N. Mohanan* 74085 (MH).

Tetrapanax (K.Koch) K.Koch

Wochenschr. Gartnerei Pflanzenk. 2: 371. 1859.

Tetrapanax papyrifer (Hook.) K.Koch, Wochenschr. Gartnerei Pflanzenk. 2: 371. 1859.

Shrubs, up to 5 m tall. Stems woody, terete, tomentose. Leaves simple, lobed, alternate; lamina orbicular, 20–45 × 18–30 cm, cordate at base, entire, stellate hairy beneath, glabrous above; petioles terete, 25–50 cm long, glabrous. Stipules lanceolate, 1.5–2 × 0.5–0.8 cm, acuminate at apex, pubescent out, glabrous within. Flowers in terminal umbels; peduncles 20–30 cm long, pubescent; pedicles 1–1.5 cm long, glabrous. Calyx 5, ovate, *c.* 3 × 2 mm, acute at apex, entire, densely stellate tomentose. Petals 5, ovate, *c.* 4 × 2 mm, acute at apex, entire, densely stellate tomentose. Stamens 5; filaments *c.* 3 mm long, erect, glabrous. Ovary ovate, glabrous; styles slender, glabrous. Berries globose.

Distribution: The native range of this species is Central & S. China and Taiwan (POWO, 2023); *Habitat*: Introduced ornamental tree; *Fl. & Ft.*: October-February.

Specimen examined: Devikulam, 17.06.2019, *Vishnu Mohan & Santhosh Nampy* 170100 (CALI).

Key to the families of Monochlamydeae

1. Flowers very often 2-sexual……...…….2

1. Flowers 1-sexual……..…….13

2. Ovary inferior…….…….……3

2. Ovary superior……..…...5

3. Ovary 4–6-celled…….……...Aristolochiaceae

3. Ovary 1-celled……..……...……4

4. Ovule solitary……..…….....Loranthaceae

4. Ovules pendulous…….……Santalaceae

5. Seeds with albumen……..……..6

5. Seeds without albumen……...9

6. Stipules 0…….……7

6. Leaves stipulate……..…….Polygonaceae

7. Perianth tubular…….……Nyctaginaceae

7. Perianth lobes united only at base……...……8

8. Perianth scarious and dry……...……..…..... Amaranthaceae

8. Perianth membraneous…….…..… Chenopodiaceae

9. Aquatic plants……..……..……..... Podostemsaceae

9. Terrestrial plants……...…….……10

10. Perianth tube narrowed above the ovary…….Eleagnaceae

10. Perianth tube not narrowed……...……..11

11. Stamen 4…….……...Proteaceae

11. Stamen 2……..……12

12. Perianth lobes 2-seriate……...……Lauraceae

12. Perianth lobes 1-seriate……..……...Thymeliaceae

13. Leafless herbs……..Balanophoraceae

13. Leafy plants……..……..……14

14. Ovary 1-carpelled, 1-celled……...……..16

14. Ovary 2-celled…….……15

15. Stipule 0……..…….Buxaceae

15. Stipule almost present…….……Euphorbiaceae

16. Stipules 0……Myrsticaceae

16. Stipules present…….....17

17. Seeds with albumen…….……18

17. Seeds with a little or no albumen……..…..……19

18. Leaves alternate…….……Piperaceae

18. Leaves opposite……...……...Chloranthaceae

19. Filaments not inflexed in bud……...……...Ulmaceae

19. Filaments inflexed in bud……20

20. Herbs, Shrubs or small trees; sap colorless & non sticky……..Urticaceae

20. Large trees or woody climbers; sap milky & sticky……Moraceae

NYCTAGINACEAE Juss.

Gen. Pl. 90. 1789, *nom. cons.*

Trees, shrubs, herbs or climbers, rarely spiny. Leaves opposite, alternate or in fascicles, simple, exstipulate, usually petiolate. Inflorescences axillary or terminal, cymose, umbellate, glomerulate, verticillate or thyrsoid. Flowers hermaphrodite or unisexual, actinomorphic, bracteate. Perianth gamophyllous. Stamens 1–many, hypogynous; filaments free or connate at base, sub-equal-unequal. Ovary superior, unilocular, sessile or stipitate; ovule 1, basal, erect; style 1, slender; stigma linear, capitate, peltate or penicillate. Fruit an achene, sometimes winged or variously ribbed, sometimes glandular.

The family includes 32 genera (POWO, 2023); three species under two genera in the study area.

Key to the genera

1. Inflorescences cymose panicles; perianth limb campanulate; filaments and style shortly exserted…….. *Boerhavia*

1. Inflorescences umbels or verticils; perianth limb funnelform; filaments and style long exserted……..*Commicarpus*

Boerhavia L.,Sp. Pl. 1: 3. 1753.

Key to the species

1. Fruits glandular hairy……... *B. diffusa*

1. Fruits eglandular……..……...……*B. erecta*

Boerhavia diffusa L., Sp. Pl. 3. 1753, *nom. cons.*; Gamble, Fl. Madras 2: 1162. 1925.

Diffuse perennial herbs. Stems terete, slender, sparsely pubescent. Leaves simple, opposite, in unequal pairs, estipulate; lamina ovate, 1–4 × 1–4 cm, acute at apex, cordate-rounded at base, slightly lobed, sparsely pubescent, thick; petioless 0.4–1.5 cm long, terete, stout, sparsely hairy. Flowers in axillary umbels, non-fragrant; peduncle 3–6 cm long, slender, sparsely pubescent; pedicels 2–4 mm long, slender, glabrous. Bracts lanceolate, *c.* 3 × 1 mm, acute at apex, entire, pubescent out, glabrous within. Perianth campanulate; lobes acute *c.* 3 × 2 mm, acute at apex, entire, glabrous. Stamens 3; filaments *c.* 3 mm

long, glabrous, slender. Ovary inferior; style *c.* 3 mm long, glabrous. Capsules obovate, ribbed, glandular hairy.

Distribution: The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat*: Moist and dry deciduous forests and also in the plains; *Fl.* & *Ft.*: August-December.

Specimen examined: Kumily, 12.11.1993, *Jomy Agustine* 12548 (CALI).

Boerhavia erecta L., Sp. Pl. 3. 1753. *Senkenbergia erecta* (L.) Hook.f. in G.Bentham & J.D.Hooker, Gen. Pl. 3: 6 1880.

Erect herbs. Stems terete glabrescent. Leaves simple, opposite, estipulate; lamina ovate-lanceolate, 1.5–3.5 × 1–2.5 cm, acute-acuminate at apex, rounded at base, entire, glabrous, membranous; petioles 1.5–4 cm, erect, sparsely pubescent. Flowers in axillary panicles, non-fragrant; peduncle 1–3 cm long, slender, glabrous; pedicels *c.* 0.5 cm long, slender. Bracts ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Perianth campanulate; lobes ovate, 2–3 × *c*. 2 mm, acute at apex, entire, glabrous. Stamens 3, slightly exserted; filaments *c.* 3 mm long, slender. Ovary inferior; style *c.* 2 mm long; stigma exerted, capitate. Capsules truncate, ribbed, eglandular hairy.

Distribution: The native range of this species is Tropical & Subtropical America (POWO, 2023); *Habitat*: Dry deciduous forests and wastelands; *Fl.* & *Ft.*: May-December.

Specimen examined: Chinnar Wildlife Sanctuary, 19.05.1999, *Satheesh George* 79245 (CALI).

Commicarpus Standl.

Contr. U.S. Natl. Herb. 12: 373 1909.

Commicarpus chinensis (L.) Heimerl H.G.A.Engler, Nat. Pflanzenfam., ed. 2. 16c: 117 1934. *Boerhavia chinensis* (L.) Rottb. in Pl. Hort. Univ. Rar. Prog.: 4 1773.

Creeping herbs. Stems terete, glabrous. Leaves simple, opposite, in equal pairs, estipiulate; lamina ovate, 2–3 × 1.5–2 cm, acute at apex, cordate at base, shallowly lobed, sparsely hairy, membranous; petioles *c.* 2.5 cm long, stout, sparsely pubescent. Flowers in terminal panicles, non-fragrant; peduncles 3–5 cm long, narrow, slender; pedicels 1–1.5 cm long, narrow, slender. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glandular. Perianth campanulate; lobes ovate, 6–7 × *c*. 3 mm long, acute at apex, entire, glabrous within, sparsely glandular out, delicate. Stamens 5; filaments *c.* 5 mm long, slender, glabrous. Ovary inferior; stigma capitate, sticky. Capsules oblanceolate, glandular.

Distribution: The native range of this species is China (Guangxi) to Tropical Asia (POWO, 2023); *Habitat*: Dry and moist deciduous forests; *Fl.* & *Ft.*: October-February.

Specimen examined: Kumily, 22.11.1988, *V. Geetha* 1839 (CALI).

AMARANTHACEAE Juss.

Gen. Pl. 87. 1789, *nom. cons*.

Annual or perennial herbs, subshrubs or shrubs. Leaves simple, alternate or opposite, estipulate. Inflorescence a dense head, lose or spike-like thyrse, raceme or panicle, basically cymose, bracteate. Flowers small, hermaphrodite or unisexual, sometimes sterile, bractolate. Tepal usually 3–5, free. Stamens 3–5; filaments fused. Ovary superior, 2–3 carpellate. Fruit a few seeded capsule, nutlets, achenes or berries. Seeds black, shiny.

The family includes 184 accepted genera in the world (POWO, 2023); eight genera and 12 species in Idukki district.

Key to the genera

1. Anthers 1-celled……. *Alternanthera*

1. Anthers 2-celled……..…….. 2

2. Leaves alternate…….……. 3

2. Leaves opposite…… 4

3. Flowers hermaphrodite……...…….5

3. Flowers unisexual……..……*Amaranthus*

4. Flowers clustered,1–3 perfect surrounded by other imperfect……..…… 6

4. Flowers not clustered, all perfect……7

5. Stems, leaves and tepals pubescent……..….*Aerva*

5. Stems, leaves and tepals glabrous……..… *Allmania*

6. Lamina rhomboid; fruit is a capsule……... ……*Cyathula*

6. Lamina ovate-orbicular; fruit is an achene……*Pupalia*

7. Staminodes absent…….…….. …*Psilotrichum*

7. Staminodes present……. …….*Achyranthus*

Achyranthes L.

Sp. Pl. 1: 204. 1753, *nom. cons*.

Key to the species

1. Pseudostaminodes between filaments fimbriate-ciliate at apex…….*A. aspera*

1. Pseudostaminodes between filaments dentate or erose……..….*A. bidentata*

Achyranthes aspera L., Sp. Pl. 204. 1753; Hook.f., Fl. Brit. India 4: 730. 1885; Gamble, Fl. Madras 2: 2: 1176. 1925.



Erect perennial herbs, up to 50 cm tall. Stems quadrangular, pubescent. Leaves simple opposite, estipulate; lamina elliptic-lanceolate, 1.5–4 × 1.5–3 cm, acuminate at apex, attenuate at base, entire, sparsely hairy, papery; petioless 0.5–1.5 cm long, sparsely hairy. Flowers in terminal spikes, non-fragrant; peduncles 15–40 cm long, sparsely pubescent; pedicels obscure. Bracts lanceolate, 3–4 × 1–2 mm, acuminate at apex, rounded at base, entire, glabrous, membranous; bracteoles spiny, 3–4 mm long, shiny, glabrous. Tepals 5, free, elliptic-lanceolate, 3.5–5 × *c*. 2 mm, acuminate at apex, entire, glabrous. Stamens 5; filaments *c.* 3 mm long, slender, glabrous; pseudostaminodes crenate, fimbriate and ciliate at apex. Utricles ovoid, *c.* 3 mm long, glabrous. Seeds brown, ovoid, *c*. 2 mm long.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Open areas; *Fl. & Ft.*: October-March.

Specimen examined: Stream near Munnar, 23.01.2018, *Vishnu Mohan & Santhosh Nampy* 158143 (CALI).

Achyranthes bidentata Blume, Bijdr. Fl. Ned. Ind. 545. 1826; Gamble, Fl. Madras 2: 1176. 1925.

Erect perennial herbs, up to 50 cm tall. Stems green, quadrangular, pubescent. Leaves simple, opposite, estipulate; lamina elliptic-lanceolate, 4–12 × 2–3 cm, sharplyacuminate at apex, cuneate at base, entire, sparsely pubescent, thin; petioless 0.5–2 cm long, hairy, slender, grooved above. Flowers in terminal or axillary spikes, non-fragrant; peduncles 10–20 cm long, slender, hispid hairy; pedicels obscure. Bracts broadly ovate, *c.* 3 × 2 mm,

acuminate at apex, entire, glabrous; bracteoles ovate, *c.* 3 × 1 mm, sharply acuminate at apex, entire, glabrous. Tepals lanceolate, 3–4 × *c.* 2 mm, acute at apex, entire, glabrous. Stamens 5; filaments *c.* 2 mm long, slender, glabrous; pseudo staminodes slightly serrulate, dentate or erose. Utricles yellowish brown, shiny, oblong, *c.* 2.5 mm long, smooth. Seeds oblong.



Distribution: The native range of this species is Tropical & Subtropical Asia to NW. Pacific (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: September-March.

Specimens examined: Chinnar, 10.02.2021, *Vishnu Mohan & Santhosh Nampy* 188768; Mathikettan Shola National Park, 11.12.2016, *Vishnu Mohan & Santhosh Nampy* 151371 (CALI).

Aerva Forssk.

Fl. Aegypt.-Arab. 170. 1775.

Aerva lanata (L.) Juss. ex Schult., Syst. Veg., ed. 15 bis 5: 564. 1819; Hook.f., Fl. Brit. India 4: 728. 1885; Gamble, Fl. Madras 1178. 1925.

Erect herbs, 30–40 cm long. Stems terete, slender, white woolly hairy. Leaves simple, alternate, estipulate; lamina orbicular, 1.5–3 × 1.5–3 cm, obtuse at apex, acute-rounded at base, entire, pubescent above, woolly below, membranous; petioles *c.* 1 cm long. Flowers in axillary spikes, non-fragrant; peduncles up to 1 cm long, slender, densely tomentose; pedicels obscure. Bracts elliptic-ovate, *c.* 1.5 × 1 mm, acute at apex, entire, pubescent out; bracteoles ovate, *c.* 1 × 1 mm, acute at apex, entire, pubescent out, glabrous within. Tepals oblong, *c.* 1.5 × 1 mm, woolly, mucronate at apex, entire, woolly out, glabrous within. Stamens 5; filaments basally connate, *c.* 0.5 mm long,



glabrous; staminodes subulate. Ovary *c.* 0.4 mm long, inferior; Utricles woolly, oblong. Seeds oblong.

Distribution: The native range of this species is Africa to Tropical Asia (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: May-December.

Specimen examined: Chinnar Wildlife Sanctuary, 18.05.1999, *P. Prashy* 79435 (CALI).

Allmania R.Br. ex Wight

J. Bot. 1: 226. 1834.

Allmania nodiflora (L.) R.Br. ex Wight, Hooker's J. Bot. 1: 26. 1834; Hook.f., Fl. Brit. India 4: 716. 1885; Gamble, Fl. Madras 2: 1167. 1925. *Celosia nodiflora* L. in Sp. Pl.: 205 1753.



Annual herbs, up to 30 cm tall. Stems terete, slender, glabrous. Leaves simple, alternate, estipulate; lamina obovate-lanceolate, 1–3 × 0.5–1 cm, acute at apex, attenuate at base, entire, glabrous; petioless 5–10 mm long, stout, glabrous. Flowers in axillary globose heads, non-fragrant; peduncles 2–10 cm long, slender, glabrous; pedicels *c.* 1 mm long, slender, glabrous. Bracts ovate, 3–4 × *c.* 2 mm, acute at apex, entire, glabrous; bracteoles lanceolate, *c.* 3 × 2 mm, acuminate at apex, entire, glabrous. Tepals ovate-lanceolate, 4–5 × *c.* 3 mm, acute at apex, entire, glabrous on both sides. Stamens 5; filaments *c.* 3 mm long, connate at base, glabrous. Ovary ovoid, glabrous. Utricles ovoid, *c.* 3 mm in diam. Seeds orbicular, 1.5–2 mm in diam.

Distribution: Indian Subcontinent to China (Guangxi) and W. & Central Malesia (POWO, 2023); *Habitat*: Deciduous forests and wastelands; *Fl. & Ft.*: March-October.

Specimen examined: Pandippara, 09.03.2021, *Vishnu Mohan* & *Santhosh Nampy* 176028 (CALI).

Alternanthera Forssk.

Fl. Aegypt. Arab. 28. 1775.

Key to the species

1. Outer tepals acute, entire……..…… 2

1. Outer tepals obtuse, aristate…… *A. pungens*

2. Inflorescence peduncled…….…… *A. brasiliana*

2. Inflorescence sessile……..……. 3

3. Appendages on androecial tube 5 …… ……..*A. ficoidea*

3. Appendages on androecial tube 3 …….…….. *A. sessilis*

Alternanthera ficoidea (L.) P.Beauv. Fl. Oware 2: 66 1818.

Alternanthera tenella Colla in Mem. Reale Accad. Sci. Torino 33: 131 1829.



Creeping perennial herbs, up to 30 cm tall. Stems quadrangular, stout, hard at base, hairy. Leaves simple, opposite, estipulate; lamina oblong-ovate, 2–3 × 0.8–1.5 cm, obtuse at apex, acuminate at base, undulate, glabrescent, thin; petioless 0.1–0.4 cm long, stout, slightly hairy. Flowers in terminal or axillary sessile heads, non-fragrant. Bracts ovate-lanceolate, *c.* 3 × 1.5 mm, acute at apex, entire, glabrous; bracteoles ovate-lanceolate, *c.* 1.5 × 1 mm, acute at apex, entire, glabrous below. Tepals ovate-oblong, 2–4 × 1–2 mm, acuminate at apex, entire, pubescent. Stamens 5; filaments *c.* 2 mm long, slender, glabrous; anthers linear; pseudostaminodes fused; appendages on androecial tube 5. Ovary glabrous; style *c.* 0.5 mm long; stigma sticky. Utricles ellipsoid. Seeds ovoid-oblong.

Distribution: The native range of this species is W. South America to Brazil (POWO, 2023); *Habitat*: Degraded deciduous forests and wastelands; *Fl. & Ft.*: August-February.

Specimens examined: Adimali, 07.08.2019, *Vishnu Mohan & Santhosh Nampy* 175991; Idukki Wildlife Santuary, 05.08.2017, *Vishnu Mohan & Santhosh Nampy*

154185; Neriyamangalam, 26.12.2017, *Vishnu Mohan & Santhosh Nampy* 1566386 (CALI).

Alternanthera brasiliana (L.) Kuntze, Revis. Gen. Pl. 2: 537. 1891. *Telanthera brasiliana* (L.) Moq. in A.P.de Candolle, Prodr. 13(2): 382 1849. *Gomphrena brasiliana* L. in Amoen. Acad. 4: 10 1759.



Annual subshrubs, up to 1 m tall. Stems erect, slender, villous, glabrate. Leaves simple, opposite, estipulate; lamina ovate-lanceolate, 3–5 × 1–2 cm, acute at apex, attenuate at base, entire, villous above, sparsely pubescent below. Flowers in terminal and axillary, pedunculate heads, non-fragrant; peduncles 0.3–0.4 mm long, sparsely pubescent. Bracts elliptic-lanceolate, *c.* 3 × 2 mm, acuminate at apex, entire, keeled. Tepals elliptic, *c.* 5 × 2 mm, acute at apex, entire, sparsely hairy. Stamens 5; filaments *c.* 3 mm long, glabrous; pseudostaminodes ligulate. Ovary inferior; style *c.* 3 mm long; stigma sticky. Utricles ellipsoid, *c.* 2 mm long. Seeds ovoid-oblong.

Distribution: The native range of this species is Mexico to Tropical America (POWO, 2023); *Habitat:* Forest margins; *Fl. & Ft.*: August-February.

Specimen examined: Neriymangalam, 07.08.2019, *Vishnu Mohan & Santhosh Nampy* 176176 (CALI).

Alternanthera pungens Kunth, F.W.H.von Humboldt, A.J.A.Bonpland & C.S.Kunth, Nov. Gen. Sp. 2: 206. 1818.

Annual creeping herbs. Stems diffuse, much branched, slender, hairy all around. Leaves simple, opposite, estipulate; lamina ovate-obovate, 1.5–3.5 × 0.5–1 cm, obtuse at apex, acuminate at base, entire, glabrous above, sparsely pilose below; petioless 0.5–1 cm, glabrous, grooved above. Flowers in axillary heads; peduncles and pedicels reduced. Bracts lanceolate, *c.* 4 × 2 mm, spiny at apex, entire, scaly, sparsely hairy below; bracteoles lanceolate, *c.* 3 × 2 mm, acuminate at apex, entire, sparsely pubescent. Tepals unequal, lanceolate, 3–5 × 1.5–2 mm, acuminate at apex, entire, glabrous above, sparsely hairy below; Outer tepals obtuse, aristate. Stamens 5; filaments *c.* 1 mm long, glabrous;

pseudostaminodes *c.* 0.6 mm long. Ovary inferior; style very short; stigma sticky. Utricles brown, ellipsoid.

Distribution: The native range of this species is Mexico to Tropical America (POWO, 2023); *Habitat*: Wastelands and degraded deciduous forests; *Fl. & Ft.*: May-July.

Specimen examined: Cheruthoni, 21.06.2019, *Vishnu Mohan* & *Santhosh Nampy* 176595 (CALI).

Alternanthera sessilis (L.) DC., Cat. Pl. Horti Monsp. 77. 1813. *Alternanthera triandra* Lam., Encycl. 1: 95. 1785, *nom. superfl.*; Gamble, Fl. Madras 2: 1179. 1925. *Paronychia sessilis* (L.) Desf. in Tabl. École Bot.: 44 1804.

Creeping herbs. Stems terete, slender, hairy. Leaves simple, opposite; lamina linear-lanceolate, 3–6 × 0.5–1 cm, acute at apex and base, entire, glabrous; petioless 0.3–0.4 cm long, glabrous. Flowers in sessile axillary heads, non-fragrant. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous; bracteoles ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous, scaly. Tepals ovate, 2–3 × *c.* 1 mm, acuminate at apex, entire, glabrous, scaly. Stamens 3; filaments *c.* 0.7 mm long, slender, glabrous; appendages on androecial tube 3; pseudostaminodes *c.* 5 mm long, glabrous. Ovary inferior, glabrous; style *c.* 2 mm long; stigma shortly lobed. Utricles obovoid, *c.* 2 mm long, glabrous. Seeds ovoid.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. & E. Australia, S. Mexico to Tropical America (POWO. 2023); *Habitat*: Along road sides; *Fl. & Ft.*: September.

Specimen examined: Kattappana, 10.09.2019, *Vishnu Mohan* & *Santhosh Nampy* 177102 (CALI).

Amaranthus L.

Sp. Pl. 2: 989, 1753.

Amaranthus spinosus L., Sp. Pl. 2: 991. 1753; Hook.f., Fl. Brit. India 4: 718. 1885; Gamble, Fl. Madras 1170. 1925.

Erect glabrous herbs. Stems terete, glabrous, profusely branching, glabrous; spines *c.* 1.2 cm long, stiff. Leaves simple, alternate, estipulate; lamina widely lanceolate, 4–8 × 2–4 cm, obtuse at apex, attenuate at base, entire, glabrous, membranous; petioless *c.* 4 cm long, slender, glabrous. Flowers unisexual in axillary-terminal panicled spikes, non-fragrant; peduncles 2–4 cm long, slender, glabrous. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous, membranous; bracteoles ovate-lanceolate, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Tepals 5, ovate-lanceolate, *c.* 3 × 2 mm, acute at apex, entire, glabrous,

membranous. Stamens 5; filaments *c.* 2 mm long, glabrous; anthers sagittate. Ovary 1-celled; style *c.* 2 mm long, glabrous; stigmas 3, sticky. Utricles circumcissile. Seeds minute, discoid.

Distribution: The native range of this species is Mexico to Tropical America. (POWO. 2023); *Habitat*: Along road sides; *Fl. & Ft.*: September.

Specimen examined: Kattappana, 10.09.2019, *Vishnu Mohan* & *Santhosh Nampy* 177102 (CALI).

Cyathula Lour.

Fl. Cochinch. 1: 101. 1790.

Cyathula prostrata (L.) Blume, Bijdr. Fl. Ned. Ind. 549. 1826; Hook.f., Fl. Brit. India 4: 722. 1885; Gamble, Fl. Madras 2: 1172. 1925.



Erect herbs, up to 30 cm tall. Stems, terete-grooved, slender, pubescent. Leaves simple, opposite; lamina rhomboid, 2–4 × 1–2 cm, acute at apex, attenuate at base, entire, glabrous; petioles 0.5–0.8 mm long, slender, sparsely hairy, grooved above. Flowers in terminal spikes. non-fragrant; peduncles 20–25 cm long, slender, pubescent; pedicels reduced, minute, *c.* 1 mm long. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, pubescent, scaly; bracteoles lanceolate, *c.* 2 × 1 mm, acute at apex, entire, pubescent, scaly. Tepals 5, elliptic-ovate, *c.* 4 × 2 mm, pilose at apex, entire, pubescent out, glabrous within. Stamens 5; filaments united at base, glabrous; staminodes membranous. Ovary obconic; style simple; stigma capitate. Capsules obovoid, compressed, golden brown.

Distribution: The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests; *Fl. & Ft.*: September-April.

Specimen examined: Valara, 05.02.2018, *Vishnu Mohan* & *Santhosh Nampy* 186715 (CALI).

Psilotrichum Blume

Bijdr. Fl. Ned. Ind. 11: 544 1826.

Psilotrichum patulum (Willd.) I.M.Turner Taxon 71: 455 2022. *Celosia patula* Willd. in Neue Schriften Ges. Naturf. Freunde Berlin 4: 198 1803.

Psilotrichum calceolatum Moq. in A.P.de Candolle, Prodr. 13(2): 280. 1849; Gamble, Fl. Madras 2: 1174. 1925.

Erect herbs. Stems terete, slender, sparsely hairy. Leaves simple, opposite, estipulate; lamina ovate-elliptic, 2–3 × 1–1.5 cm, acute at apex, obtuse at base, entire, pubescent, membranous; petioles *c.* 0.3 cm long, stout, sparsely pubescent. Flowers in terminal-axillary spikes, non-fragrant; peduncles up to 2 cm long; pedicels *c.* 0.2 cm long, pubescent. Bracts ovate, *c.* 1.5 × 1 mm, acute at apex, entire, glabrous above, pubescent out; bracteoles lanceolate, *c.* 1.5 × 1 mm, acute at apex, entire at margins, pubescent on both sides. Tepals 5, ovate, *c.* 3 × 2 mm, acute at apex, entire, silky pubescent. Stamens 5; filaments connate at base, *c.* 1.5 mm long, glabrous. Ovary *c.* 0.5 mm, globose; style *c.* 0.5 mm long; stigma capitellate. Utricles ovoid, *c.* 2 mm long.

Distribution: The native range of this species is Ethiopia to E. DR Congo and Tanzania, S. India and Sri Lanka (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: December-May.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175978; Chinnar Wildlife Sanctuary, 19.05.1999, *T. Resmi* 78386; Neriyamangalam, 26.12.2018, *Vishnu Mohan* & *Santhosh Nampy* 186628 (CALI).

Pupalia Juss.

Ann. Mus. Natl. Hist. Nat. 2: 132. 1803.

Pupalia lappacea (L.) Juss., Ann. Mus. Natl. Hist. Nat. 2: 132. 1803; Hook.f., Fl. Brit. India 4: 724. 1885; Gamble, Fl. Madras 2: 1173. 1925. *Achyranthes lappacea* L. in Sp. Pl.: 204 1753.

Erect herbs. Stems slender, terete, densely hispid. Leaves simple, opposite, estipulate; lamina, ovate-orbicular, 2–3 × 1.5–2 cm, obtuse at apex, attenuate at base, entire, fulvous tomentose, membranous; petioles 0.5–1 cm long, stout, sparsely pubescent. Flowers in axillary spikes; peduncles up to 0.5 cm long, sparsely pubescent; pedicels reduced. Bracts orbicular, *c.* 3 × 2 mm, acute at apex, entire, glabrous within, pubescent out; bracteoles orbicular, *c.* 2 × 1 mm, acute at apex, entire. Tepals 5, elliptic, *c.* 5 × 2 mm, acute at apex, entire, densely covered with hooked bristles. Stamens 5; filaments united into short tube

at base. Ovary obovoid, compressed; style simple; stigma capitate. Achenes with hooked hairs.



Distribution: The native range of this species is Mozambique to S. Africa, E. Afghanistan to Myanmar (POWO, 2023); *Habitat*: Moist deciduous forests; *Fl. & Ft.*: June-February.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 188868; Chinnar Wildlife Sanctuary, 14.02.2001, *K. Sonia* 72682; Mankulam, 15.06.2018, *Vishnu Mohan* & *Santhosh Nampy* 176102 (CALI).

CHENOPODIACEAE Vent.

Tabl. Regn. Veg. 2: 253. 1799, *nom. cons*.

Herbs. Leaves alternate, often fleshy, granular or hairy. Inflorescence cymose. Flowers monochlamydeous, hermaphrodite or unisexual, pentamerous. Teplas five, membraneous. Stamens four or five, antiphyllous, bent inwards in bud. Carpels two, syncarpous, unilocular; placentation basal. Fruit an achene. Seeds endospermic.

The family includes 184 accepted genera in the world (POWO, 2023); only two species in the study area.

Key to the genera

1. Leaves entire; stigma two……...…*Chenopodium*

1. Leaves deeply serrate; stigma five…….……...…….. *Dysphania*

Chenopodium L.

Sp. Pl. 1: 218. 1753.

Chenopodium album L., Sp. Pl. 1: 219. 1753; Hook.f., Fl. Brit. India 5: 3. 1886; Gamble, Fl. Madras 1181. 1925.

Erect annual herbs, up to 80 cm tall. Stems terete, sparsely pubescent. Leaves simple, alternate, estipulate; lamina lanceolate, 2–6 × 0.5–1 cm, acute at apex and base, entire, pubescent, actinodromous reticulate perfect venation; petioless 3–6 mm long, pubescent, stout. Flowers in cymosely branched terminal panicles, non-fragrant; peduncles *c.* 10 cm long, pubescent; pedicels very much reduced. Perianth segments 5, dorsally keeled,

lanceolate, *c.* 3 × 2 mm, acute at apex, attenuate at base, entire, pubescent out, glabrous within. Stamens 5; filaments glabrous, adnate at base. Ovary inferior; style short, glabrous; stigma two, capitate. Seeds horizontally compressed, black.

Distribution: The native range of this species is Temp. to Indian Subcontinent (POWO, 2023); *Habitat*: Scrub jungles and degraded forests, also in the wastelands; *Fl. & Ft.*: Throughout the year.

Specimens examined: Kattappana, 14.11.2014, *P.M. Thasnim* 142732; Kumily, 22.11.1988, *V. Geetha* 1841 (CALI).

Dysphania R.Br.,

Prodr. Fl. Nov. Holland. 411. 1810.

Dysphania ambrosioides (L.) Mosyakin & Clemants, Ukrayins'k. Bot. Zhurn. 59(4): 382 2002. *Chenopodium ambrosioides* L. in Sp. Pl.: 219 1753.



Erect herbs, up to 1 m tall. Stems terete, slender, glabrous, smooth, branched. Leaves, simple, alternate, estipulate; lamina elliptic-lanceolate, 3–6 × 1–1.5 cm, acuminate at apex, attenuate at base, deeply serrate, sparsely hairy, membranous, actinodromous reticulate perfect venation; petioless 0.5–1 cm long, grooved above, glabrous. Flowers in much branched panicles, non-fragrant; peduncles 8–15 cm long, slender, glabrous; pedicels 0.3–0.6 cm long, glabrous, stout, glabrous. Bracts lanceolate-spathulate, *c.* 3 × 1.5 mm, acute at apex, entire, glabrous, membranous. Perianth 4, elliptic-ovate, *c.* 1.5 × 1 mm, acute at apex, entire, green. Stamens 4, free; filaments glabrous. Ovary minute, glabrous; stigmas 5, sticky. Achenes ovoid, enclosed by persistent perianth.

Distribution: The native range is Tropical America; widely introduced elsewhere (POWO, 2023); *Habitat*: Wastelands; *Fl. & Ft.*: March-April.

Specimen examined: Erattyar, 03.03.2018, *Vishnu Mohan & Santhosh Nampy* 158475 (CALI).

POLYGONACEAE Juss.

Gen. Pl. 82 1789, *nom. cons*.

Herbs, shrubs, lianas. Leaves stipulate, alternate (rarely opposite). Flowers usually hermaphrodite, small, polygamo- monoecious or dioecious; inflorescence terminal cymes or axillary racemes, corymbs, spikes and heads, sometimes in axillary fascicles; calyx and corolla distinct, or both sepal -like or petal -like, 2–6, free or joined, 1–2- whorled or spiralled, persistent in fruit and often accrescent; stamens (2–) 6 (–9) to many; stigmas 2 or 3, ovary superior, unilocular, uniovulate, placentation basal, orthotropous. Fruit dry, indehiscent usually a trigonous or flattened nut or achene-like.

This family includes 56 genera (POWO, 2023); three genera and six species in the study area.

Key to the genera

1. Plants tendril climbers……..…….…… ….*Antigonon*

1. Plants erect or scrambling or medium sized tre…….…… ….2

2. Perianth 3–5 cleft; stamens 5…….……..….. …..*Persicaria*

2. Perianth 4–6 cleft; stamens 9……...…… ….*Rumex*

Antigonon Endl.

Gen. Pl. pt. 4: 310 1837.

Antigonon leptopus Hook. & Arn., Bot. Beech. Voy. 308. t. 69. 1841; Manilal & Sivar., Fl. Calicut 247. 1982.



Climbing shrubs. Stems woody, grooved, wiry, rigid, glabrous. Leaves simple, alternate; lamina, hastate, 3–6 × 1.5–3 cm, acuminate at apex, cordate at base, entire, hairy above, glabrescent below, coriaceous; petioless 1–2 cm long, slender, glabrous, grooves. Tendrils branched, wiry, slender. Flowers on axillary panicles, non-fragrant; peduncles 5–8 cm long, glabrous; pedicels slender, narrow, 0.5–1 cm long, glabrous. Perianth 5, ovate, 6–15 × 3–7 mm, acute at apex, cordate at base, entire, glabrous. Stamens 8; filaments *c.* 3 mm long, erect, slender, sparsely hairy throughout. Ovary ovate, inferior; style *c.* 3 mm long, erect; stigma curved, sticky. Carpels 3, ovoid.

Distribution: The native range of this species is Mexico to Central America (POWO, 2023); *Habitat*: Grown as ornamental plants, now getting naturalized in wastelands; *Fl. & Ft.*: November-June.

Specimens examined: Anakkulam, 10.06.2018, *Vishnu Mohan* & *Santhosh Nampy* 184219 (CALI).

Persicaria (L.) Mill.

Gard. Dict. Abr., ed. 4. 1754.

Key to the species

1. Flowers in heads……..……...……..…… *P. chinense*

1. Flowers in spikes or racemes……..……..…..…… …2

2. Plants glandular punctuate……..…...……. .. *P. hydropiper*

2. Plants eglandular……..…….…… …3

3. Ochrea glabrous; plants brownish when dry…….…...…… … *P. glabra*

3. Ochrea long ciliate at mouth; plants greenish when dry……..…….. ……. *P. barbata*

Persicaria barbata (L.) H.Hara, Fl. E. Himal. 70. 1966. *Polygonum barbatum* L., Sp. Pl. 362. 1753; Hook.f., Fl. Brit. India 5: 37. 1886; Gamble, Fl. Madras 2: 1189. 1925.

Erect herbs, up to 50 cm tall; plants greenish when dry. Stems slender, terete, glabrous. Leaves simple, alternate; lamina lanceolate, 5–8 × *c.* 1 cm, acute at apex, cuneate at base, entire, glabrous except margins; petioless *c.* 1.5 cm long, coarsely ciliate; ochrea long ciliate at mouth. Flowers in terminal spikes, bisexual, non-fragrant; peduncles 5–10 cm long, terete; pedicels 0.2–0.3 cm long, glabrous. Bracts ovate, 2–3 × 1–2 mm, acute at apex, entire, glabrous. Perianth lobed, lobes 5, obtuse, *c.* 4 × 2 mm, entire, glabrous. Stamens 5, included; filaments *c.* 3 mm long, glabrous. Ovary obovoid; style three, reflexed; stigma capitate. Nutlets trigonous.

Distribution: The native range of this species is Arabian Peninsula, Tropical & Subtropical Asia (POWO, 2023); *Habitat:* Along stream sides; *Fl. & Ft.:* August-April.

Specimens examined: Munnar, 20.09.2018, *Vishnu Mohan* & *Santhosh Nampy* 164586; Near to Rajamala, 13.11.2019, *Vishnu Mohan & Santhosh Nampy* 188888; Neriyamangalam, 26.12.2017, *Vishnu Mohan & Santhosh Nampy* 156384; Vellakayam, 04.04.2018, *Vishnu Mohan & Santhosh Nampy* 158449 (CALI).

Persicaria chinensis (L.) H.Gross, Bot. Jahrb. Syst. 49: 269. 1913. *Polygonum chinense* L., Sp. Pl. 363. 1753; Hook.f., Fl. Brit. India 5: 44. 1886; Gamble, Fl. Madras 2: 1190. 1925.



Scandent subshrubs. Stems terete, sparsely hairy, zig-zag. Leaves simple, alternate; lamina broadly ovate-elliptic, 5–10 × 3–5 cm, acute at apex, rounded at base, entire, glabrous, membranous; petioless 0.3–0.6 cm long, grooved above, glabrous, auricled at base. Flowers in heads, bisexual, non-fragrant; peduncles *c.* 5 cm long, slender, glabrous; pedicels short *c.* 0.4 cm long, slender, glabrous. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous, membranous. Perianth lobes 5, ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Stamens 5; filaments *c.* 4 mm long, slender, glabrous. Ovary 3-gonous, styles 3. Nutlets trigonous.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and moist deciduous forests; *Fl. & Ft.*: Throughout the year.

*Specimens examined:*Kanthallur, 25.02.2003, *Roshni Balakrishnan* 89950; way to Marayoor, 24.02.2003, *Ligimol* 89800 (CALI).

Persicaria glabra (Willd.) M.Gómez, Anales Inst. Segunda Enseñ. 2: 278. 1896. *Polygonum glabrum* Willd., Sp. Pl. 2: 447.1799; Hook.f., Fl. Brit. India 5: 34. 1886; Gamble, Fl. Madras 2: 1189. 1925.



Erect herbs, up to 50 cm tall; plants brownish when dry. Stems terete, slender, glabrous, smooth. Leaves simple, alternate; lamina elliptic, 8–13 × *c.* 2 cm, acute at apex and base, entire, glandular below, glabrous above, membranous; petioless *c.* 2 cm long, stout, glabrous; ochrea glabrous. Flowers in terminal racemes, bisexual, non-fragrant; peduncles 2–4 cm long, slender, erect, glabrous; pedicels obscure. Bracts ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous, membranous. Perianth lobes 5, ovate, 2–3 × *c.* 1 mm, acute at apex, entire, glabrous. Stamens 5; filaments *c.* 2 mm long, erect, glabrous.

Ovary inferior; style *c.* 2 mm long, stout, glabrous; stigma capitate, sticky. Nut biconvex, black.

Distribution: The native range of this species is New World, Central African Republic to Arabian Peninsula, Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Moist areas in forests, also in the plains; *Fl. & Ft.*: May-January.

Specimens examined: Mankulam, 25.05.2018, *Vishnu Mohan* & *Santhosh Nampy* 174586; Thekkady, 23.11.1988, *P.P.Sudhirkumar* 2796; way to Kanthallur from Marayoor, 23.01.2005, *P. Prabitha* 110533 (CALI).

Persicaria hydropiper (L.) Delarbre, Fl. Auvergne, ed. 2: 518. 1800. *Polygonum hydropiper* L., Sp. Pl. 361.1753; Hook.f., Fl. Brit. India 5: 39. 1886; Gamble, Fl. Madras 2: 1190. 1925.



Slender annual herbs, up to 50 cm tall. Stems terete, glandular punctuate. Leaves simple, alternate; lamina lanceolate, 6–9 × *c.* 1 cm, acute at apex, cuneate at base, entire, glabrous except margins, membranous; petioless *c.* 0.5 cm long, slender, glabrous; ochrea glabrous. Flowers in terminal slender racemes, bisexual, non-fragrant; peduncles 4–8 cm long, glabrous, slender, narrow erect; pedicels obscure. Bracts ovate, *c.* 3 × 2 mm, ciliate at apex, mouth oblique, glabrous, membranous. Perianth lobes 5, ovate-elliptic, *c.* 4 × 2 mm, acute at apex, entire, glandular out, glabrous within, membranous. Stamens 5; filaments *c.* 2 mm long, erect, stout, glabrous. Ovary inferior; styles *c.* 3 mm long, stout, glabrous; stigma capitate. Nut biconvex, granulate.

Distribution: The native range of this species is NW. Africa, Temp. Eurasia to W. & Central Malesia, Australia (POWO, 2023); *Habitat*: Moist localities in semi-evergreen forests; *Fl. & Ft.*: February-October.

Specimens examined: Anakulam, 03.10.2017, *Vishnu Mohan* & *Santhosh Nampy* 154682; Munnar, 09.02.2017, *Vishnu Mohan* & *Santhosh Nampy* 151678; Sivaloda, 10.10.1993, *Jomy Augustine* 12508 (CALI).

Rumex L.

Sp. Pl. 1: 333. 1753.

Rumex nepalensis Spreng**.**, Syst. Veg., ed. 16 (2): 159. 1825; Hook.f., Fl. Brit. India 5: 60. 1886; Gamble, Fl. Madras 2: 1192. 1925.

Erect herbs, up to 1 m tall. Stems terete, slender, grooved, glandular. Leaves simple, alternate, estipulate; lamina elliptic-lanceolate, 4–9 × 2–5 cm, acute at apex, attenuate at base, crenate, membranous; petioless 2–5 cm long, stout, glabrous. Flowers in axillary panicles, bisexual, non-fragrant; peduncles 4–20 cm long, slender, glabrous; pedicels obscure. Perianth lobes 6, biseriate, orbicular-elliptic, 5–6 × *c*. 3 mm, acute at apex, attenuate at base, entire, glabrous, membranous. Stamens 9, free; filaments *c.* 4 mm long, slender, glabrous. Ovary 3-celled, 3-winged; styles 3, slender, glabrous; stigma laciniate, sticky. Capsules 3-winged.

Distribution: The native range of this species is Cameroon to Eritrea and S. Africa, Arabia Peninsula, Madagascar, SE. Europe to China and Jawa (POWO, 2023); *Habitat*: Degraded forest areas in the high ranges; *Fl. & Ft*.: December-March.

Specimen examined: Edamalakkudy, 30.03.2019, *Vishnu Mohan* & *Santhosh Nampy* 186523 (CALI).

PODOSTEMSACEAE Rich. ex Kunth

Nov. Gen. Sp. 1: ed. 4: 246. 1816, *nom. cons*.

Submerged, aquatic annual or perennial herbs; closely attached to the rocks. Plant body thalloid, attached by root hairs. Primary axis produces leaf bearing secondary shoots. Secondary shoots well developed or reduced. Leaves simple or much divided, linear, delicate, glabrous or hairy, often with a sheathing base. Flowers solitary, fascicled at leaf base, terminal or axillary, stalked or sessile. Tepals 2, linear, delicate. Stamens 2 or 3; anthers oblong, 4-celled, introse or extrose; pollen grains generally in dyads. Ovary superior, ellipsoid or globose, 2 or 3-locular, placenta axial; stigma 2 or 3, generally unequal, subulate, dentate or lanceolate. Fruits dehiscent or indehiscent, capsule, commonly ribbed. Seeds many, non-endosermous.

Includes 50 accepted genera in the world (POWO,2023); four genera and nine species in Idukki district.

Key to the genera

1. Plant body erect branching……..…..……*Indotristicha*

1. Plant body creeping thalloid…….……..……2

2. Capsules isolobus; ovary with equal loculi……...……*Polypleurum*

2. Capsules anisolobus; ovary with unequal loculi……3

3. Spathe tubular, splitting apically……..……*Podostemsum*

3. Spathe boat-shaped, splitting dorsally……...*Zeylanidium*

Indotristicha P.Royen

Acta Bot. Neerl. 8: 474. 1959.

Indotristicha ramosissima (Wight) P.Royen, Acta Bot. Neerl. 8: 475. 1959. *Dalzellia ramosissima* Wight, Icon. Pl. Ind. Orient. 5: 34. t. 35. 1852. *Tristicha ramosissima* (Wight) Willis, Ann. Roy. Bot. Gard. (Peradeniya) 1: 208. 1902; Gamble, Fl. Madras 1194. 1925.



Floating herbs, up to 25 cm long. Plant body erect, cylindrical, branched. Stems terete, glabrous, reddish brown; branches 2 types: short branches with leaves and long branches with the structure of main axis. Stipules 0. Leaves simple, needle-like, *c.* 0.05 cm long, reddish brown. Flowers bisexual, axillary, solitary, terminal, actinomorphic, trimerous; pedicels 3–6 mm long, glabrous. Tepals 3, sepaloid, imbricate, slightly fused at base, elliptic, *c.* 1.5 × 1 mm, rounded at apex, smooth, glabrous. Stamens 3, free, alternate with tepals; anthers elliptic, *c.* 0.8 mm long, introse, longitudinally dehiscing. Ovary, ovate, *c.* 0.1 cm long, 3-carpellary; style 0; stigma feathery, sticky. Capsule splitting by equal valves, 11-ribbed. Seeds many.

Distribution: Native range is SW. India (POWO, 2023); *Habitat*: On submerged rocks in streams; *Fl. & Ft.:* December-February.

Specimens examined: Kaliyar, 07.02.2021, *Vishnu Mohan & Santhosh Nampy* 173359;

Polypleurum (Tul.) Warm.

Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd. ser. 6, 11(1): 64. 1901.

Key to the species

1. Thallus attached all along the length, < 10 cm long……..…..…*P. wallichi*

1. Thallus attached only at base, distal part free floating, > 10 cm long……..……..…2

2. Fruiting pedicels 2–4 cm long……*P. stylosum*

2. Fruiting pedicels 1–1.5 cm long……..……3

3. Leaves caducous……*P. dichotomum*

3. Leaves persistant……*P. munnarensis*

Polypleurum dichotomum (Gardner) J.B.Hall. Kew Bull. 26(1): 131. 1971; *Podostemsum dichotomum* Gardner, Calcutta J. Nat. Hist. 7: 185. 1847; Hook.f., Fl. Brit. India 5: 64. 1886; *Dicraeia dichotoma* Tul., Ann. Sci. Nat. Bot. ser. 3, 11: 101. 1849; Gamble, Fl. Madras 1196.1925.



Prostrate floating thalloid herbs, up to 25 cm long, attachment by the base only, distal part free floating. Thallus flat, ribbon-like, *c*. 4 mm wide, dichotomous, green, base thick, tip thin, ribbon-like, less than 5 mm wide. Leaves sub-marginal, balloon-shaped, caducous, seen as whorls of 3. Flowers solitary, from nodes. Bracts 3 paired, fleshy, imbricate, glabrous, boat-shaped, 0.2–0.5 × 0.1–0.3 cm, rounded at apex, truncate at base, smooth. Spathe delicate, splitting irregularly. Stamens 2; filaments narrow, bifurcating at apex, 0.5–1 cm long; anthers widely ovate, tetralocular, dorsifixed, dehiscing longitudinally. Ovary superior, elliptic, trilocular; style 0; stigma 2, sticky. Capsule splitting by equal valves, 8-ribbed; fruiting pedicels 1–1.5 cm long. Seeds many, oval.

Distribution: Native range is India (POWO, 2023); *Habitat*: On submerged rocks in streams; *Fl. & Ft.*: October-December.

Specimens examined: Kaliyar river, 30.11.2019, *Vishnu Mohan & Santhosh Nampy* 164649; above Valara waterfalls, 27.12,2017, *Vishnu Mohan & Santhosh Nampy* 156550; (CALI). Neriamangalam, 26.12.2017, *Vishnu Mohan & Santhosh Nampy* 156381 (CALI).

Polypleurum munnarense Nagendran & Arekal, Bot. Not. 132: 49. 1979. *Podostemsum munnarense* (Nagendran & Arekal) C.J.Mathew & Satheesh, Aquatic Bot. 57: 255. 1997. Floating herbs, up to 30 cm long. Stems dichotomously branched, green, glabrous, basally attached by means of rhizoids. Leaves simple, 2–3 pairs, alternate, spathulate, 5–6 cm long, rounded at apex, entire, glabrous, persistant. Stipules 0. Flowers solitary, 1-flowersed, irregular, hypogynous, bisexual; pedicels *c.* 1 cm long, slender, glabrous. Bracts 2 or 3 paired, subulate, imbricate, falcate, fleshy. Spathe tubular, funnel-shaped *c.* 4 × 2 mm, membranous, erect, splits irregularly at tip. Tepals 2, membranous, elliptic, rounded at apex, smooth, glabrous. Stamens 2; anthers elliptic, 2–2.5 mm long, introse, longitudinally dehiscing. Ovary superior, ellipsoid, *c.* 3 × 2 mm long, 2-carpellary; style 0; stigma sticky lanceolate. Capsule splitting by equal valves, 8-ribbed fruiting pedicels 1.5–2 cm long. Seeds many.

Distribution: Native range is India (Kerala) (POWO, 2023); *Habitat*: On submerged rocks in streams; *Fl. & Ft.:* December-February

Specimen examined: Kannimala saw mill, 24.01.2018, *Vishnu Mohan & Santhosh Nampy* 158150 (CALI).

Polypleurum stylosum (Wight) J.B. Hall. Kew Bull. 26(1): 131. 1971. *Dicraeia stylosa* Wight, Icon. Pl. Ind. Orient. 5: t. 1917. f. 2. 1852; Gamble, Fl. Madras 1196. 1925; Manilal, Fl. Silent Valley 228. 1988. *Podostemsum stylosum* (Wight) Benth. ex Hook.f., Fl. Brit. India 5: 64. 1886.



Floating thalloid herbs, up to 30 cm long. Thallus ribbon-like, dichotomous, green to reddish brown, glabrous, attached only at base, distal part free floating, up to 15 cm long, more than 5 mm wide. Leaves 2 or 3 pairs, alternate, distichous, *c.* 3 mm long, glabrous. Stipules 0. Flowers axillary, irregular, hypogynous; pedicels 1–1.5 mm long. Bracts 2 or 3 paired, fleshy, keeled, imbricate. Spathe membranous, funnel-shaped, *c.* 3 × 1 mm, erect, splitting irregularly at tip. Tepals 2, membranous, elliptic, *c.* 1.5 × 1 mm, rounded at apex, smooth. Stamens 2; anther elliptic, *c.* 0.8 mm long, introse, longitudinally dehiscing. Ovary superior, ellipsoid, *c.* 0.1

cm long, 2-carpellary; style 0; stigma glabrous, linear. Capsules splitting by equal valves, 8-ribbed; fruiting pedicels 2–4 cm long. Seeds many.

Distribution: The native range of this variety is Indian Subcontinent to Indo-China (POWO, 2023); *Habitat*: On submerged rocks in streams; *Fl. & Ft.*: September-February.

Specimens examined: Kainagiri-Mankulam, 16.09.2018, *Vishnu Mohan & Santhosh Nampy* 161945; Karimmutty, 29.12.2017, *Vishnu Mohan & Santhosh Nampy* 156600; Koymanchola, 10.02.202, *Vishnu Mohan & Santhosh Nampy* 188796 (CALI).

Polypleurum wallichii (R.Br. ex Griff.) Warm., Kongel. Danske Vidensk. Selsk. Skr., Naturvidensk. Math. Afd. Ser. 6, 11(1): 57. 1901. *Podostemsum wallichii* R.Br. ex Griff., Asiat. Res. 19: 103. t. 17. 1836; Hook.f., Fl. Brit. India 5: 67. 1886.

Floating, thalloid fleshy herbs. Thallus irregularly branched, green to reddish brown, glabrous, attached all along the length, less than 10 cm long. Leaves simple glabrous, alternate, distichous, clavate, *c.* 2 mm long. Stipules 0. Flowers solitary, terminal, 1-flowersed, irregular, hypogynous, zygomorphic; pedicels *c.* 6 mm long, narrow. Bracts 2–3 paired, keeled, imbricate. Spathe erect, membranous, tubular, 2–3 × 1–1.5 mm, splits irregularly at tip. Tepals 2, membranous, elliptic, rounded at apex, smooth. Stamens 2; anther elliptic, 2–2.5 mm long, extrose, longitudinally dehiscing. Ovary superior, obovoid, *c.* 0.1 cm long, 2-carpellary; style 0; stigma glabrous. Capsule splitting by equal valves, 8-ribbed. Seeds many.

Distribution: Native range is Indian Subcontinent to Indo-China (POWO, 2023); *Habitat*: On submerged rocks in streams; *Fl. & Ft.:* December.

Specimen examined: Above Valara, 27.12.2017, *Vishnu Mohan & Santhosh Nampy* 156551 (CALI).

Zeylanidium Engl.

Nat. Pflanzenfam., ed. 2, 18a: 61. 1930.

Key to the species

1. Spathe splitting dorsally……..2

1. Spathe splitting apically……..……..*Z. subulatum*

2. Capsule globular……..……..…….……*Z. sessile*

2. Capsule ellipsoid to ovoid……..3

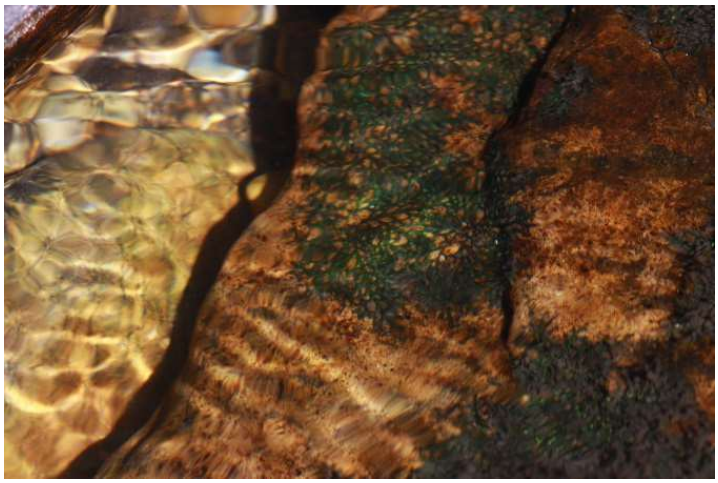
3. Thallus branched more or less acropetally……*Z. lichenoides*

3. Thallus unbranched, with regular margins……..*Z. olivaceum*

Zeylanidium lichenoides (Kurz) Engl. Nat. Pflanzenfam., ed. 2. 18a: 62 1930. *Hydrobryum lichenoides* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 103. 1873; Gamble, Fl. Madras 1199. 1925.

Podostemsum acuminatum Wedd. in DC., Prodr. 17: 75. 1873; Hook.f., Fl. Brit. India 5: 66. 1886.

Podostemsum microcarpum Wedd. in DC., Prodr. 17: 76. 1873; Hook.f., Fl. Brit. India 5: 66. 1886.



Crustaceous herbs, green to reddish brown, forming circular colony 7–9 cm diam. Thallus branched more or less acropetally, completely adpressed by means of root hairs. Leaves simple, glabrous, 4 pairs, alternate, distichous, hairy, linear, *c.* 0.7 cm long. Stipules 0. Flowers solitary, zygomorphic, hypogynous, sub-sessile. Bracts 2 paired, horizontal, imbricate, crustaceous, keeled. Spathe boat-shaped, prostrate, *c.* 1.8 × 1 mm, smooth, splits on the dorsal side by a median slit. Tepals 2 membranous, linear, smooth. Stamens 2; anther elliptic, *c.* 0.4 mm long, introse, longitudinally dehiscing. Ovary superior, elliptic, *c.* 1.4 × 0.5 mm long, unequally 2-carpellary; style 0; stigma unequal, sticky subulate. Capsules ovoid, splitting by equal valves, 8-ribbed. Seeds many.

Distribution: Native range is India to Myanmar and Sri Lanka (POWO, 2023); *Habitat:* On submerged rocks in streams; *Fl. & Ft.:* December–February

Specimen examined: Munnar, 22.01.2018, *Vishnu Mohan & Santhosh Nampy* 158486 (CALI)

Zeylanidium olivaceum (Gardner) Engl., Nat. Pflanzenfam., ed. 2, 18a: 62. 1930. *Podostemsum olivaceum* Gardner, Calcutta J. Nat. Hist. 7: 181. 1847; Hook.f., Fl. Brit. India 5: 66. 1886. *Hydrobryum olivaceum* Tul., Ann. Sci. Nat. Bot. ser. 3, 11: 104. 1849; Gamble, Fl. Madras 1198. 1925.

Crustaceous herbs, dark green, deeply lobed. Thallus unbranched, with regular margins. Leaves simple, 2 pairs, alternate, distichous, linear, glabrous, 2–4 cm long, hairy, deciduous. Stipules 0. Flowers solitary, zygomorphic, hypogynous, sub-sessile; pedicels

c. 1.5 mm long. Bracts 2 paired, prostrate, imbricate, crustaceous. Spathe boat-shaped, *c.* 2.5 × 1.5 mm, smooth, splits by means of median line on upper side. Tepals 2 membranous, linear, smooth. Stamens 2; anther elliptic, *c.* 0.8 mm long, introse, longitudinally dehiscing. Ovary superior, elliptic, *c.* 1.6 × 1.1 mm long, unilocular; style 0; stigma unequal, sticky, subulate. Capsules ellipsoid, splitting by equal valves, 8-ribed. Seeds many.

Distribution: The native range is S. India and Sri Lanka (POWO, 2023); *Habitat:* On submerged rocks in streams; *Fl. & Ft.:* December–February.

Specimen examined: Nedumkandam, 12.02.2018, *Vishnu Mohan & Santhosh Nampy* 159175(CALI).

Zeylanidium sessile (Willis) C.D.K.Cook & Rutish., Taxon 50: 1167. 2001. *Hydrobryopsis sessilis* (Willis) Engl., Nat. Pflanzenfam, ed. 2. 18a: 60. 1930. *Hydrobryum sessile* Willis, Ann. Roy. Bot. Gard. Peradeniya 1(3): 239. 1902; Gamble, Fl. Madras 1198. 1925.

Thallus lichen-like, 2–8 mm wide, green or dark green, crustose, pinnately branched, forming a colony of 10–15 cm diam. Secondary shoots endogenous, marginal. Leaves 2–3 pairs, alternate, distichous, linear, 7–8 mm long, glabrous; upper leaves larger than lower leaves. Flowers zygomorphic, hypogynous, sessile. Bracts dorsiventrally flattened, 4–6, imbricate, dome-shaped. Spathe boat-shaped, *c.* 2 × 1 mm, prostrate, crustaceous, splits dorsally through longitudinal slits. Tepals 2, scale-like, *c.* 1 mm long, smooth, glabrous. Stamens 2, monadelphous, *c*. 1.5 mm long; anthers dithecous, introse. Ovary superior, obliquely globose, *c.* 2 mm long, bicarpellary, syncarpus; style reduced; stigma 2, equal. Capsules sub-sessile, smooth, globular, anisolobous. Seeds many.

Distribution: The native range is SW. India (POWO, 2023); *Habitat*: On submerged rocks in streams; *Fl. & Ft.:* December.

Specimen examined: Thommankutthu, 31.12.2017, *Vishnu Mohan & Santhosh Nampy* 159167 (CALI).

Zeylanidium subulatum (Gardner) C.Cusset Bull. Mus. Natl. Hist. Nat., B, Adansonia 14: 32 1992. *Podostemsum subulatum* Gardner in Calcutta J. Nat. Hist. 7: 184. 1847; Hook.f., Fl. Brit. India 5: 65. 1886; Gamble, Fl. Madras 1196. 1925.

Filamentous prostrate herbs, up to 8 cm long, green. Thallus branched in zig-zag manner. Leaves simple, alternate, subulate, glabrous, linear, 5–6 cm long, smooth, glabrous. Stipules 0. Flowers solitary, zygomorphic, sub-sessile, hypogynous. Bracts 2 or 3 paired,

imbricate, keeled, fleshy, glabrous. Spathe ellipsoid, *c.* 5 mm long, splits irregularly at tip, glabrous; pedicels *c.* 2 mm long. Tepals 2, membranous, linear, smooth, scale-like, glabrous. Stamens 2; anthers elliptic, *c.* 2 mm long, introse, longitudinally dehiscing. Ovary superior, ellipsoid, *c.* 2 × 1 mm long, 2-carpellary; stigma sticky, lanceolate, sessile. Capsules splitting by equal valves, 8-ribbed. Seeds many.

Distribution: Native range is S. & E. India and Sri Lanka (POWO, 2023); *Habitat*: On submerged rocks in streams; *Fl. & Ft.:* December-February.

Specimen examined: Manjappara, 12.02.2017, *Vishnu Mohan & Santhosh Nampy* 167895(CALI).

ARISTOLOCHIACEAE Juss.

Gen. Pl. 72. 1789, *nom. cons*.

Shrubs or perennial herbs, prostrate or climbing. Leaves alternate, entire or lobed, often with a stipule-like leaf of an undeveloped bud in the axils; petioless dilated at base. Flowers solitary or fascicled or racemose or cyme in the leaf axils; bracts often rather large. Perianth very variable in shape, size and colour, the tube inflated below, contracted in the central in a cylindrical neck, and then expanded in to a dilated oblique usually 2 lipped limb. Stamens adnate to the style column; anthers extrorse. Ovary inferior, more or less 6-celled; style column thick, 3–6-lobed. Fruit a septicidal capsule.

Eight genera and 706 species worlds over (POWO, 2023); two genera and five species in the study area.

Key to the genera

1. Climbing herbs or sub-shrubs; flowers zygomorphic ..…….…. *Aristolochia*
1. Shrubs or undershrubs; flowers actinomorphic ……...…..……...……. *Thottea*

Aristolochia L.

Sp. Pl. 2: 960. 1753.

Key to the species

1. Leaves cordate; limbs > 3 cm long…….……*A. acuminata*
1. Leaves lanceolate; limbs < 3 cm long……..*A. indica*

Aristolochia acuminata Lam., Encycl. 1: 254. 1783.

Aristolochia tagala Cham., Linnaea 7: 207. t. 5. f. 3. 1832; Gamble, Fl. Madras 1202. 1925.

Aristolochia roxburghiana Klotzsch in Monatsber., Königl. Preuss. Akad. Wiss. Berlin 1859: 596. 1859; Hook.f., Fl. Brit. India 5: 75. 1886.

Climbing glabrous subshrubs. Stems angled, slender, glabrous. Leaves simple, alternate; lamina cordate, 7.5–12.5 × 8–9.5 cm, acuminate acute at apex, deeply cordate at base, smooth, glabrous, membranous; petioles 3–5 cm long, slender, glabrous. Flowers in axillary racemes, non-fragrant; peduncles 0.6–1.5 cm long, slender; pedicels *c.* 2 cm long, slender, glabrous. Bracts ovate, 2–4 × *c.* 1 cm, acuminate at apex, smooth, glabrous. Perianth tube 1–1.5 cm long, hairy within, glabrous out, greenish-brown; limb *c.* 4.5 cm long, brown, tomentose within. Stamens 12, biseriate; connective broad, reduced; anthers oblong. Ovary 6-celled; ovules numerous; style reduced, glabrous, brown coloured; stigma 6, sticky. Capsules obovoid, transversely rugose, stalked, 6-celled. Seeds deltoid.

Distribution: Tropical & Subtropical Asia to NE. Queensland (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests; *Fl. & Ft.:* June-September.

Specimen examined: Poonkavanam, 08.06.1995, *Jomy Augustine* 15496 (CALI).

Aristolochia indica L., Sp. Pl. 2: 960. 1753; Hook.f, Fl. Brit. India 5: 75. 1890; Gamble, Fl. Madras 1202. 1921.

Climbing slender perennial herbs. Stems slender, narrow, glabrous. Leaves simple, alternate; lamina lanceolate, 3.5–5 × 1.5–2 cm, acute-acuminate at apex, truncate at base, smooth, glabrous, membranous; petioles 1–1.75 cm long, stout, glabrous. Flowers in few flowersed axillary racemes, non-fragrant; peduncles 1–2 cm long, glabrous, slender; pedicels 0.4–0.6 cm long, glabrous. Bracts lanceolate, 1–1.5 × 0.65–0.75 mm, acuminate at apex, entire, glabrous. Perianth tube funnel shaped, 1–1.5 cm long, bulbous at base, glabrous, grayish-brown; limbs narrowly elliptic, 2–2.5 cm long, rounded at apex, fleshy. Stamens 6; filaments glabrous. Ovary superior, elliptic, 2–3 mm long, glabrous, pale green; style very much reduced; stigma 6, sticky, sessile, fleshy. Capsules broadly elliptic, 2–3 × *c.* 1.5 cm, 8-ribbed. Seeds flat, deltoid, winged, thin.

Distribution: The native range of this species is Indian Subcontinent to Andaman Islands (POWO, 2023); *Habitat*: Road sides; *Fl. & Ft.:* June-September.

Specimens examined: Munnar, 08.06.2019, *Vishnu Mohan & Santhosh Nampy* 159276; Thannikkudy, 10.07.1993, *Jomy Augustine* 12073 (CALI).

Thottea Rottb.

Nye Saml. Kongel. Danske Vidensk. Selsk. Skr. 2: 529. t. 2. 1783.

Key to the species

1. Inflorescence > 3 cm long; stamens 15, free in 2 whorls……..……..…*T. dinghoui*
1. Inflorescence < 1.5 cm long; stamens 9, connate, triadelphous…….……2
2. Perianth lobes broadly elliptic, divided to base…….……..*T. siliquosa*

2. Perianth lobes broadly ovate, divided to middle……..…..*T. duchartrei*

Thottea dinghoui Swarupan., Blumea 28: 407. 1983.

Perennial erect herbs. Stems woody, channelled, pubescent on younger parts, glabrous when old Leaves opposite, decussate; lamina lanceolate-elliptic, 12.5–15 × 4.5–5.5 cm, acuminate at apex and base, entire, glabrous above, hispid below, leathery; petioless 0.3–1.5 cm long, ribbed, shallowly pubescent. Flowers in axillary racemes, more than 3 cm long, puberulous; peduncles 3–15 cm long, stout, hispid; pedicels *c.* 0.4 cm long, hispid on young stage, becoming glabrous. Bracts linear-lanceolate, 2–3 × 1 mm, acuminate at apex, entire, pubescent. Tepals 3, yellow, ovate-cordate, *c.* 5 × 4 mm, acute at apex, entire, fleshy, hairy out, glabrous within. Stamens 15, biseriate; filaments connate at base, glabrous; anthers linear, sickle shaped, yellow. Ovary hairy, inferior; ovules numerous; style, reduced; stigma capitate, sticky, many lobed. Capsules valved, 5–6 × *c*. 0.5 cm, purple. Seeds many, yellowish-brown.

Distribution: The native range of this species is India (Kerala) (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* April-November.

Specimen examined: Arjunan kotta, 03.04.1995, *Jomy Augustine* 15092 (CALI).

Thottea duchartrei Sivar., A.Babu & Balach., Indian J. Forest. 8: 267. 1985.



Erect shrubs, up to 2 m long. Stems minutely pubescent on younger parts, glabrous owhen old; nodes swollen and glabrous. Leaves simple, alternate, sub-sessile; lamina oblong-lanceolate, 12–30 × 3–7.5 cm, acuminate at apex, acute-oblique at base, entire, grayish, puberulous; petioless 0.2–0.5 cm long, puberulent, grooved. Flowers in axillary cymes; peduncles 0.2–0.3 cm long, slender, puberulous; pedicels 0.2–2.5 cm long, brown, sparsely pubescent. Bracts linear, *c.* 2 × 1 mm, acute at apex, smooth, hispid. Perianth tube 3-lobed, divided to middle, lobes broadly ovate, 4–5 × 6–8 mm, acute at apex, deeply purple-yellow, fleshy, minutely puberulent. Stamens (3 + 3 + 3); filaments very much reduced, glabrous; anthers sickle shaped, *c.* 2 × 1 mm. Ovary

inferior, linear, 2–3 × *c*. 1 mm, glabrous; style 0; stigma sessile, 9, sticky, velvitish. Capsules linear, 5–10 × *c*. 0.5 cm, many seeded. Seeds brown, ellipsoid, rugose.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat:* Shola forests; *Fl. & Ft.:* June-March.

Specimens examined: Kannadippara, 08.06.2018, *Vishnu Mohan & Santhosh Nampy* 159276; Thommankutthu, 10.12.2016, *Vishnu Mohan & Santhosh Nampy* 151311; way to Panamkutty, 10.03.2017, *Vishnu Mohan & Santhosh Nampy* 152057(CALI).

Thottea siliquosa (Lam.) Ding Hou, Blumea 27: 327. 1981. *Apama siliquosa* Lam., Encycl. 1: 91. 1783; Gamble, Fl. Madras 1200. 1921.

Bragantia wallichii Wight & Arn. in R.Wight, Cat. Ind. Pl. 57. 1833; Hook.f, Fl. Brit. India 5: 73. 1890.



Shrubs, up to 2 m long. Stems solid, striated, quadrangular, bulged on the nodal region, hairy on younger parts, glabrous when old. Leaves simple, alternate; lamina lanceolate-oblong, 9–25 × 3–6 cm, acuminate at apex, cuneate-rounded at base, entire, tomentose below, glabrous above; petioless 0.5–1 mm long, grooved, glabrous. Flowers in axillary fascicles; peduncles 0.2–0.8 cm long, pubescent; pedicels 0.2–0.3 cm long, pubescent. Bracts linear, *c.* 3.5 × 1 mm, acute-acuminate at apex, pubescent. Perianth tube 3-lobed, divided to the base, incurved, ovate, *c.* 6 × 5 mm, obtuse at apex, rounded at base, smooth, yellow-purplish brown, densely pubescent on inner surface and sparsely pubescent on outer surface. Stamens 6–9 (2 + 2 + 2 / 3 + 3 + 3); filaments much reduced; anthers *c.* 2 × 1 mm. Ovary linear, inferior, 3–5 mm long, glabrescent, pubescent with hooked hairs; style much reduced; stigma 3–6. Capsules linear, longitudinally ribbed, 5–10 × *c*. 0.5 cm, siliquiform, glabrous. Seeds ellipsoid, *c*. 2 mm long.

Distribution: The native range of this species is India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.:* March-December.

Specimens examined: Edamalakkudi, 10.03.2019, *Vishnu Mohan & Santhosh Nampy* 15918; Edamalakkudy, 16.03.2019, *Vishnu Mohan & Santhosh Nampy* 168971; Kannadippara, 08.06.2018, *Vishnu Mohan & Santhosh Nampy* 159276;

MATHIKETTAN SHOLA NATIONAL PARK, Sivanpara, 16.12.2017, *S. Syam Radh & Santhosh Nampy* 153416; Nallathanni kallar, 16.09.2018, *Vishnu Mohan & Santhosh Nampy* 161938 (CALI).

PIPERACEAE Giseke

Prael. Ord. Nat. Pl. 123. 1792, *nom. cons*.

Herbs or shrubs, erect or scandent; vascular bundles more or less scattered. Leaves usually alternate, entire, rarely opposite, or whorled, stipules adnate to the petioles or absent. Flowers minute, hermaphrodite or unisexual, usually densely spicate or spikes umbellate. Perianth absent. Stamens 2–6, hypogynous; filaments usually free; anthers 2-celled, distinct or confluent. Ovary superior, 1-celled, 1-ovuled; stigmas 1–5, short; ovule erect. Fruit baccate, small, with a succulent, thin or dry pericarp. Seeds small, with small endosperm and copious mealy perisperm; embryo very small.

The family includes five genera and 3832 species (POWO, 2023); two genera and 14 species in the study area.

Key to the genera

1. Woody climbing shrubs; spikes unisexual…….. *Piper*

1. Soft erect herbs or sub-shrubs; spikes bisexual……..……..……. *Peperomia*

Peperomia Ruiz & Pav.

Fl. Peruv. Prodr. 8. 1794.

Key to the species

1. Stamen one……. *P. ekakesara*

1. Stamens 2 or 3…….…….2

2. Annuals, non-stoloniferous; leaves alternate, base of blade cordate; erect or ascending; ……..... *P. pellucida*

2. Perenials, stoloniferous; leaves opposite or in whorls of 3–5, base of blade cuneate to rounded……..……..……3

3. Peduncles densely pubescent; leaves usually thick..... *P. tetraphylla*

3. Peduncles glabrous; leaves thin and flat…..……4

4. Stamens 3…….*P. portulacoides*

4. Stamens 2…….……5

5. Leaves persistently uniformly pubescent to shortly hispid ……*P. leptostachya*

5. Leaves glabrous or rapidly glabrescent……..……*P. heyneana*

Peperomia ekakesara Syam Radh & Nampy, Phytotaxa 364: 284. 2018.



Annual, epipetric, glabrous herbs. Stems procumbent, transparent, succulent, swollen at nodes. Leaves simple, opposite, or whorled towards apex; lamina ovate-elliptic, 2.5–3 × 1.3–1.7 cm, obtuse-rounded at apex, obtuse at base, entire, glabrous, rarely hairy at apex, fleshy, veins sunken; petioless 0.3–0.5 cm long, geniculate, glabrous. Flowers bisexual, in terminal and axillary spikes, non-fragrant, green; peduncle s 1.5–4 cm long, glabrous, green. Bracts peltate, margin wavy, *c.* 0.5 × 0.5 mm, glabrous, green, persistent. Stamens 1 in each flowers, oriented towards left side; filaments *c.* 0.15 mm long, glabrous, white; anthers *c.* 0.25 × 0.25 mm, white. Ovary green, superior, *c.* 0.5 × 0.25 mm, elliptic, glabrous; style absent. Fruits globose to ovoid. Seeds 1, adherent to the endocarp, albumen floury.

Distributon: The native range of this species is India (Kerala) (POWO, 2023);

Habitat: Shola forests: *Fl. & Ft.*: August-December.

Specimens examined: Mathikettan Shola National Park (Sivanpara), 16.08.2016, *S.Syam Radh & Santhosh Nampy* 151707; Mathikettan Shola National Park, 05.08.2018, *Vishnu Mohan & Santhosh Nampy* 144123 (CALI).

Peperomia heyneana Miq., Syst. Piperac. 123. 1843; Gamble, Fl. Madras 2: 1210. 1925. *Peperomia wightiana* Miq., London J. Bot. 5: 548. 1846; Hook.f., Fl. Brit. India 5: 98. 1886; Gamble, Fl. Madras 2: 1210. 1925.

Perennial, erect, epiphytic herbs, up to 15 cm tall. Stems glabrous, fleshy, transparent. Leaves simple, whorled, estipulate; lamina elliptic-obovate, 0.7–2 × 0.5–1.5 cm, acute-rounded at apex, attenuate at base, entire, glabrous or rapidly glabrescent, fleshy, veins sunken; petioless 3–5 mm long, glabrous, fleshy. Flowers bisexual, in axillary-terminal solitary, spikes, non-fragrant, green; peduncles 1.5–3 cm long, glabrous, fleshy, glabrous; pedicels reduced. Bracts peltate, glabrous, entire. Stamens 2; filaments *c.* 0.3 mm long, glabrous. Ovary oblique, superior, hyaline; style reduced; stigma two, sticky. Fruit globose, minutely stipitate. Seeds globose.

Distributon: The native range of this species is Indian Subcontinent to S. China and Indo-China (POWO, 2023); *Habitat:* Evergreen forests: *Fl. & Ft.*: August-December.

Specimen examined: Rhodovalley, 22.11.2018, *Vishnu Mohan & Santhosh Nampy* 168801 (CALI).

Peperomia leptostachya Hook. & Arn., Bot. Beechey Voy. 96. 1832.

Peperomia dindygulensis Miq., Syst. Piperac. 122. 1843; Hook.f., Fl. Brit. India 5: 98. 1886; Gamble, Fl. Madras 2: 1210. 1925.

Annual epiphytic, erect terrestrial herbs. Stems terete, tomentose, fleshy. Leaves simple, opposite, estipulate; lamina elliptic-obovate, 2–4.5 × 1.5–3 cm, acute at both ends, entire, uniformly pubescent to shortly hispid, fleshy; veins sunken; petioles *c.* 1.2 cm long, fleshy, glabrous-sparsely pubescent. Flowers bisexual, in terminal slender axillary spikes, non-fragrant, green; peduncle 1–2 cm long, glabrous. Bracts orbicular, peltate *c.* 0.8 × 0.3 mm, ovate at apex. Stamens 2; filaments *c.* 0.5 mm long, glabrous. Ovary; style reduced; stigma 2, capitate. Nutlets obovoid.

Distributon: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat:* Moist deciduous, semi-evergreen and evergreen forests: *Fl. & Ft.*: July-December.

Specimen examined: Munnar, 08.10.2018, *Vishnu Mohan & Santhosh Nampy* 152436 (CALI).

Peperomia pellucida (L.) Kunth F.W.H.von Humboldt, A.J.A.Bonpland & C.S.Kunth, Nov. Gen. Sp. 1: 64. 1816; Gamble, Fl. Madras 1210. 1925. *Piper pellucidum* L. in Sp. Pl.: 30 1753. *Peperomia exigua* Sensu Hook.f., Fl. Brit. India 5: 97. 1886 non (Blume) Miq. 1843.

Delicate glabrous annual herbs, up to 20 cm tall. Stems pellucid, fleshy, transparent. Leaves simple, alternate throughout, estipulate; lamina cordate, 1–3 × 1–3 cm, shortly acuminate at apex, cordate at base, entire, thin, delicate, pellucid, veins sunken; petioles 5–15 mm long, glabrous, transparent, clasping on stems. Flowers bisexual, in



terminal-axillary solitary spikes non-fragrant, green; peduncles 2–5 cm long, glabrous, fleshy. Bracts peltate, *c.* 0.3 × 0.2 mm, glabrous, entire. Tepals absent. Stamens 3; filaments *c.* 0.4 mm long, transparent. Ovary orbicular; style reduced; stigma 3, sticky. Fruit globose-ellipsoid, sessile. Seeds ovate, glabrous.

Distributon: The native range of this species is Tropical & Subtropical America, Tropical Africa, Madagascar (POWO, 2023); *Habitat:* Lithophyte in evergreen forests: *Fl. & Ft.*: July-December.

Specimen examined: Adimali, 07.08.2019, *Vishnu Mohan & Santhosh Nampy* 170215 (CALI).

Peperomia portulacoides (Lam.) Dietr., Sp. Pl. ed. 6. 1: 172. 1831; Hook.f., Fl. Brit. India 5: 98. 1886; Gamble, Fl. Madras 2: 1210. 1925.



Perennial terrestrial creeping herbs, up to 25 cm tall. Stems glabrous, terete, fleshy. Leaves simple, opposite-sub-opposite towards tip, estipulate; lamina obovate-rhomboid, 2–3.5 × 1.5–2.5 cm, obtuse at apex, cuneate at base, entire, glabrous, fleshy, veins sunken; petioless 8–18 mm long, glabrous, shallowly grooved above, fleshy. Flowers bisexual, in axillary solid spikes, non-fragrant, green; peduncles *c.* 2 cm long, glabrous, fleshy; pedicels obscure. Bracts orbicular, *c.* 0.3 × 0.2 mm, glabrous, sessile, margins white. Tepals absent. Stamens 3; filaments *c.* 0.3 mm long, glabrous, transparent. Ovary ovate; style reduced; stigma capitate. Drupes scaly.

Distributon: The native range of this species is Seychelles, Mascarenes, SW. & S. India, Sri Lanka and N. Thailand (POWO, 2023); *Habitat:* Lithophyte in evergreen forests: *Fl. & Ft.*: July-December.

Specimens examined: Calvari mount, 06.09.2017, *Vishnu Mohan & Santhosh Nampy* 154396; Kannadippara, 08.06.2018 *Vishnu Mohan & Santhosh Nampy*; Meenuliyan para, 12.12.2016, *Vishnu Mohan & Santhosh Nampy* 151416; Valara, 27.12.2018, *Vishnu Mohan & Santhosh Nampy* 156536 (CALI).

Peperomia tetraphylla (G.Forst.) Hook. & Arn., Bot. Beechey Voy. 97. 1832. *Peperomia reflexa* sensu Hook.f., Fl. Brit. India 5:99.1886; Gamble, Fl. Madras 1209. 1925. non (L. f.) Dietr.,



Epiphytic erect herbs, up to 15 cm tall. Stems quadrangular, sparsely hairy, fleshy. Leaves simple, whorled, estipulate; lamina elliptic-orbicular, 5–10 × 5–7 mm, obtuse at apex, acute-rounded at base, entire, glabrous-s parsely hairy, fleshy, veins sunken; petioless *c.* 3 mm long, glabrous, fleshy. Flowers bisexual, in terminal erect spike non-fragrant, green; peduncles 1–2 cm long, densely pubescent, thin. Bracts peltate, ovate, *c.* 0.3 × 0.2 mm, glabrous, sessile. Tepals absent. Stamens 2; filaments *c.* 1 mm long, glabrous, thin. Ovary ovate; style *c.* 0.2 mm long, glabrous; stigmas 3-toothed. Drupes ovate, glabrous. Nutlets ovoid, beaked, brown, glabrous.

Distributon: The native range of this species is Tropics & Subtropics (POWO, 2023); *Habitat:* Evergreen, moist deciduous and shola forests: *Fl. & Ft.*: September-March. *Specimens examined*: Anamudi shola, 25.01.2018 *Vishnu Mohan & Santhosh Nampy* 158263; Mesthirikettu, 30.12.2017 *Vish nu Mohan & Santhosh Nampy* 158097; M.S.N.P, 04.01.2017, *Vishnu Mohan & Santhosh Nampy* 151442; Munnar, 15.09.2018, *Vishnu Mohan & Santhosh Nampy* 141823 (CALI).

Piper L.

Sp. Pl. 1: 28. 1753.

1. Erect shrubs……..…….…… *P. umbellatum*
1. Climbing shrubs ……...…….…….2
2. Flowers subtended by peltate orbicular bracts…….…...……3
2. Flowers not as the above but on cups……...*P. trichostachyon*
3. Leaves prominently ribbed…….……4
3. Leaves not ribbed……...…….5
4. Leaf base acute……..……..…….*P. peepuloides*
4. Leaf base cordate……..…...……..*P. schmidtii*

5. Stipules present……..…….……*P. barberi*

5. Stipules absent…….…….6

6. Bracts forming a cup under the flowers…….……*P. velayudhanii*

6. Bracts adnate to the rachis……7

7. Leaves coriaceous……..……*P. wightii*

7. Leaves membranous……*P. argyrophyllum*

Piper argyrophyllum Miq., Syst. Piperac. 330. 1844; Hook.f., Fl. Brit. India 5: 93. 1886; Gamble, Fl. Madras 2: 1207. 1925.



Slender climbing shrubs. Stems woody, terete, branched, glabrous, nodes jointed, smooth when young, lenticellate when old. Leaves simple, alternate, estipulate; lamina ovate-lanceolate, 8–13 × 5–6 cm, acuminate at apex, acute or rounded at base, entire, glabrous, membranous, not ribbed, actinodromous imperfect reticulate venation; petioless *c.* 1 cm long, glabrous, smooth, grooved above. Flowers bisexual, in leaf opposed slender drooping spikes, subtended by peltate orbicular bracts, non-fragrant, green; peduncles 2–3 cm long, slender, glabrous; pedicels obscure. Bracts adnate with rachis, oblong-elliptic, *c.* 0.3 × 2 mm, ciliate, glabrous, thick. Tepals absent. Stamens 2; filaments *c.* 0.3 mm long, glabrous, transparent, erect, glabrous, slender. Ovaryorbicular; style obscure; stigma 3, sticky. Berries globose.

Distributon: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat:* Semi-evergreen and evergreen forests: *Fl. & Ft.*: March-July.

Specimens examined: Edamalakkudi, 17.03.2018, *Vishnu Mohan & Santhosh Nampy* 168974; Devikulam, 21.04.2018, *Vishnu Mohan & Santhosh Nampy* 152340; Kuttikkanam, 28.04.2018, *Vishnu Mohan & Santhosh Nampy* 159222; Mankulam, 05.12.2018, *Vishnu Mohan & Santhosh Nampy* 168862; Pampadum Shola, 15.06.2019, *K.D. Prathapan* 543 (CALI).

Piper barberi Gamble, Bull. Misc. Inform. Kew 1924: 387. 1924, Gamble, Fl. Madras 2: 1206. 1925.

Slender climbing shrubs. Stems woody, terete, glabrous, nodes jointed, smooth when

young, lenticellate when old. Leaves simple, alternate; lamina oblong-lanceolate, 8–15 × 3–6 cm, abruptly acuminate at apex, obtuse at base, entire, glabrous, leathery, not ribbed, actinodromous imperfect reticulate venation; petioless 1–3 cm long, glabrous, erect, slender, grooved above. Stipules lanceolate, 2–2.5 ×0.8 cm, acuminate at apex, entire, glabrous. Flowers bisexual, in leaf opposed slender drooping spikes, subtended by peltate orbicular bracts, non-fragrant, green; peduncles 2–4 cm long, slender; pedicels obscure. Bracts peltate, orbicular, entire, glabrous, thin, transparent. Tepals absent. Stamen 1; filaments *c.* 0.3 mm long, transparent, glabrous. Ovary ovate, glabrous; style obscure; stigma 2, curved, sticky, fleshy. Berries globose.

Distributon: The native range of this species is S. India (POWO, 2023); *Habitat:* Evergreen forests: *Fl. & Ft*.: March-September.

Specimens examined: Anakkulam, 19.09.2019, *Vishnu Mohan & Santhosh Nampy* 161970; Puthukkad, 08.08.2018, *Vishnu Mohan & Santhosh Nampy* 151203 (CALI).

Piper peepuloides Roxb. Fl. Ind. 1: 159. 1820.

Piper brachystachyum Wall. ex Hook.f., Fl. Brit. India 5: 87. 1886, *nom. illeg*; Gamble, Fl. Madras 2: 1206. 1925.

Slender climbing shrubs. Stems woody, terete, glabrous, jointed at nodes, glabrous when young, lenticellate when old. Leaves simple, alternate, estipulate; lamina elliptic, *c.* 9 × 4 cm, acuminate at apex, acute at base, entire, glabrous, coriaceous, ribs prominent, actinodromous imperfect reticulate venation; petioless 1–2 cm long, glabrous, grooved above, slender. Flowers unisexual, in leaf opposed slender erect spikes, subtended by peltate orbicular bracts, non-fragrant, green. Male spike erect, up to 4 cm long, slender. Bracts peltate, orbicular *c.* 0.3 × 0.3 mm, glabrous on both sides. Stamens 3; filaments *c.* 0.3 mm long, glabrous. Female spike erect, oblong; peduncles *c.* 1 cm long, slender, glabrous. Ovary ovate; style obscure; stigmas 3, spreading, sticky. Berries globose glabrous. Nutlet ovate.

Distributon: The native range of this species is Indian Subcontinent to China (S. Sichuan, Yunnan) and N. Indo-China and Hainan (POWO, 2023); *Habitat:* Evergreen and shola forests: *Fl. & Ft*.: January-April.

Specimen examined: Anamudishola, 30.04.2018, *Vishnu Mohan & Santhosh Nampy* 185462 (CALI).

Piper schmidtii Hook.f., Fl. Brit. India 5: 89. 1886; Gamble, Fl. Madras 1206. 1925.

Climbing shrubs. Stems woody, terete, nodes swollen, glabrous, nodes jointed, smooth when young, lenticellate when mature. Leaves simple, alternate, estipulate; lamina ovate-elliptic, 7–16 × 3–5 cm, acuminate at apex, cordate at base, entire, glabrous, glaucous below, ribs prominent, actinodromous imperfect reticulate venation; petioless 1–2 cm long, glabrous, slightly grooved above. Flowers unisexual, in leaf opposed drooping spikes, subtended by peltate orbicular bracts, non-fragrant, green-white. Male spikes 3–7 cm long; peduncles 1–2 cm long. Bracts circular with free margin, glabrous. Stamens usually two; filaments *c.* 0.3 mm long, glabrous. Female spikes 5–7 cm long; bracts orbicular-ovate, *c.* 0.3 × 0.3 mm, glabrous. Ovary ovate; style obscure; stigma sticky, fleshy. Berries ovate.

Distributon: The native range of this species is W. & S. India (POWO, 2023); *Habitat:* Shola forests; *Fl. & Ft.*: November-April.

Specimen examined: Rhodovalley, 22.11.2018, *Vishnu Mohan & Santhosh Nampy* 168802 (CALI).

Piper trichostachyon (Miq.) C.DC. A.P.de Candolle, Prodr. 16(1): 242. 1869; Hook.f., Fl. Brit. India 5: 80. 1886; Gamble, Fl. Madras 2: 1205. 1925. *Muldera trichostachya* Miq. in London J. Bot. 5: 556. 1846.

Climbing stout shrubs. Stems woody, terete, glabrous, nodes jointed, swollen at nodes; smooth when young, lenticellate when mature. Leaves simple, alternate, estipulate; lamina elliptic-ovate, 8–12 × 3–6 cm, acuminate at apex, acute at base, entire, glabrous, coriaceous, actinodromous imperfect reticulate venation; petioless 1–2 cm long, stout, glabrous. Flowers bisexual, on cups of drooping spikes, non-fragrant; peduncles 1–3 cm long, slender, glabrous. Bracts pubescent, forming a fleshy cup, glabrous, thick. Stamens 2; filaments *c.* 0.5 mm long, stout, fleshy, glabrous. Ovary ovate, glabrous; style obscure; stigma sticky, fleshy. Berries globose, yellowish red, glabrous.

Distributon: The native range of this species is S. India (POWO, 2023); *Habitat:* Semi-evergreen and moist deciduous forests: *Fl. & Ft.*: March-June.

Specimens examined: Mankulam, 13.08.2018, *Vishnu Mohan & Santhosh Nampy* 1654230; Uppupara, 24.03.1994, *Jomy Augustine* 13478 (CALI).

Piper umbellatum L., Sp. Pl. 1: 30. 1753. *Lepianthes umbellata* (L.) Raf. ex Ramamoorthy in C.J.Saldanha & D.H.Nicolson, Fl. Hassan Distr. 52. 1976.

Heckeria subpeltata (Willd.) Kunth, Linnaea 13: 571. 1840; Gamble, Fl. Madras 2: 1208. 1925.

Piper subpeltatum Willd., Sp. Pl., ed. 4. 1: 166. 1797; Hook.f., Fl. Brit. India 5: 95. 1886.



Erect shrubs, up to 2 m tall. Stems ridged, woody a t base, angular-terete, glabrous, smooth when young, lenticellate when mature. Leaves simple, alternate, estipulate; lamina orbicular, 20–40 × 20–40 cm, rounded at apex, cordate at base, entire, pubescent above, glabrous below, campylodromous venation, thin; petioless 10–20 cm long, terete, slender, glabrous, glaucous. Flowers bisexual, in axillary spikes, non-fragrant, green; peduncles 3–8 cm long; pedicels reduced or absent. Bracts peltate, stalked, triangular, *c.* 2 × 1 mm, acute at apex, ciliate, glabrous, thin. Tepals absent. Stamens 3; filaments *c.* 0.5 mm long, glabrous. Ovary obovoid, truncate; style absent; stigmas 3, sessile, curved. Berries trigonous, glabrous.

Distributon: The native range of this species is Mexico to Tropical America (POWO, 2023); *Habitat:* Semi-evergreen and evergreen forests: *Fl. & Ft.*: June-February.

Specimen examined: Vallakkadavu, 08.05.2018, *Vishnu Mohan & Santhosh Nampy* 1515284 (CALI).

Piper velayudhanii E.S.S.Kumar & S.P.Mathew, J. Sci. Res. (Rajshahi) 5: 579. 2013. *Piper pseudonigrum* Velay. & Amalraj in J. Econ. Taxon. Bot. 16: 247. 1992, *nom. illeg*. *Piper sivarajanii* Karthik. & V.S.Kumar, Phytotaxa 167: 210. 2014, *nom. superfl.*

Climbing shrubs. Stems woody, terete, glabrous but rough, swollen at nodes, nodes jointed, glabrous, smooth when young, lenticellate when old. Leaves alternate, simple, estipulate; lamina ovate, 10–20 × 6–12 cm, acuminate at apex, rounded-acute at base, entire, glabrous, coriaceous, not ribbed, actinodromous imperfect reticulate venation; petioless 1–2 cm long, glabrous, terete, grooved above. Flowers unisexual, in slender leaf opposite drooping spikes, subtended by peltate cup shaped bracts, non-fragrant, green. Male spikes up to 20 cm long; peduncles 1–3 cm long, pubescent. Stamens two; filaments *c.* 0.4 mm long, glabrous; anthers two-celled. Female spikes drooping, 7–10 cm long, peduncles up to 2.4 cm, glabrous. Ovary spherical, subtended by a cupular bract; stigma sessile, 3–4 lobed, lobes short, papillate. Fruits globose.

Distributon: The native range of this species is India (Kerala) (POWO, 2023); *Habitat:* Evergreen forests; *Fl. & Ft.*: December-May.

Specimens examined: Mathikettan Shola National Park 11.12.2016, *Vishnu Mohan & Santhosh Nampy* 151376; Nakshathrakutthu, 04.12.2018, *Vishnu Mohan & Santhosh Nampy* 168837; way to Mankulam, 27.12.2017, *Vishnu Mohan & Santhosh Nampy* 156535 (CALI).

Piper wightii Miq., Hook.'s London J. Bot. 5: 552. 1846; Hook.f., Fl. Brit. India 5: 94. 1886; Gamble, Fl. Madras 1207. 1925.

Stout climbing shrubs. Stems woody, terete, rigid, jointed at nodes, glabrous, lenticellate at base. Leaves simple, alternate, estipulate; lamina ovate, lanceolate, 12–17 × 6–8 cm, acuminate at apex, round-subcordate at base, entire, glabrous above, glaucous beneath, coriaceous, not ribbed, actinodromous imperfect reticulate venation; petioless 1–2 cm long, glabrous, terete, slender. Flowers bisexual, in leaf opposed slender drooping spikes, non-fragrant, green; peduncles 1–2 cm long, slender, glabrous; pedicels obscure. Bracts hooded at one side, attached to rachis, orbicular-elliptic *c.* 0.4 × 0.4 mm, rounded, entire, glabrous, smooth. Tepals absent. Stamens 2; filaments *c.* 0.6 mm long, smooth, thin. Ovary ovate-orbicular, glabrous; style reduced; stigma sticky, fleshy. Berries globose, smooth.

Distributon: The native range of this species is S. India (POWO, 2023); *Habitat:* Evergreen and shola forests: *Fl. & Ft.*: July-February.

Specimen examined: Anamudi Shola National Park, 25.01.2018, *Vishnu Mohan & Santhosh Nampy* 158254 (CALI).

CHLORANTHACEAE R.Br. ex Sims

Bot. Mag. 48: ad t. 2190 1820, nom. cons.

Evergreen trees and scandent shrubs. Leaves opposite, margins crenate-serrate. Staminate flowers 60–300 per spike, without perianth, ebracteate, with 1–3 sessile stamens. Pistillate flowers few; perianth 3-toothed, calyx like, free at base. Fruit a fleshy drupe, aromatic and brightly coloured, exocarps thin. Seed 1 per fruit, small, brown or black smooth or minutely papillate.

The family icludes four genera and about 75 species (POWO, 2023); a single species in the study area.

Sarcandra Gardner

Calcutta J. Nat. Hist. VI. 1846

Sarcandra glabra subsp. **brachystachys** (Blume) Verdc., Kew Bull. 40(1): 216. 1985 *Chloranthus brachystachys* Blume in Fl. Javae, Chloranth.: 13 1829.

Sarcandra irvingbaileyi Swamy, Proc. Natn. Inst. Sci. India 19: 301. 1953. *Sarcandra grandifolia* (Miq.) Subram. & Henry, Bull. Bot. Surv. India 12: 5. 1972; *Chloranthus grandifolius* Miq., Fl. Ind. Bat. 1: 802. 1856; Wight, Icon. Pl. Ind. Orient. 6. T. 1946. 1853; Matthew, Illu. Fl. Palni Hills 604. 1996.



Erect branching shrubs, 1–1.5 m tall. Stems woody, terete, slender, nodes swollen, glabrous, green when young. Leaves simple, opposite; lamina ovate-lanceolate, 8–19 × 2–8 cm, acuminate at apex, cuneate at base, coarsely serrate, glabrous, coriaceous; petioless 1–2 cm long, glabrous. Stipules often forming sheath round the nodes, glabrous, membranous. Flowers in terminal or axillary spikes or panicles, 3–6 cm long, unisexual, non-fragrant. Bracts, petalloid, elliptic-ovate, *c.* 6 × 3 mm, acute at apex, entire, glabrous, yellow. Male flowers: Perianth 0. Stamen 1, cylindrical, fusiform, up to 6 mm long, fleshy, glabrous. Female flowers sessile. Ovary 1-ovuled; stigma sessile, truncate. Berries ovoid, 6–8 × 3–4 mm, purplish-black, glabrous, smooth.

Distribution: The native range of this subspecies is S. India, Sri Lanka, Assam to S. China and New Guinea (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: August-May.

Specimens examined: Kalvari mount, 06.09.2017 *Vishnu Mohan* & *Santhosh Nampy* 188892; Mathikettan Shola National Park, Sivanpara, 23.08.214, *S. Syam Radh & Santhosh Nampy* 143525; Painavu, 04.04.2018 *Vishnu Mohan & Santhosh Nampy* 158437 (CALI).

MYRISTICACEAE R.Br.

Prodr. 399. 1810, *nom. cons.*

Trees. Leaves alternate, entire, stipules absent. Inflorescences axillary or extra-axillary, rarely terminal, capitate, umbellate, fascicled or racemose; bracts often present; bracteoles mostly absent. Male flowers: Stamens 2–30(–40); filaments joined into a column; anthers adnate to the column; rudimentary ovary absent. Female flowers: Ovary superior, usually sessile; style very small or absent; stigmas 2. Fruits with fleshy or leathery pericarp, mostly dehiscent into 2 valves. Seeds with a thin or fleshy, often highly coloured entire, lobed or laciniate aril.

The family includes 21 genera in the world (POWO, 2023); three genera and three species in the study area.

Key to the genera

1. Staminal column peltate……..……...……*Knema*

1. Staminal column not peltate…….2

2. Anthers free at apex……...……*Gymnacranthera*

2. Anthers attached completely ……..….*Myristica*

Gymnacranthera (A.DC.) Warb.

Ber. Deutsch. Bot. Ges. 13. 94. 1896.

Gymnacranthera canarica (Bedd. ex King) Warb. Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 68: 368 1897; Gamble, Fl. Madras 2: 1212. 1925.

Large trees, up to 20 m tall. Stems woody, terete; bark smooth, brown. Leaves simple, alternate, estipulate; lamina elliptic-lanceolate, 8–12 × 5–8 cm, acute at apex, rounded at base, entire at margins, glabrous above, glaucous beneath; petioles 1–2 cm long, sparsely pubescent, slightly grooved above. Flowers in axillary racemes, unisexual, fragrant; peduncles 8–13 cm long, stout, sparsely pubescent; pedicels *c.* 0.5 cm long, stout, narrow. Perianth tubular, 4-lobed; lobes ovate, *c.* 5 × 3 mm, acute at apex, entire, pubescent above, glabrous within. Stamens 6; anthers free at apex; filaments united at base, *c.* 5 mm long, glabrous. Ovary superior, ovate; style narrow, reduced, glabrous; stigma capitate fleshy. Capsules glabrous, orbicular. Seed one, arilate.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Along banks of rivers in evergreen forests; *Fl. & Ft.*: March-April.

Specimen examined: Puthussery, 05.04.1994, *Jomy Agustine* 13510 (CALI).

Knema Lour.

Fl. Cochinch. 2: 604. 1790.

Knema attenuata (Wall. ex Hook.f. & Thomson) Warb. Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 68: 590 1897; Gamble, Fl. Madras 2: 1215. 1925. *Myristica attenuata* Wall. ex Hook.f. & Thoms., Fl. Ind. 157. 1855; Hook.f., Fl. Brit. India 5: 110. 1886.

Large trees, up to 20 m tall. Stems terete, glabrous, woody; bark grey, lenticellate. Leaves simple, alternate, estipulate; lamina ovate, 8–15 × 4–6 cm, acute at apex, attenuate at apex, glabrous and glossy above, glaucous beneath; petioles 0.6–1.4 cm long, glabrous, terete. Flowers in rusty pubescent fascicles, unisexual, non-fragrant; peduncles 0.5–2 cm long, stout, golden-brown pubescent; pedicels narrow. Bracts absent. Perianth united at base,

fleshy, 3-lobed; lobes ovate, 5–10 × 4–8 mm, acute at apex, entire, rusty pubescent out, glabrous within. Stamens 12; staminal column peltate, fleshy, united at base. Ovary superior, ovoid; style short, thick, fleshy, hairy; stigma 2, sticky. Capsules ovoid, apiculate, rusty tomentose.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: December-June.

Specimen examined: Valara, 06.04.1992, *N.N. Kurian* 46310 (CALI).

Myristica Gronov.

Fl. Orient. 141. 1755.

Myristica malabarica Lam. Mém. Acad. Sci. (Paris) 1788: 162 1791; Hook.f., Fl. Brit. India 5: 103. 1886; Gamble, Fl. Madras 2: 1213. 1925.

Dioecious trees, up to 20 m tall. Stems terete, glabrous, woody; bark greenish-black, smooth. Leaves simple, alternate, estipulate; lamina elliptic-oblong, 8–16 × 3–7 cm, acute at apex, attenuate at base, entire, glabrous and glossy above, glaucous beneath, coriaceous; petioles 1–1.5 cm long, stout, grooved above, glabrous. Flowers unisexual, fragrant, pale green, in axillary cymes; pedicels 0.3–0.6 cm long, glabrous. Perianth urceolate, 5–7 × *c*. 4 mm, acute at apex, entire, puberulous out, glabrous within. Stamens 12; anthers sessile at apex; filaments fused, fleshy, glabrous. Ovary superior, sessile, globose, hairy; stigma 2-clefted, glabrous. Capsules oblong, pubescent. Seed one, oblong.

Distribution: The native range of this species is SW. India and Bangladesh (POWO, 2023); *Habitat*: Evergreen and swamp forests; *Fl. & Ft.*: January-September.

Specimen examined: Koruthode, 28.02.1997, *Jomy Agustine* 13397 (CALI).

LAURACEAE Juss.

Gen. Pl. 80. 1789, *nom. cons.*

Trees or shrubs with aromatic oil glands. Leaves simple, exstipulate. Infloresence an axillary cyme, raceme or rarely flowers solitary. Flowers bisexual or unisexual. Perianth 2 seriate-whorled, apo-tepalous; hypanthium present. Stamens 3–12; staminodes often present; anthers valvular. Ovary 1-locular; style terminal; stigmas 1–3. Fruit a berry or drupe.

The family includes 56 genera in the world (POWO, 2023); ten genera and 31 species in the study area.

Key to the genera

1. Flowers unisexual, in pseudo-umbels or racemes, rarely solitary; bracts with involucres……...2

1. Flowers bisexual, in panicles or clusters, rarely in pseudoumbels; bracts without involucres……...4

2. Flowers 2-merous; perianth lobes……..……..……*Neolitsea*

2. Flowers 3-merous; perianth lobes 6 or 12 or 22……3

3. Bracts of involucre imbricate, caducous, leaves usually whorled, rarely opposite or alternate; inflorescence an umbel…….……*Actinodapne*

3. Bracts of involcure decussate, persistent or late deciduous, leaves usually alternate, rarely sub-verticillate or opposite, inflorescence raceme……*Litsea*

4. Anthers 2-locular……5

4. Anthers 4-locular……6

5. Fruits enveloped by dilated perianth……..……*Cryptocarya*

5. Fruits not enveloped by dilatedperianth tube…….*Beilschmiedia*

6. Leaves opposite or sub-opposite, tri nerved…….……. *Cinnamomum*

6. Leaves alternate or crowded towards apex of branchlets, penninerved……..……7

7. Perianth lobes persistent …….……8

7. Perianth lobes deciduous ……9

8. Anthers 4-locular……...……*Phoebe*

8. Anthers 2-locular……..*Apollonias*

9. Perianth lobes persistent, 5–6 mm long……*Machilus*

9. Perianth lobes caducous, 3–4 mm long…….……...……*Alseodaphne*

Actinodaphne Nees

Pl. Asiat. Rar. 2. 68. 1831.

Key to the species

1. Leaves 5–9.5 × 1.5–3 cm...……...……..……2

1. Leaves 10–25 × 4–8 cm ……..……...……3

2. Tepals persistent …….…….. ……..……*A. salicina*

2. Tepals caducous …….……...…….*A. campanulata*

3. Perianth cup platelliform……..……..…….…….*A. wightiana*

3. Perianth cup shaped…….……...……..……*A. bourdillonii*

Actinodaphne bourdillonii Gamble, Bull. Misc. Inform. Kew 1925(3): 129. 1925; Gamble, Fl. Madras 1231. 1925.

Medium sized trees, up to 10 m high. Stems woody, terete; bark greyish-brown, densely tomentose. Leaves simple, opposite or sub-opposite, estipulate; lamina elliptic-lanceolate, 10–20 × 4–8 cm, acuminate at apex, acute at base, entire, glabrous above, softly grey,

coriaceous; petioless *c.* 0.1 cm long, stout. Flowers unisexual, in axillary umbels, non-fragrant; pedicels 4–15 mm long, sparsely pubescent. Bracts ovate-orbicular, 8–12 × 6–8 mm, rounded at apex and base, entire, pubescent. Male flowers: Tepals 6, oblong, 10–14 × 8–10 mm, rounded at apex, entire, pubescent out, glabrous within. Stamens 3+3+3; filaments glandular, hispid. Female flowers: Perianth cup shaped, lobes ovate, 7–9 × 6–8 mm, acute at apex, entire. Staminodes 3+3+3, glandular. Ovary half inferior, ovoid; stigma dilated. Berries globose, black, smooth; perianth cup cup shaped.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Shola and evergreen forests: *Fl. & Ft.*: September-April.

Specimens examined: Arjunankotta, 17.01.1994, *Jomy Augustine* 13146 (CALI); Eravikulam, 27.02.1999, *K. Kishore* 18546 (KFRI); Lockhert gap, 20.04.1964, *K.M. Sebastine* 18332 (MH); Meenmutty, 12.11.1981, *C.N. Mohanan* 72472 (MH); Vandanmedu, 28.09.1981, *C.N. Mohanan* 72063 (MH).

Actinodaphne campanulata Hook.f., Fl. Brit. India 5: 148. 1886; Gamble, Fl. Madras 1230. 1925.

Small trees, up to 10 m tall. Stems woody, terete, tomentose when young. Leaves simple, whorled, estipulate; lamina elliptic-obovate, 5–7 × 1.5–3 cm, obtuse at apex, acute at base, entire, pubescent above, glabrous and glaucous beneath, coriaceous; petioless 0.5–1.3 cm long, stout, tomentose. Flowers unisexual, in axillary umbels, non-fragrant; peduncles 5–10 mm long, glabrous; pedicels reduced. Bracts ovate, *c.* 2 × 1 mm, ovate. Male flowers: Tepals 6, ovate, *c.* 8 × 3 mm, acute at apex, entire, silky brown hairy without, caducous. Stamens 3+3+3; filaments *c.* 5 mm long, villous, glandular. Female flowers: Perianth lobes ovate, *c.* 6 × 4 mm, acute at apex, entire at margins. Staminodes 3+3+3, glandular. Ovary attenuate into the style, half inferior; stigma dilated. Berries ovoid.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Shola forests: *Fl. & Ft.*: January-October.

Specimens examined: Deviar, 18.01.1998, *Jomy Augustine* 17956 (CALI); PTR, Deviar, 18.01.1998, *Jomy Augustine* 17956 (KFRI).

Actinodaphne salicina Meisn. In A.P.de Candolle, Prodr. 15(1): 212. 1864; Hook.f., Fl. Brit. India 5: 148. 1886; Gamble, Fl. Madras 1230. 1925.

Small trees, up to 6 m tall. Branchlets slender, minutely fusco-tomentose; bark pale brown. Leaves simple, sub-verticillate; lamina linear-lanceolate, 5–9.5 × 1.5–2.5 cm, narrowly acute at apex, attenuate at base, entire, membranous, silky tomentose when young, glabrous when old, glaucous beneath; petioless 0.5–0.9 cm long, slender, glabrous.

Flowers unisexual, sessile, in few flowersed axillary fascicles. Bracts elliptic, 4–7 × 3–4 mm, rounded at apex and base, entire, silky tomentose. Male flowers: Tepals 6, elliptic, *c.* 5 × 4 mm, acute at apex, ciliate, persistant. Stamens 3+3+3; filaments *c.* 1 mm long, sparsely pilose. Female flowers as same as male flowers. Staminodes 3+3+3, *c.* 1 cm long. Ovary ovoid; style 0.5 mm long, thick, sparsely villous; stigma lobed. Berry depressed lobed.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen and shola forests: *Fl. & Ft.*: September-March.

Specimen examined: Kulamavu, 03.10.1983, *V.S. Ramachandran* 79950 (MH).

Actinodaphne wightiana (Kuntze) Noltie, Regnum Veg. 145: 495. 2005.

Actinodaphne hirsuta Hook.f., Fl. Brit. India 5: 152. 1886, *nom. illeg.*; Gamble, Fl. Madras 1231. 1925.

Trees, up to 20 m tall. Stems woody, terete, tomentose; bark dark grey, smooth, lenticellate. Leaves simple, opposite or sub-opposite, estipulate; lamina elliptic-lanceolate, 10–25 × 4–6 cm, acuminate at apex, entire, glabrous above, villous beneath; petioless 0.7–2 cm long, stout, tomentose. Flowers unisexual, male in densely tomentose axillary racemes, female in axillary umbels, non-fragrant; peduncles 2–6 mm long, sparsely pubescent; pedicels 3–5 mm long, slender. Bracts orbicular, 6–10 × 5–7 mm, acute at apex, entire, tomentose. Male flowers: Tepals 6, free, oblong, *c.* 6 × 3 mm, acute at apex, entire, silky brown tomentose. Stamens 3+3+3; filaments 2-galndular, densely hispid. Female flowers: Perianth platelliform, lobes ovate, *c.* 4 × 3 mm, acute at apex, entire. Staminodes 3+3+3, 2-glandular. Ovary half inferior, ovoid; stigma dilated. Berries globose, seated in a perianth cup; perianth cup platelliform, shallow.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Shola forests: *Fl. & Ft.*: January-October.

Specimens examined: Deviar, 18.01.1998, *Jomy Augustine* 17956 (CALI); Pachakkanam, 03.10.1976, *K. Vivekananthan* 48575; Thekkadi, 12.03.1973, *B.D. Sharma* 43827; Valara, 19.03.1982, *R. Rajan* 73084 (MH).

Alseodaphne Nees

Pl. Asiat. Rar. 2. 71. 1831.

Alseodaphne semecarpifolia Nees in N.Wallich, Pl. Asiat. Rar. 2: 72. 1831; Hook.f., Fl. Brit. India 5: 144. 1886; Gamble, Fl. Madras 2: 1226. 1925.

Trees, up to 25 m tall. Stems woody, terete, glabrous; bark lenticellate. Leaves simple, alternate, crowded near the tips of branchlets, estipulate; lamina elliptic-obovate 10–17 × 6–12 cm, round at apex, acute at base, entire, coriaceous, glabrous, shining above, glaucous beneath; petioless 1–2.5 cm long, stout, glabrous. Flowers non-fragrant, green, unisexual, small, yellowish-green, in slender lax axillary panicles; peduncles 5–20 cm long, slender, glabrous; pedicels filiform, glabrous. Male flowers: Perianth lobes 6, ovate, 3–4 × 2 mm, acute-rounded at apex, ciliate, pubescent within, glabrous out. Stamens 3+3+3, filaments erect, slender with 2 large glands. Female flowers: Tepals campanulate at base, lobes ovate, 4–5 × *c*. 3 mm, acute at apex, entire, glabrous out, pubescent within. Ovary half inferior, globose; stigma peltate. Berries ellipsoid, dark red; seed oblong-globular.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Moist deciduous forests: *Fl. & Ft.*: April-November.

Specimens examined: Meenuliyanpara, 29.11.2019, *Vishnu Mohan & Santhosh Nampy* 164629; Sundaramala, 08.04.1994, *Jomy Augustine* 13502 (CALI).

Apollonias Nees

Laurin. Expos. 10. 1833.

Apollonias arnottii Nees, Syst. Laur. 670. 1836; Hook.f., Fl. Brit. India 5: 121. 1886; Gamble, Fl. Madras 1219. 1925.



Small trees, up to 10 m tall. Stems woody, terete, glabrescent; bark greyish brown. Leaves simple, scattered near the end of branchlets, estipulate; lamina elliptic-lanceolate 8–16 × 3–4 cm, acuminate at apex, attenuate at base, entire, pubescent when young, coriaceous; petioless 1–1.5 cm long, slender, grooved above, glabrous. Flowers in axillary racemes, non-fragrant; peduncles slender, 2–5 cm long, glabrous; pedicels slender, 5–10 mm long, glabrous. Bracts small, free, ovate, *c*. 4 × 2 mm, acute at apex, entire, glabrous. Male flowers: Perianth lobes 3 + 3, ovate, *c*. 5 × 3 mm, acute at apex, entire. Stamens 9; filaments slender, pubescent; anthers

2-locular. Female flowers as same as male flowers. Ovary half inferior, sessile; style curved; stigma depressed capitate. Drupes ovoid, pale green, seated on enlarged perianth lobes.

Distribution: The native range of this species is India (POWO, 2023); *Habitat*: Shola and evergreen forests: *Fl. & Ft.*: November-February.

Specimens examined: Eravikulam, 27.02.1999, *K. Kishore* 18554 (KFRI); Rajamala, 17.02.1998, *M.R. Susmitha* 61106; near Subran shed, Pettimudi, 30.12.2019, *Vishnu Mohan & Santhosh Nampy* 170053; way to Anamudi Base camp, 10.12.2019, *Vishnu Mohan & Santhosh Nampy* 170019; way to Kanketty, Mankulam, 20.12.2019, *Vishnu Mohan & Santhosh Nampy* 164818; way to Eravikulam National Park, 13.02.2001, *P. Hajarommabi* 72844 (CALI).

Beilschmiedia Nees in Wallich

Pl. Asiat. Rar. 2: 61, 69. 1831.

Beilschmiedia gemmiflora (Blume) Kosterm. Sci. Res. (Jakarta) 1: 115. 1952. *Laurus gemmiflora* Blume in Bijdr. Fl. Ned. Ind.: 555 1826.

Beilschmiedia bourdillonii Brandis, Indian Trees 528. 1906; Gamble, Fl. Madras 1221. 1925.

Trees, up to 25 m tall. Stems woody, terete, glabrous; bark smooth; blaze pale yellow; branchlets glabrous. Leaves simple, opposite or alternate, estipulate; lamina elliptic-ovate or ovate-lanceolate 7–15.5 × 3–5 cm, acute at apex, attenuate at base, entire, glabrous, shining above, coriaceous; petioless 0.8–2.5 cm, stout, glabrous. Flowers in axillary and terminal tomentose racemes, non-fragrant; peduncles *c.* 5 mm long, glabrous; pedicels *c.* 3 mm long, glabrous, slender. Male flowers: Perianth lobes 3 + 3, ovate, acute at apex, entire, pubescent out, glabrous within. Stamens 3 + 3 + 3; filaments eglandular. Female flowers as same as male flowers. Staminodes 3; glands 6, stipitate. Ovary half inferior, ovoid, pubescent; style slender; stigma sub-capitate. Berries cylindrical.

Distribution: The native range of this species is Malesia to New Guinea (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests: *Fl. & Ft.*: January-February.

Specimen examined: Karimala, 15.01.1994, *Jomy Augustine* 13119 (CALI).

Cinnamomum Schaeff.

Bot. Exped. 74. 1760, *nom. cons*.

Key to the species

1. Lateral veins reaching the leaf apex……...2

1. Lateral veins not reaching the leaf apex……..……4

2. Inflorescence many flowersed……...……*C. malabatrum*

2. Inflorescence few flowersed…….……...……3

3. Leaves elliptic-lanceolate, glaucous beneath..……..……*C. sulphuratum*

3. Leaves ovate-acute, glabrous beneath……..……..*C. perrottettii*

4. Leaves apex acute…….……..…*C. keralaense*

4. Leaves apex obtuse…….…..*C. wightii*

Cinnamomum keralaense Kosterm., Bull. Bot. Surv. India 25: 98. 1985.

Trees, up to 25 m tall. Stems terete, woody; bark grey, smooth. Leaves simple, opposite or sub-opposite, estipulate; lamina elliptic-lanceolate, 5–15 × 3–6.5 cm, acute at apex and base, entire, glabrous, smooth and glossy above, pale beneath, coriaceous; lateral veins not reaching the leaf apex; petioles 1.5–2.5 cm long, glabrous, grooved above. Flowers fragrant, greenish yellow in axillary panicles; pedicels 3–5 mm long, slender, glabrous. Tepals 6, ovate, 4–7 × 3 mm, rounded-acute at apex, entire, glabrous within, tomentose out. Stamens 3 + 3 + 3; filaments 2, glandular. Staminodes 3. Ovary half inferior, ovate; stigma capitate, sticky. Berries ellipsoid; cupular, sub-conical.

Distribution: The native range of this species is India (Kerala, Tamil Nadu) (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: December-January.

Specimen examined: Karimala, 15.01.1994, *Jomy Augustine* 15689 (CALI).

Cinnamomum malabatrum (Burm.f.) J.Presl, Přir. Rostlin Aneb. Rostl. 2: 46. 1825.



Trees, up to 20 m tall. Stems woody, terete, glabrous; bark smooth, lenticellate. Leaves simple, opposite or sub-opposite; lamina oblong-lanceolate 8–26 × 3–8 cm, acute at apex and base, entire, glabrous above, coriaceous; lateral veins reaching the leaf apex; petioless 1.5–2 cm long, stout, glabrous, grooved above. Flowers in axillary and pseudo terminal many flowersed panicles, fragrant; pedicels 3–5 mm long, slender, glabrous. Perianth lobes ovate, *c.* 5 × 3 mm, acute at apex, entire, pubescent out, glabrous within. Stamens 3+3+3; stamens eglandular, fleshy, pubescent. Staminodes hastate. Ovary half inferior, ellipsoid;

style thick, cylindrical; stigma peltate. Berries ovate.

Distribution: The native range of this species is W. & S. India (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, also in the plains: *Fl. & Ft.*: January-April.

Specimens examined: Anakkara, 17.03.2017, *Vishnu Mohan & Santhosh Nampy* 158395; Edamalakkudi, 16.03.2019, *Vishnu Mohan & Santhosh Nampy* 168972 (CALI); Kuttikkanam, 21.01.1965, Meenmutty, 25.02.1982, *C.N. Mohanan* 73279 (MH).

Cinnamomum perrottetii Meisn. In A.P.de Candolle, Prodr. 15(1): 22. 1864; Hook.f., Fl. Brit. India 5: 134. 1886; Gamble, Fl. Madras 1225. 1925.

Small trees, up to 10 m tall. Stems woody, terete; bark smooth, brown. Leaves simple, opposite, estipulate; lamina ovate, 3.5–6 × 2–4 cm, acute at apex and base, entire, glabrous, coriaceous; lateral veins reaching the leaf apex; petioless 1–1.5 cm long, stout, grooved above, tomentose. Flowers in axillary, few-flowersed panicles, fragrant; peduncels 5–10 cm long, thick, glabrous; pedicels narrow, 2–4 mm long, slender, glabrous. Perianth lobes 6, ovate, *c.* 5 × 3 mm, rounded at apex, entire, fleshy, densely appressed pilose within; glabrous out. Stamens 9; filaments 2-glandular. Staminodes 3. Ovary half inferior, ellipsoid; stigma small, peltate. Berries ellipsoid, subtended by densely woolly tepals.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, also in the plains: *Fl. & Ft.*: February-May.

Specimens examined: Anakuthivayal, 16.03.1997, *Jomy Augustine & K.P. Rajesh* 17798; Mathikettan Shola National Parkc (Udumbuparaa), 24. 02.2016, *Syam Radh S* 145153 (CALI).

Cinnamomum sulphuratum Nees in Wallich, Pl. Asiat. Rar. 2: 74. 1831; Hook.f., Fl. Brit. India 5: 132. 1886; Gamble, Fl. Madras 1225. 1925.

Small trees, up to 8 m tall. Stems woody, terete, glabrous; bark smooth. Leaves simple, opposite or sub-opposite, estipulate; lamina elliptic-lanceolate, 4–18 × 4–9 cm, acuminate at apex, acute at base, entire, glabrous and glossy above, glaucous beneath; lateral veins reaching the leaf apex; petioles 1–1.5 cm long, stout, glabrous, grooved above. Flowers in axillary few flowersed panicles, fragrant, branchlets few, slender; perianth tube 1–1.5 mm long, densely yellow pilose on both sides. Perianth lobes 6, ovate, 2–4 × *c*. 3 mm, acute, yellow pilose on both sides; Stamens 9; filaments 2-glandular. Staminodes 3. Ovary half inferior, ellipsoid; stigma peltate. Berries cup-shaped.

Distribution: The native range of this species is S. India, E. Himalaya to Assam (POWO, 2023); *Habitat*: Evergreen and shola forests: *Fl. & Ft.*: February-April.

Specimen examined: Thekkady, 16.02.1997, *Jomy Augustine & K.P. Rajesh* 17705 (CALI).

Cinnamomum wightii Meisn. In A.P.de Candolle, Prodr. 15(1): 11. 1864; Hook.f., Fl. Brit. India 5: 132. 1886; Gamble, Fl. Madras 1224. 1925.

Small trees, up to 8 m tall. Stems woody, terete, glabrous, smooth; bark smooth, glabrous. Leaves simple, opposite; lamina elliptic, 5–17 × 3–6 cm, obtuse at apex, cuneate at base, entire, glabrous, glossy above; lateral veins not reaching the leaf apex; petioles 1–1.5 cm long, stout, glabrous. Flowers in axillary and terminal, fragrant; peduncles stout, 3–6 mm long, glabrous; pedicels *c.* 5 mm long, thick, glabrous. Perianth funnel shaped; lobes 6, ovate-oblong, *c.* 6 × 3 mm, acute-rounded at apex, entire. Stamens 9; filaments eglandular, pilose. Staminodes pilose, stipitate. Ovary ellipsoid, half inferior; style slender; stigma peltate. Berries ellipsoid, subtended by fleshy obconical pedicels.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Shola forests: *Fl. & Ft.*: April-June.

Specimen examined: Kottamala, 08.05.1995, *Jomy Augustine* 15383 (CALI).

Cryptocarya R.Br.

Prodr. Fl. Nov. Holland. 402. 1810, *nom. cons.*

Key to the species

1. Leaves densely tomentose beneath; fruit basally constricted……*C. anamalayana*
1. Leaves sparsely pubescent beneath; fruit not basally constricted……..……2
2. Inflorescence 4–7 cm long; drupes globose……...……*C. wightiana*
2. Infloresence 2−4 cm long; d□upes oblong……...*C. paraetervisa*

Cryptocarya anamalayana Gamble, Bull. Misc. Inform. Kew 1925: 126. 1925; Gamble, Fl. Madras 2: 1218. 1925.

Small evergreen trees, up to 8 m tall. Stems woody, terete; bark greyish-brown, smooth tomentose. Leaves simple, alternate, estipulate; lamina elliptic-oblong, 9–18 × 4–8 cm, acuminate at apex, obtuse at base, entire, densely tomentose beneath, shiny above, glaucous beneath, coriaceous; petioless *c.* 1 cm long, stout, tomentose. Flowers in short axillary cymose panicles, non-fragrant; pedicels *c.* 4 mm long, pubescent. Bracts and bracteoles oblong, 3–6 × 2–4 mm, acute-rounded at apex, entire, persistent. Perianth lobes 6, *c.* 4 × 3 mm, rounded at apex, entire, tomentose out, glabrous within. Stamens 3+3+3,

eglandular; filaments stout. Staminodes 2. Ovary sessile, half inferior; stigma dilated. Drupes enclosed in accrescent perianth-tube, basally constricted.

Distribution: The native range of this species is S. India (Anamalai Hills) (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: December-April.

Specimen examined: Edamalakkudi, 17.03.2019, *Vishnu Mohan & Santhosh Nampy* 168977 (CALI).

Cryptocarya praetervisa M.G.Gangop., Chakrab. & A.S.Chauhan, J. Econ. Taxon. Bot. 26: 472. 2002.

Medium sized trees, up to 18 m high. Stems woody, terete, glabrous; bark brown, smooth. Leaves simple, alternate, estipulate; lamina 5–10 × 2–6 cm, sub-orbicular, obovate-oblong or ovate, base round or sub-acute, apex round, truncate, emarginate or apiculate, entire, scattered pilose on midrib above, sparsely pubescent beneath, glaucous beneath, coriaceous; petioless 0.6–1 cm long, stout, grooved above. Flowers bisexual, in axillary and terminal short panicles, non-fragrant; peduncles stout, 2–4 cm long, glabrous; pedicels *c.* 5 mm long, glabrous, slender. Perianth lobes 6, sub-equal, ovate, acute at apex. Stamens 3+3+3; filaments stout, glabrous. Staminodes 3. Ovary sessile, enclosed in the tube; style short, exserted. Drupes oblong, woody, smooth, not basally constricted.

Distribution: The native range of this species is India (Tamil Nadu) (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: December-April.

Specimen examined: Vellimala, 27.12.1993, *Jomy Augustine* 12901 (CALI).

Cryptocarya wightiana Thwaites, Enum. Pl. Zeyl. 254. 1861; Hook.f., Fl. Brit. India 5: 120. 1886.

Cryptocarya bourdillonii Gamble in Bull. Misc. Inform. Kew 1925: 127. 1925.

Medium sized trees, up to 18 m tall. Stems woody, terete, pubescent; bark brown, lenticellate. Leaves simple, alternate, estipulate; lamina elliptic-oblong, 9–20 × 3–8 cm, obtuse, round or acute at apex, sub-acute at base, entire, sparsely pubescent beneath, coriaceous; petioless 1–2 cm long, stout, glabrous. Flowers in axillary long panicles, non-fragrant; peduncles 4–7 cm long, slender, glabrous; pedicels slender, 3–5 mm long, glabrous. Bracts ovate, *c.* 4 × 2 mm, acute at apex, entire, cauducous. Perianth cupular; lobes 6, ovate, 4–6 × *c.* 3 mm, rounded at apex, entire, tomentose. Stamens 3+3+3; filaments 2, glandular. Ovary sessile, half inferior, glabrous; style short; stigma truncate. Drupes globose, glabrous, not basally constricted.

Distribution: The native range of this species is S. India, Sri Lanka, Andaman Islands and Myanmar (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests: *Fl. & Ft.*: March-August.

Specimen examined: Koruthode, 08.08.1993, *Jomy Augustine* 12246 (CALI).

Litsea Lam.

Encycl. 3(2): 574. 1792.

Key to the species

1. Inflorescence solitary umbels…….…….2
1. Inflorescence racemose umbels……..…….6
2. Leaves tomentose or pubescent……...……3
2. Leaves glabrous……...……5
3. Fruits ellipsoid……...*L. bourdillonii*
3. Fruits depressed globose…….……4
4. Leaves sub-verticillate……...……...*L. ghatica*
4. Leaves alternate……...……...*L. deccanense*
5. Inflorescence sessile umbels……...……*L. coriacea*
5. Inflorescence sub-sessile umbels…..…….…….…...……..*L. mysorensis*
6. Leaves opposite, not glaucous below……....……*L. oleoides*
6. Leaves alternate, glaucous below……..…….7
7. Stems and leaves tomentose.……..……8
7. Stems and leaves glabrous……..……9
8. Fruits ovoid, sparsely silky pubescent…..……...……*L. floribunda*
8. Fruits ellipsoid, glabrous……...……...……*L. wightiana*
9. Leaves linear lanceolate…….…….…..…*L. beddomei*
9. Leaves oblanceolate……..……10
10. Fruits ovoid, fruiting pedicels angular……...…*L. stocksii*
10. Fruits ellipsoid, fruiting pedicels terete……...*L. glabrata*

Litsea beddomei Hook.f., Fl. Brit. India 5: 177. 1886; Gamble, Fl. Madras 1237. 1925.

Small trees, up to 5 m tall. Stems woody, terete, sparsely glabrous, smooth; bark brown. Leaves simple, alternate, estipulate; lamina linear-lanceolate, 8–15 × 4–7 cm, obtuse at apex, acute at base, entire, glabrous; petioless 0.4–0.8 cm long, glabrous. Flowers unisexual, in axillary fascicles, non-fragrant; peduncles stout, *c.* 5 cm long, pubescent; pedicels *c.* 0.8 cm long, narrow, pubescent. Male flowers: Perianth lobes obscure,

glabrous, fleshy. Stamens 12; filaments short, glabrous. Female flowers as same as male flowers; Ovary half inferior; style short; stigma peltate. Berries oblong. Seeds 2.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: April-November.

Specimens examined: Kottamala, 08.05.1995, *Jomy Augustine* 15381; Peerumedu, 27.04.2018, *Vishnu Mohan & Santhosh Nampy* 159207 (CALI); PTR, 31.05.1995, *N. Sasidharan* 15381 (KFRI).

Litsea bourdillonii Gamble, Bull. Misc. Inform. Kew 1925: 131. 1925; Gamble, Fl. Madras 2: 1237. 1925.

Small trees, up to 10 m tall. Stems woody, terete, smooth, glabrous; bark grey, tomentose. Leaves simple, alternate, estipulate; lamina obovate-oblong, 10–19 × 5–10 cm, acute at apex, obtuse at base, entire, tomentose, glaucous beneath, coriaceous; petioless 1–1.5 cm long, stout. Flowers unisexual, in axillary solitary umbels, non-fragrant; peduncles 1–3 cm long, sparsely pubescent; pedicels *c.* 5 mm long, slender, narrow. Bracts 4, orbicular, *c.* 5 × 3 mm, rounded at apex, entire, tomentose out, glabrous within. Male flowers: Periath lobes 6, acute at apex, entire, tomentose. Stamens 3 + 3 + 3 + 3; filaments glabrous, 2-glandular. Staminodes linear. Female flowers as same as male flowers. Ovary half inferior, ovoid; style thick; stigma dilated. Berries ellipsoid, seated on a cup-shaped perianth tube.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: December-May.

Specimens examined: Devikulam, 12.12.1970, *M.K. Sreedharan Nambiar* 174; way to Kanketty, 20.12.2019, *Vishnu Mohan & Santhosh Nampy* 164591 (CALI).

Litsea coriacea (B.Heyne ex Nees) Hook.f., Fl. Brit. India 5: 166. 1886; Gamble, Fl. Madras 2: 1236. 1925.



Trees, up to 15 m tall. Stems woody, terete, bark brown, thinly scaly. Leaves simple, alternate, estipulate; lamina elliptic-ovate, 6–18 × 3–7 cm, acute at apex, cuneate at base, entire, coriaceous, glabrous; petioless 0.5–1 cm long, slender, pubescent. Flowers unisexual, in axillary

sessile umbels, non-fragrant. Bracts 4, elliptic, *c.* 3 × 2 mm, rounded at apex, entire, silky tomentose. Male flowers: Perianth funnel shaped; lobes 6, ovate, *c.* 4–6 × 2–3 mm, acute at apex, entire, silky tomentose. Stamens 3+3+3+3; filaments *c.* 4 mm long, thick, pubescent. Staminodes glandular. Female flowers as same as male flowers. Ovary half inferior, ovoid; style slender; stigma small, erect. Berries ovoid.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Semi-evergreen forests and sacred groves; *Fl. & Ft.*: August-April.

Specimens examined: Adimali, 28.03.1980, *R. Rajan* 66556; Kattappana, 13.11.1981, *C.N. Mohanan* 72489 (MH); Meenuliyanpara, 29.11.2019, *Vishnu Mohan & Santhosh Nampy* 64631; Thekkady, 06.10.1993, *Jomy Augustine* 12520 (CALI); Thekkady, 23.09.1981, *R. Ramamurty* 24375 (MH); Vallakkadavu, 30.04.1994, *N. Sasidharan* 13672 (KFRI).

Litsea ligustrina (Nees) Fern.-Vill. In F.M.Blanco, Fl. Filip. ed. 3. 4(13A): 180. 1880.
Litsea deccanensis Gamble, Fl. Madras 2: 1235. 1925.
Litsea tomentosa senIsu Heyne ex Nees in Wall. Hook.f., Fl. Brit. India 5: 157. 1886.

Small trees, up to 10 m tall. Stems woody, terete, smooth; bark rough, tomentose. Leaves simple, alternate, estipulate, crowded at the end of branchlets; lamina elliptic, 6–19 × 4–10 cm, acuminate at apex, acute at base, entire, glabrous above except veins, tomentose; petioles 2–4 cm long, stout, tomentose, grooved above. Flowers unisexual, small, in axillary many flowersed solitary umbels, non-fragrant; peduncles 10–12 mm long, drooping, tomentose; pedicels *c.* 3 mm, slender, smooth. Bracts 4, orbicular, concave, tomentose out, glabrous in. Male flowers: Perianth lobes ovate, 4–4.5 × *c*. 3 mm, acute at apex, entire, hairy out, glabrous within. Stamens in 4 rows; filaments slender, densely villous. Female flowers as same as male flowers. Staminodes glandular. Ovary half inferior, enclosed in the perianth tube, glabrous; style *c.* 3 mm long; stigma dilated. Berries globose, black, seated on flat, thickened cup.

Distribution: The native range of this species is SW India, Sri Lanka, Bangladesh to Myanmar (POWO, 2023); *Habitat*: Dry deciduous forests and scrub jungles: *Fl. & Ft.*: June-December.

Specimens examined: Kallar, 08.12.2018, *Vishnu Mohan & Santhosh Nampy* 159168; Viripara, 14.07.2018, *Vishnu Mohan & Santhosh Nampy* 159168 (CALI); Uliyanmala, 25.12.1983, *A.G. Pandurangan* 6647; Thekkady, 28.09.1972, *B.D.*

Sharma 42078; Vandanmedu, 28.08.1977, *K. Vivekananthan* 50569 (MH); way to Marayur, 10.06.2018, *Vishnu Mohan & Santhosh Nampy* 152830 (CALI).

Litsea floribunda Gamble, Fl. Madras 2: 1238. 1925.

Trees, up to 15 m tall. Stems woody, terete, tomentose, bark brown, smooth, brittle, lenticellate. Leaves simple, alternate, estipulate; lamina elliptic-oblong or ovate-oblong, 8–18 × 3–10 cm, acute at apex and base, entire, rusty tomentose, coriaceous; petioless 1.–1.5 cm long, stout, pubescent. Flowers unisexual, in axillary racemose umbellules, non-fragrant, yellow; peduncles 5–10 mm long, silky pubescent; pedicels stout, glabrous. Bracts 4, orbicular, *c.* 3 × 3 mm, rounded at apex, entire, silky tomentose out, glabrous within. Male flowers: Perianth turbinate, silky tomentose; lobes 6, ovate, acute at apex, entire. Stamens 12, in 4 rows; filaments hairy 2-glandular. Female flowers as same as male flowers. Staminodes linear, glandular. Ovary half inferior; stigma capitate. Berries ovoid, sparsely silky pubescent, seated on a turbinate perianth tube.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and shola forests; *Fl. & Ft.*: December-August.

Specimens examined: Chenthamara, 03.3.1994, *Jomy Augustine* 13453 (CALI); Kalvary mount, 18.08.1994, *N. Sasidharan* 13862 (KFRI); Kanketty, 26.12.2019, *Vishnu Mohan & Santhosh Nampy* 176512 (CALI).

Litsea ghatica Saldanha Fl. Karnataka 1: 67 1985.

Small trees, up to 10 m tall. Stems woody, terete; young shoots tomentose: bark brown, smooth. Leaves simple, sub-verticillate, estipulate; lamina obovate, 10–20 × 4–9 cm, abruptly acute at apex, rounded at base, entire, glabrous except nerves above, more or less softly tomentose beneath; petioless *c.* 1 cm long, soft, terete, stout. Flowers unisexual, solitary umbels, non-fragrant; peduncles 5–8 mm long, cauliferous; pedicels glabrous, slender. Bracts ovate, *c.* 5 × 3 mm, paired, tomentose out, glabrous within. Male flowers: Perianth 6-lobed; tube short, smooth thick. Stamens 16, biseriate; filaments hairy. Female flowers as same as male flowers. Staminodes with stalked glands. Ovary half inferior, glabrous; style 3 mm long; stigma dilate. Berries globose, smooth.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and shola forests; *Fl. & Ft.*: September-February.

Specimen examined: Mathikettan Shola National Park, 11.12.2016, *Vishnu Mohan & Santhosh Nampy* 151369 (CALI).

Litsea glabrata (Wall.) Hook.f., Fl. Brit. India 5: 174. 1886; Gamble, Fl. Madras 2: 1237. 1925.

Trees, up to 12 m tall. Stems woody, terete, glabrous; bark pale brown, smooth. Leaves simple, alternate, estipulate; lamina linear-oblong-oblanceolate, 6–15 × 3–5 cm, acute at apex, cuenate at base, entire, glabrous, coriaceous; petioless 1.5–2.5 cm long, stout, grooved above, glabrous. Flowers unisexual, umbellules in axillary racemes; peduncles stout, *c.* 1 cm long, pubescent; pedicels slender, sparsely pubescent. Male flowers: Perianth lobes 6, ovate, *c.* 5 × 3 mm, acute-rounded at apex, hispid out, glabrous within. Stamens 12, in 4 rows; filaments glandular hairy. Female flowers as same as male flowers. Staminodes 2-glandular. Ovary half inferior, ovate, glabrous; style short, glabrous; stigma capitate. Berries glabrous, ellipsoid; fruiting perianth obconic.

Distribution: The native range of this species is SW. India (POWO, 223); *Habitat*: Semi-evergreen forests: *Fl. & Ft.*: September-May.

Specimens examined: Karimala, 15.01.1994, *Jomy Augustine* 13122; Nallathanni Kallar, 16.08.2019, *Vishnu Mohan & Santhosh Nampy* 186729 (CALI).

Litsea mysorensis Gamble, Bull. Misc. Inform. Kew 1925: 130. 1925.

Dioecious small trees, up to 10 m tall. Stems woody, terete, smooth; bark smooth, grey. Leaves simple, alternate, estipulate; lamina elliptic-oblong, 8–12 × 1–2 cm, acute-acuminate at apex, acute at base, entire, glabrous; petioless *c.* 0.5 cm long, stout, pubescent. Flowers unisexual, yellowish, in sub-sessile solitary umbels; peduncles stout, *c.* 5 mm long, pubescent; pedicels narrow, slender. Bracts orbicular, *c.* 3 × 2 mm, rounded at apex, sericeous out, glabrous within. Male flowers: Perianth lobes 6, oblong, *c.* 5 × 6 mm, rounded at apex, entire, sericeous out, glabrous within. Stamens 3 + 3 + 3; filaments glabrous, glandular. Female flowers as same as male flowers. Staminodes 9, 2-glandular. Ovary half inferior, ovate, glabrous; style thick; stigma capitate. Berries ovate, glabrous, shining.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Semi-evergreen forests: *Fl. & Ft.*: July-December.

Specimens examined: Meenuliyanpara, 12.12.2016, *Vishnu Mohan & Santhosh Nampy* 151411; Pambadum Shola National Park, 21.12.2018, *Vishnu Mohan & Santhosh Nampy* 167888, Puthukkad, Mankulam, 15.09.2018, *Vishnu Mohan & Santhosh Nampy* 161921 (CALI).

Litsea oleoides (Meisn.) Hook.f., Fl. Brit. India 5: 175. 1886; Gamble, Fl. Madras 1236. 1925. *Tetranthera oleoides* Meisn. in A.P.de Candolle, Prodr. 15(1): 195. 1864.

Dioecious trees, up to 25 m tall. Stems woody, terete, smooth; bark brown, smooth, slightly rugose. Leaves simple, opposite, estipulate; lamina elliptic-lanceolate, 8–15 × 4–7 cm, obtuse at apex, acute at base, entire, glaucous below, coriaceous; petioles 1–3 cm long, stout, grooved above, glabrous. Flowers unisexual, in axillary solitary umbels; peduncles *c.* 6 mm long, glabrous, stout; pedicels slender, *c.* 3 mm long, glabrous, thick. Bracts orbicular, *c.* 4 × 3 mm, rounded at apex, entire, pubescent. Male flowers: Perianth lobes 6, ovate, *c.* 2.5 × 3 mm, obtuse at apex, entire, pubescent. Stamens 3+3+3; filaments with sessile glands at base, pubescent. Staminodes 3+3+3, glandular at base. Female flowers as same as male flowers. Ovary half inferior, papillose; style *c.* 3 mm long, sparsely pubescent; stigma sticky. Berries ovate, subtended by cupular perianth.

Distributon: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: October-April.

Specimens examined: PTR, 16.10.1993, *N. Sasidharan* 12518 (KFRI); Thekkady, 06.10.1993, *Jomy Augustine* 12518 (CALI).

Litsea stocksii (Meisn.) Hook.f., Fl. Brit. India 5: 176. 1886; Gamble, Fl. Madras 2: 1236. 1925.

Medium sized trees, up to 17 m tall. Stems woody, terete; bark smooth, glabrous. Leaves simple, alternate; lamina elliptic-obovate-oblanceolate, 8–14 × 5–8 cm, acute at apex and base, entire, glabrous; petioles 0.5–1 cm long, glabrous, smooth, grooved above. Flowers unisexual, in axillary racemes non-fragrant; peduncles thick, 2–3 cm long, glabrous; pedicels 5–9 mm long, glabrous. Bracts orbicular, *c.* 5 × 4 mm, rounded at apex, entire, puberulus out, glabrous within. Male flowers: Perianth lobes 6; acute, thin, pubescent. Stamens 3+3+3; filaments *c.* 5 mm long, glabrous, glandular. Female flowers as same as male flowers. Staminodes glandular. Ovary half inferior; style *c.* 3 mm long, glabrous; stigma sticky. Drupes ovoid, reddish brown, smooth; fruiting pedicels angular.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: April-June.

Specimen examined: Arjunankotta, 08.04.1995, *Jomy Augustine* 15094 (CALI).

Litsea wightiana (Nees) Wall. ex Hook.f., Fl. Brit India 5. 177. 1886; Gamble, Fl. Madras 2: 1238. 1925.

Cylicodaphne wightiana Nees in N.Wallich, Pl. Asiat. Rar. 2: 68. 1831.

Large trees, up to 30 m tall. Stems woody, terete, tomentose; bark smooth, grey. Leaves simple, alternate, estipulate; lamina elliptic-lanceolate, 7–10 × 4–7 cm, acute at apex, cuneate at base, entire, coriaceous, tomentose; petioles *c.* 2 cm long, glabrous, grooved

above. Flowers unisexual, in axillary racemes; peduncles 5–15 mm long, glabrous, smooth; pedicels slender, glabrous, *c.* 4 mm long. Bracts ovate *c.* 4 × 2 mm, acute at apex, entire, glabrous within, puberlous out. Male flowers: Perianth lobes 6; ovate, acute at apex, entire, glabrous within. Stamens 3+3+3; filaments *c.* 5 mm long, glandular. Female flowers as same as male flowers. Staminodes glandular. Ovary half inferior; style *c.* 3 mm long, glabrous; stigma capitate. Berries ellipsoid, glabrous.

Distribution: The native range of this species is W. India (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: July-January.

Specimens examined: Mangaladevi Hills, 15.07.2017, *Vishnu Mohan & Santhosh Nampy* 152869; Nymakkad, 24.01.2017 *Vishnu Mohan & Santhosh Nampy* 158174; Swamikkayam, 08.09.1993, *Jomy Augustine* 12481; Pambadum shola. 19.12.2018, *Vishnu Mohan & Santhosh Nampy* 167840 (CALI).

Machilus Rumph. ex Nees in N.Wallich

Pl. Asiat. Rar. 2: 61. 1831.

Machilus glaucescens (Nees) Wight, Icon. Pl. Ind. Orient. 5: t. 1825. 1852. *Ocotea glaucescens* Nees in N.Wallich, Pl. Asiat. Rar. 2: 71 1831.

Persea macrantha (Nees) Kosterm., Reinwardtia 6: 193. 1962.

Machilus macrantha Nees in Wall., *sensu*; Hook.f., Fl. Brit. India 5: 140. 1886; Gamble, Fl. Madras 1227. 1925.

Evergreen trees, up to 30 m tall. Branchlets woody, terete; bark scurfy and thinly scaly. Leaves simple, alternate, clustered at the tip of branchlets; lamina elliptic-oblong, 6.5–20 × 3.7–10 cm, obtuse at apex, oblique or acute at base, entire, glabrous, glaucous beneath, coriaceous; petioless 1.5–4 cm long, stout, grooved above, glabrous. Flowers in panicles from upper axils and terminal. Perianth lobes 6, obovate, 5–6 × 2–3 mm, rounded at apex, entire, puberulous. Stamens 9; filaments 2.5 mm long, pubescent. Staminodes 3, stalked, pubescent. Ovary half inferior, sessile; style, slender, *c.* 2 mm; stigma discoid. Berries globose, aromatic; lobes reflexed in young fruits, deciduous. Seed one, globose.

Distribution: The native range of this species is Indian Subcontinent to China (W. Yunnan) and Myanmar (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: November-March.

Specimens examined: Anamudi Shola, 02.11.1995, *K. Kishore* 16714 (KFRI); Meenmutty, 13.12.1982, *C.N. Mohanan* 73212; Thekkady, 12.03.1973, *B.D. Sharma* 43830; Valara, 07.02.1984, *K. Ramamurty* 80892 (MH).

Neolitsea (Benth. & Hook.f.) Merr.

Philipp. J. Sci. 1: 56. 1906, *nom. cons.*

Key to the species

1. Fruiting calyx 2–2.5 mm across……..…….. *N. cassia*

1. Fruiting calyx 5–8 mm across…….…….…. *N. foliosa var. scrobiculata*

Neolitsea cassia (L.) Kosterm. J. Sci. Res. (Jakarta) 1: 85 1952. *Laurus cassia* L. in Sp. Pl.: 369. 1753.

Neolitsea zeylanica (Nees) Merr. *sensu*; Gamble, Fl. Madras 1239. 1925.

Litsea zeylanica Nees, *sensu* Hook.f., Fl. Brit. India 5: 178. 1886.

Deciduous trees, up to 18 m tall. Stems woody, terete, smooth; bark grey, rough, brittle. Leaves simple, alternate, estipulate; lamina elliptic-lanceolate, 4–8 × 3–5 cm, acute at apex, attenuate at base, entire, glabrous above, glaucous beneath, coriaceous; petioles 2–3 cm long, glabrous, grooved above, slender. Flowers unisexual, 2-merous in axillary sessile umbels, non-fragrant; pedicels *c.* 3 mm long, glabrous. Bracts orbicular, *c.* 5 × 3 mm, acute at apex, entire, concave. Male flowers: Tepals 4, ovate-oblong, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Stamens 6, in 3 rows; filaments *c.* 5 mm long, greenish-yellow, glabrous. Female flowers as same as male flowers. Staminodes 6, in 3 rows. Ovary half inferior, ovoid; style long; stigma large peltate. Drupes globose, seated on disc like crenate perianth cup; fruiting calyx 2–2.5 mm across.

Distribution: The native range of this species is India to Assam and Sri Lanka (POWO, 2023); *Habitat*: Shola and evergreen forests: *Fl. & Ft.*: November-April.

Specimens examined: Anamudishola, 21.11.1996, *K. Kishore* 17696 (KFRI); Sundaramala, 09.04.1994, *Jomy Augustine* 13617 (CALI).

Neolitsea foliosa var. **scrobiculata** (Meisn.) Chakrab., Phytotaxa 419: 213. 2019.

Neolitsea scrobiculata Gamble, Fl. Madras 2: 1240. 1925.



Deciduous trees, up to 15 m tall. Stems woody, terete, glabrous; bark grey, smooth. Leaves simple, alternate, estipulate; lamina ovate-lanceolate, 5–11 × 3–6 cm, obtusely acute at apex, rounded at base, entire, glabrous above, glaucous beneath, coriaceous; petioles 1.5–2

cm long, slender, glabrous. Flowers unisexual, 2-merous, in axillary sub-sessile umbellules, non-fragrant; peduncles 10–20 mm long, glabrous, smooth; pedicels smooth, glabrous. Bracts 4, ovate, acute at apex, entire, concave. Male flowers: Tepals 4, orbicular, *c.* 4 × 3 mm, rounded at apex, entire, glabrous within, pubescent out. Stamens 6 in 3 whorls; filaments *c.* 0.5 mm long. Staminodes thin, glabrous. Female flowers as same as male flowers; Ovary half inferior, globose; stigma discoid. Drupe *c.* 8 mm across, globose; fruiting calyx 5−8 mm across.

Distribution: The native range of this variety is Indian Subcontinent to Myanmar (POWO, 2023); *Habitat*: Evergreen and shola forests: *Fl. & Ft.*: May-January. *Specimens examined*: Uppuparaa, 06.01.1997, *Jomy Augustine* 17964; way to Anamudi base camp, 10.12.2019, *Vishnu Mohan & Santhosh Nampy* 164681 (CALI).

Phoebe Nees

Syst. Laur. 98. 1836.

Key to the species

1. Branchlets, leaves and inflorescence glabrous; leaves lanceolate, acuminate; inflorescence 9−12 cm long; berries narrowly ellipsoid……*P. lanceolata*

1. Branchlets, leaves and infloresence rustly tomentose; leaves obovate to lanceolate, short acuminate; inflorescence 5−8 cm long; berries broadly ellipsoid……*P. wightii*

Phoebe lanceolata (Nees) Nees, Syst. Laur. 109. 1836. Hook.f., Fl. Brit. India 5: 141. 1886; Gamble, Fl. Madras 2: 1228. 1925.

Evergreen trees, up to 12 m tall. Stems woody, terete, glabrous; bark greyish-brown, smooth. Leaves simple, alternate, estipulate, clustered at the tip of branchlets; lamina lanceolate, 8–25 × 3–4.5 cm, acuminate at apex, cuneate at base, entire, glabrous, coriaceous; petioless 1–1.8 cm long, slender, grooved above, glabrous. Flowers in axillary slender panicles 9−12 cm long, non-fragrant; peduncles stout, glabrous, smooth; pedicels very short, glabrous. Perianth tube short; lobes 6, ovate, acute at apex, entire, tomentose. Stamens 9 in 3 rows; filaments *c.* 5 mm long, glabrous; anthers 4-locular. Staminodes 3. Ovary half inferior, sessile, globose, pubescent; style slender; stigma discoid. Drupes ovoid or ellipsoid, glabrous, black.

Distribution: The native range of this species is Indian Subcontinent to China (S. Yunnan) and W. Malesia (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests, also in secondary forests: *Fl. & Ft.*: October-March.

Specimen examined: Thekkady, 06.10.1993, *Jomy Augustine* 12502 (CALI).

Phoebe wightii Meisn. in A.P.de Candolle, Prodr. 15(1): 38. 1864; Gamble, Fl. Madras 1228. 1925.

Evergreen trees, up to 10 m high. Branchlets woody, terete, rustly tomentose; bark brown, smooth. Leaves simple, alternate, estipulate, crowded at the tips of branchlets; lamina obovate-lanceolate, 7.5–15 × 3–6 cm, acuminate at apex, cueneate at base, entire, rusty tomentose beneath, coriaceous; petioles 0.7–1.5 cm long, stout, rusty pubescent. Flowers yellowish-green, in axillary panicles 5−8 cm long; pedicels *c.* 5 mm long. Perianth lobes 6, ovate, 3–4.5 × 2–3 mm, acute at apex, entire, tomentose. Stamens 9, perfect, in 3 rows; anthers 4-locular. Staminodes 3. Ovary half inferior, sessile; style *c.* 2 mm long; stigma simple. Drupes broadly ellipsoid; perianth lobes persistent.

Distributon: The native range of this species is SW. India (POWO, 2023); *Habitat*: Evergreen and shola forests: *Fl. & Ft*.: April-May.

Specimen examined: Devikulam, 19.04.1964, *K.M. Sebastine* 18322 (MH).

PROTEACEAE Juss.

Gen. Pl. 78. 1789, *nom. cons.*

Trees or shrubs. Leaves alternate, rarely opposite, simple or much divided; stipules absent. Flowers in a bracteate capitulum or elongated spike. Calyx petaloid, tetramerous, valvate. Stamens 4−5; anthe□s opposite the calyx-lobes, sub-sessile, 2-celled. Ovary superior, 1-celled; style long, simple; ovule 1, sub-pendulous. Fruit a nut, densely bearded, crowned by persistent style.

The family includes 80 genera (POWO, 2023); single species in the study area.

Grevillea R.Br. ex Knight

Cult. Prot. 17, 120. 1809.

Grevillea robusta A.Cunn. ex R.Br., Suppl. Prodr. Fl. Nov. Holl. 24. 1830.

Evergreen trees, up to 20 m tall. Stems woody, terete, glabrous; bark grey. Leaves dissected, alternate, estipulate; leaflets linear lanceolate, variously sized, acuminate at apex and base, recurved, sessile, silver grey, silky hairy beneath. Flowers in axillary racemes, bisexual, non-fragrant, yellow; peduncles up to 10 cm long, slender, pubescent; pedicels 0.2–0.3 cm long, pubescent. Tepals 5, linear, 1.5–2 cm long, hooded, orange yellow to orange or golden yellow to lemon yellow with dark red inner base. Stamens 5, sessile; disc semi-annular. Ovary glabrous; style *c.* 2 cm long; stigma dilated. Follicles 2-seeded, 1.5–2.cm long. Seeds broadly winged, thin, ovate, non-endospermic.

Distribution: The native range of this species is SE. Queensland to NE. New South Wales (POWO, 2023); *Habitat:* Grown as shade tree; *Fl. & Ft*.: June-September.

Specimen examined: Munnar, 19.06.2019, *Vishnu Mohan* & *Santhosh Nampy* 176075 (CALI).

THYMELAEACEAE Juss.

Gen. Pl. 76. 1789, *nom. cons.*

Trees or shrubs. Leaves alternate or opposite, simple, entire, without stipules. Inflorescences terminal or axillary, sessile or pedunculate. Flowers bisexual, polygamous or dioecious. Calyx tubular. Petals generally inserted at the throat of calyx-tube, equal or double the number of calyx-lobes. Stamens as many or twice as many as calyx-lobes. Ovary superior; stigma usually capitate; disc hypogynous. Fruit often a berry, sometimes a nut, drupe or loculicidal capsule, usually enclosed in the base of persistent calyx-tube. The family includes 52 genera in the world (POWO, 2023); single species in the study area.

Lasiosiphon Fresen.

Flora 21(2): 602. 1838.

Lasiosiphon glaucus Fresen., Flora 21: 603. 1838. *Gnidia glauca* (Fresen.) Gilg in H.G.A.Engler & K.A.E.Prantl, Nat. Pflanzenfam. 3(6a): 227. 1894.

Lasiosiphon eriocephalus Decne. in V.Jacquemont, Voy. Inde 4: 148. 1844; Hook.f., Fl. Brit. India 5: 197. 1886; Gamble, Fl. Madras 2: 1244. 1925.



Small trees or shrubs, up to 10 m tall. Stems woody, terete; branchlets angular and pubescent, becoming terete. Leaves simple, alternate, crowded towards apex of branchlets, estipulate; lamina linear-lanceolate, 5–10 × 2–3 cm, acute at apex, attenuate at base, entire, glabrous above, puberulent beneath, coriaceous; petioles *c.* 0.5 cm long, slender, pubescent. Flowers in terminal white silky compact heads, bisexual, non-fragrant, bright yellow; peduncles 0.5–1 cm long, silky pubescent; pedicels *c.* 0.2 cm long, densely pilose. Bracts ovate-lanceolate, 2–3 cm long, acuminate at apex, entire, leafy, silky pubescent. Tepals fused to form a tube, 1–1.5 cm, densely long pilose without; lobes 5, oblong, pilose without. Stamens 8; filaments short, *c.* 4 mm long, glabrous. Ovary superior,

sessile, oblong; style filiform; stigma capitate. Berries ellipsoid, densely pilose, enclosed in the calyx. Seed brown, ridged laterally.

Distribution: The native range of this species is Tropical Africa, S. India, Sri Lanka (POWO, 2023); *Habitat*: Evergreen, dry deciduous and shola forests; *Fl. & Ft.*: January-May.

Specimen examined: Anamudishola National Park, 15.08.2018, *Vishnu Mohan & Santhosh Nampy* 186636 (CALI).

ELAEAGNACEAE Juss.

Gen. Pl. 74. 1789, *nom. cons.*

Trees. Stems and leaves covered with silvery brown scaly hairs. Leaves alternate, opposite or in whorls, leathery, simple; stipules absent. Flowers solitary or in clusters or racemes, bisexual or unisexual. Petals absent. Perianth 8-lobed, narrowed above the ovary. Stamens 4–8. Ovary superior; style long; stigma simple. Fruit an achene.

The family includes 102 species in three genera (POWO, 2023); two species in the study area.

Elaeagnus L.

Sp. Pl. 1: 121. 1753.

Key to the species

1. Lower surface of leaf coppery; nut winged……*E. conferta*

1. Lower surface of leaf silvery; nut wingless……...*E. indica*

Elaeagnus conferta Roxb.Fl. Ind. 1: 460 1820. *Elaeagnus kologa* Schult. in DC., Prodr. 14: 611. 1857; Gamble, Fl. Madras 2: 1246. 1925.



Climbers. Stems woody, terete; bark brown, densely covered with silvery scales; thorns axillary, straight, *c.* 2 cm long. Leaves simple, alternate, estipulate; lamina ovate-elliptic, 8–10 × 5–7 cm, acute at apex and base, entire, glabrous above, coppery below, leathery; petioless *c.* 0.5 cm long, silvery scaly, slender. Flowers 3–6 in axillary fascicles, bisexual, non-fragrant; peduncles 0.5–1.5 cm long, terete, scaly; pedicels *c.* 0.5 cm long, narrow, slender. Perianth greenish

white, campanulate; lobes 4, ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Stamens 4; filaments free, broadened, glabrous. Ovary inferior; style filiform; stigma lateral. Nut winged, covered with thickened perianth base, reddish, fleshy.

Distribution: The native range of this species is Himalaya to China (Yunnan, Guangxi) and W. Malesia (POWO, 2023); *Habitat*: Moist deciduous forests; *Fl. & Ft.*: January-May.

Specimens examined: Chinnar, 18.02.1998, *K.B. Bindhu* 61303; Kallar, 03.05.2017, *Vishnu Mohan & Santhosh Nampy* 1159188; Munnar, 09.02.2017, *Vishnu Mohan* 151673; Nymakkad, 24.01.2017, *Vishnu Mohan* 158171 (CALI).

Elaeagnus indica Serv., Bull. Herb. Boiss. ser.2, 8: 393. 1908; Gamble, Fl. Madras 1246. 1925.

Climbers. Stems terete, woody, densely covered with silvery scales; thorns axillary, straight, 1–2 cm long. Leaves simple, alternate, estipulate; lamina ovate, 4–8 × 3–6 cm, acute at apex, rounded at base, entire, glabrous above, silvery-white below, coriaceous; petioles *c.* 0.5 cm long, grooved above, glabrous. Flowers in axillary fascicles, bisexual, non-fragrant; peduncles *c.* 0.5 cm long, stout, glabrous; pedicels narrow, slender. Perianth greenish white, campanulate; lobes 4, ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Stamens 4; filaments free, broadened below. Ovary 1-celled, inferior; style filiform; stigma lateral. Nuts wingless, ovate, reddish, fleshy, covered with thickened perianth base.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Moist deciduous forest; *Fl. & Ft.*: January-June.

Specimens examined: Marayoor, 11.06.2010, *Anoop P. B. & K. D. Prathapan* 133; Way to Anamudi National Park, 22.06.2018, *Vishnu Mohan* 159374 (CALI).

LORANTHACEAE Juss.

Ann. Mus. Natl. Hist. Nat. 12: 292. 1808, *nom. cons*.

Parasitic shrubs on trees. Leaves mostly opposite or whorled, simple, entire, sometimes reduced to scales. Flowers mostly actinomorphic, bisexual or unisexual, often brightly coloured. Receptacle sometimes with a calyx-like rim (calyculus). Perianth-segments valvate, free or united. Stamens the same number as the perianth-segments and inserted on them or at their base; anthers 2-celled or rarely 1-celled. Disk present or absent. Rudimentary ovary sometimes presents in male, staminodes in female. Ovary inferior, usually without a distinct placenta and ovule solitary. Fruit a berry or drupe.

The family includes 78 accepted genera (POWO, 2023); five genera and eight species in the study area.

Key to the genera

1. Flowers with 2 connate bracteoles ……..…….....*Macrosolen*

1. Flowers without bracteoles ……..……. 2

2. Flowers 4-merous ……...…….……3

2. Flowers 5-merous ……4

3. Plants glabrous; petals free …….……..…*Helixanthera*

3. Plants tomentose; petals fused ……..... *Scurrula*

4. Leaves opposite …….…… *Taxillus*

4. Leaves alternate …….…..... *Dendrophthoe*

Dendrophthoe Mart.

Flora 13(1): 109. 1830.

Dendrophthoe falcata (L.f.) Ettingsh., Denkschr. Kaiserl. Akad. Wiss., Wien. Math.-Naturwiss. Kl. 32: 52. 1872.



Parasitic sub-shrubs. Stems woody, terete, stellate hairy on young parts. Leaves simple, alternate; lamina elliptic, *c.* 15 × 6 cm, obtuse at apex and base, entire, glabrous, pinnately veined; petioless *c.* 0.5 cm long. Flowers bisexual, in axillary racemes or spikes. Bracts subtending each flowers, shorter than calyx. Calyx ovoid or urceolate, limb cupular, persistent. Corolla tube inflated, 2.5–3 cm long, tip clavate, lobes twisted, elliptic, entire, glabrous. Stamens inserted at base of corolla lobes; filaments 3–7 mm long, glabrous, flattened; anthers 4-loculed. Ovary 1-loculed; Style filiform, 5-angled; stigma capitate. Berries ovoid, exocarp leathery.

Distribution: The native range of this species is Indian Subcontinent and E. Queensland (POWO, 2023); *Habitat*: Moist and dry deciduous forests, also in the plains; *Fl. & Ft.*: November-May.

Specimen examined: Kattappana, 25.11.2018, *Vishnu Mohan* & *Santhosh Nampy* 152346 (CALI).

Helixanthera Lour.

Fl. Cochinch. 1: 142. 1790.

Key to the species

1. Corolla lobes red out, bluish within……. *H. obtusata*

1. Corolla lobe red at base only and yellowish green towards apex……... *H. intermedia*

Helixanthera intermedia (Wight) Danser Bull. Jard. Bot. Buitenzorg, sér. 3, 10: 317 1929. *Loranthus intermedius* Wight in Calcutta J. Nat. Hist. 4: 361 1845; Hook.f., Fl. Brit. India 5: 205. 1886; Gamble, Fl. Madras 1251. 1925.



Parasitic glabrous shrubs. Stems woody, terete; branchlets slender, glabrous. Leaves simple, alternate; lamina ovate, 4–8 × 3–5 cm, obtuse at apex and base, entire, coriaceous; petioles *c.* 1 cm long, slender, glabrous. Flowers on axillary racemes; peduncles *c.* 7 cm long, axillary, many-flowersed. Pedicels 5–7 mm long, slender, glabrous. Flowers buds 4-angled and curved. Calyx fused, glabrous. Corolla lobes 4, straight, red at base only and yellowish green towards apex. Stamens 4; filaments short. Ovary globose; stigma globose. Berries ovoid, truncate at apex

Distribution: The native range of this species is SW. and S. India (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: April-June.

Specimen examined: Pettimudi, 15.09.2017, *Vishnu Mohan & Santhosh Nampy* 154263 (CALI).

Helixanthera obtusata (Wall. ex Wight & Arn.) Danser Bull. Jard. Bot. Buitenzorg, sér. 3, 10: 317 1929. *Loranthus obtusatus* Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 381. 1834; Hook.f., Fl. Brit. India 5: 205. 1886; Gamble, Fl. Madras 2: 1251. 1925.

Parasitic shrubs. Stems woody, terete; branchlets slender, ferruginous-tomentose. Leaves simple, alternate; lamina ovate-elliptic, *c.* 14 × 8 cm, obtuse at apex, rounded at base, entire, coriaceous, glabrous; young leaves usually red; petioless *c.* 1 cm long, slender, glabrous. Flowers in many flowersed axillary racemes. Peduncles *c.* 8 cm long, slender, densely golden tomentose. Bracts elliptic, *c.* 3 × 2 mm, rounded at apex, entire, with a small appendage. Calyx tube *c.* 3 mm long, cylindric, slightly constricted at mouth, limb

very short. Corolla tube 15–18 mm long, 4-angular; lobes 4, free, tomentose out, glabrous within, red out, bluish within. Stamens 4; filaments short; anthers dark brown. Style 4 angled; stigma capitate. Berries ovoid, truncate at apex somewhat tuberculate.



Distribution: The native range of this species is SW. and S. India (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: April-September.

Specimen examined: Pettimudi, 15.09.2017, *Vishnu Mohan & Santhosh Nampy* 154263 (CALI).

Macrosolen Blume

Syst. Veg., ed. 15 bis 7(2): 1731. 1830.

Key to the species

1. Flowers without bracteoles ……...……..…… 2

1. Flowers with 2 connate bracteoles ……..……...……..*M. trigonus*

2. Corolla tube < 2.5 cm long, yellow-white ……*M. capitellatus*

2. Corolla tube > 2.5 cm long, red……..…… *M. parasiticus*

Macrosolen capitellatus (Wight & Arn.) Danser, Blumea 2: 36. 1936. *Loranthus capitellatus* Wight & Arn., Prodr. 382. 1834; Hook.f., Fl. Brit. India 5: 221. 1886.

Parasitic shrubs. Stems woody; branches 2-angulr, glabrous, smooth. Leaves simple, opposite; lamina elliptic-lanceolate, 5–8 × 2–3 cm, acute at apex, cuneate at base, entire, glabrous, coriaceous; petioless 0.5–0.7 cm long, stout, glabrous. Flowers 2-4 together, nearly sessile, in axillary fascicles. Bracts ovate-orbicular, 3–4 × *c.* 2 mm, rounded at apex, entire; bractoles absent. Calyx tube *c.* 5 mm long, cylindric, truncate with short rounded lobes. Corolla tube *c.* 2 cm long, yellow to white; lobes 6, linear or linear spathulate. Stamens 6; filaments 3–5 mm long, slender, glabrous. Berries ellipsoid, purple-black when ripe, beaked with persistent calyx tube.

Distribution: The native range of this species is S. India, Sri Lanka and Myanmar (POWO, 2023); *Habitat*: Deciduous forests, also in the plains; *Fl. & Ft.*: April-June.

Specimen examined: Kattadikkadavu, 09.05.2017, *Vishnu Mohan & Santhosh Nampy* 142536 (CALI).

Macrosolen parasiticus (L.) Danser, Blumea 2: 36. 1936. *Lonicera parasitica* L. in Sp. Pl.: 175. 1753.



Loranthus loniceroides L., Sp. Pl. ed. 2. 473. 1762; Hook.f., Fl. Brit. India 5: 221. 1886.

Woody sub-shrubs. Stems woody, terete, glabrous. Leaves simple, opposite; lamina ovate-elliptic, *c.* 8 × 2 cm, acute at apex, cuneate base, entire, glabrous, coriaceous; petioless up to 1 cm long, slender, glabrous. Flowers bisexual, in axillary cymes; peduncles up to 1 cm long, stout, glabrous. Bracts ovate, 3–5 × *c.* 2 mm, rounded at apex, entire, glabrous; bractoles absent. Calyx tube 5–8 mm long, truncate, glabrous. Corolla tube 2.5–4 cm long; lobes 5, lanceolate, acute. Stamens 5; filaments *c.* 1 cm long, glabrous. Ovary ovate; style *c.* 6.5 cm long; stigma globose. Berries ovate, glabrous.

Distribution: The native range of this species is SE. Tibet to Sri Lanka (POWO, 2023); *Habitat*: Semi-evergreen, moist decid uous and dry deciduous forests; *Fl. & Ft.*: December-May.

Specimen examined: Neriyamangalam, 17.05.2017, *Vishnu Mohan & Santhosh Nampy* 142546 (CALI).

Macrosolen trigonus (Wight & Arn.) Tiegh. Bull. Soc. Bot. France 42: 442 (1895). *Dendrophthoe trigona* (Wight & Arn.) Danser ex Santapau, Rec. Bot. Surv. India 16(1): 263. 1953. *Loranthus trigonus* Wight & Arn. in Prodr. Fl. Ind. Orient. 1: 386. 1834.

Parasitic shrubs. Stems woody, glabrous; branchlets often acutely 3-angled. Leaves simple, alternate; lamina ovate, *c.* 20 × 13 cm, obtuse at apex, acute at base, entire, glabrous, leathery; petioless 0.3–0.7 cm long, stout, flattened or winged. Flowers bisexual in axillary clusters. Bracts forming a shallow oblique cup. Calyx cupular, truncate, glabrous. Corolla tube 1.5–2 cm long, pink or yellow, split to the middle, lobes 5, linear, glabrous. Stamens inserted at base of corolla lobes; filaments 5–6 mm long, glabrous, flattened; anthers 4-loculed. Ovary 1-loculed; Style filiform; stigma capitate, sticky. Berries obovoid, crowned by cup-shaped calyx limb.

Distribution: The native range of this species is India (POWO, 2023); *Habitat*: Semi-evergreen forests; *Fl. & Ft.*: May-September.

Specimen examined: Eravikulam, 28.08.2018, *Vishnu Mohan & Santhosh Nampy* 154236 (CALI).

Scurrula L.

Sp. Pl. 1: 110. 1753.

Scurrula parasitica L., Sp. Pl. 110. 1753.

Parasitic shrubs. Stems woody, terete; branches rusty tomentose. Leaves simple, opposite; lamina ovate, 5–9 × 3–5 cm, rounded at apex and base, entire, coriaceous, golden tomentose below; petioless up to 1 cm long, stout, glabrous. Flowers in axillary fascicles or short peduncled cymes. Bracts ovate, 4–6 × *c.* 3 mm, rounded at apex, entire, concave, densely tomentose. Calyx tube 2–3 mm long, copular, grey tomentose, limb truncate, entire. Corolla tube up to 15 mm long, greenish-yellow, slender, densely tomentose; lobes 4, ovate. Stamens 4; filaments flattened, glabrous. Ovary orbicular; style 7–8 mm long; stigma clavate. Berries obovoid, densely hairy.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Moist and dry deciduous forests; *Fl. & Ft.*: November-February.

Specimen examined: Kattappana, 16.05.2017, *Vishnu Mohan* & *Santhosh Nampy* 145236 (CALI).

Taxillus Tiegh.

Bull. Soc. Bot. France 42: 256. 1895.

Taxillus recurvus (Wall. ex DC.) Tiegh., Bull. Soc. Bot. France 42: 256. 1895. *Loranthus recurvus* Wall. ex DC., Prodr. 4: 299. 1830; Hook.f., Fl. Brit. India 5: 213. 1886; Gamble, Fl. Madras 2: 1252. 1925.

Parasitic shrubs. Stems woody at base; branchlets terete, rusty tomentose. Leaves simple, alternate; lamina obovate, 3–5 × 2–3 cm, obtuse at apex, cuneate at base, entire, thinly grey-pubescent below; petioless up to 1.5 cm long, slender, glabrous. Flowers in axillary few flowersed cymes. Bracts ovate, 4–7 × *c*. 3 mm, rounded at apex, entire, glabrous. Calyx-tube 3–4 mm long; irregularly lobed, glabrous, thick. Corolla tube *c.* 2 cm long, yellowish green; tube curved, split half-way, gibbously inflated below the middle, rusty-villous; lobes 5. Stamens 5; style *c.* 2 cm long, slender, glabrous; stigma capitate, sticky. Drupes oblong to flask-shaped.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.*: August-December.

Specimen examined: Anamudishola, 18.08.2017, *Vishnu Mohan* & *Santhosh Nampy* 153290 (CALI).

SANTALACEAE R.Br.

Prodr. Fl. Nov. Holland. 350. 1810, *nom. cons.*

Herbs, shrubs or trees, hemiparasitic. Leaves often alternate, sometimes opposite, exstipulate. Flowers in various sorts of essentially cymose inflorescences, often with a small dichasium axillary to each bract, regular, monochlamydeous. Stamens as many as opposite the lobes, inserted at or below their base; disk epigynous, intrastaminal. Ovary inferior, unilocular; placenta erect, free-central; style simple, cylindric; stigma terminal, capitate or 2–3(–5)-lobed. Fruit an indehiscent, dry or fleshy nut or drupe.

The family includes 43 genera in th world (POWO, 2023); two species in the study area.

Key to the genera

1. Stems not spinous……*Osyris*

1. Stems spinous……*Scleropyrum*

Osyris L.

Sp. Pl. 1022. 1753.

Osyris lanceolata Hochst. & Steud., Exsicc. (Unio Itin.) 1832: s.n. 1832.

Osyris arborea Wall. ex A.DC. in A.P.de Candolle, Prodr. 14: 633. 1857.

Shrubs, up to 5 m tall. Branchlets sharply triangular, glabrous. Leaves simple, alternate, estipulate; lamina elliptic, 3.5–4 × *c*. 2 cm, mucronate at apex, acute-rounded at base, entire, glaucous and pubescent below; petioless 0.1–0.3 cm, slender, glabrous. Flowers unisexual, yellowish-green, axillary. Male flowers in long peduncled, shortly pedicelsled, 5–10-flowersed umbels. Flowers 3-merous. Male flowers: Tepals connate at base; lobes ovate, *c.* 2 × 1.5 mm, acute at apex, entire, hairy within, spreading. Stamens exserted. Bisexual flowers as same as male flowers. Ovary inferior sunk in the perianth tube; style short; stigma 3-lobed. Drupe sub-globose, yellow.

Distribution: The native range of this species is Canary Islands, S. Iberian Peninsula Baleares, Sahara to S. Africa, Socotra, Indian Subcontinent to S. China and Indo-China (POWO, 2023); *Habitat*: Dry deciduous forests and montane scrub jungles; *Fl.* & *Ft.*: January-April.

Specimen examined: Chinnar, 12.02.1995, *N. Sasidharan* 11952 (KFRI).

Scleropyrum Arn.

Mag. Zool. Bot. 2: 549. 1838.

Scleropyrum pentandrum (Dennst.) Mabb., Taxon 26: 533. 1977. *Pothos pentandrus* Dennst., Schluss. Hort. Malab. 16, 24, 33. 1818.



Scleropyrum wallichianum (Wight & Arn.) Arn., Mag. Zool. Bot. 2: 550. 1838; Hook.f., Fl. Brit. India 5: 234. 1886; Gamble, Fl. Madras 1262. 1925. Small trees, up to 15 m tall. Stems woody, terete; bark brown, spinous. Leaves simple, alternate, estipulate; lamina ovate-elliptic, 8–12 × 4–9 cm, rounded-acute at apex, rounded at base, entire, glabrous, coriaceous; petioles *c.* 0.4 cm long, stout, glabrous, smooth, slightly grooved above. Flowers polygamous on drooping spikes, non-fragrant, yellowish orange; peduncles 6–9 cm long, fleshy, thick, glabrous; pedicels short *c.* 0.3 cm long, stout, glabrous. Bracts triangular, *c.* 1.5 × 1 mm, acuminate at apex, entire, glabrous, filiform. Perianth fused; lobes ovate, *c.* 3 × 2 mm, acute at apex, entire, fleshy, glabrous, adnate to ovary. Stamens 5; filaments *c.* 3 mm long, filiform. Ovary inferior, 1-celled; style short; stigma peltate, sticky. Drupes pyriform.

Distribution: The native range of this species is India to China (Yunnan, Guangxi) and W. New Guinea (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests, also in the sacred groves; *Fl. & Ft.*: November-April.

Specimen examined: Thommankuthu, 30.11.2019, *Vishnu Mohan & Santhosh Nampy* Thommankuthu (CALI).

BALANOPHORACEAE Rich.

Mem. Mus. Hist. Nat. 8: 429. 1822, *nom. cons.*

Glabrous fleshy herbs with a tuberous rootstock, warted with lenticels abounding in a waxy secretion. Peduncles bursting through root stock, forming a ring or sheath at base. Male flowers with perianth of 2–6 valvate lobes, stamens 2–∞; filaments 0 o□connate in a column. Female flowers without perianth; ovary ellipsoid, 1-celled; style long, slender; stigma simple, minute. Fruit minute achene, crustaceous. Seeds globose.

Sixteen genera in the world (POWO, 2023); two species in the study area.

Balanophora J.R.Forst. & G.Forst.

Char. Gen. Pl., ed. 2. 99. 1776.

Key to the species

1. Monoecious herbs…….…….. *B. abbreviat*

1. Dioecious herbs…… *B. fungosa* subsp. *indica*

Balanophora abbreviata Blume, Enum. Pl. Javae. 1: 87. 1827.

Fleshy monecious parasytic herbs, up to 8 cm tall. Rhizome finely warted with lenticels, cream coloured. Leaves simple, alternate, scaly, ovate, *c.* 1.5 × 1 cm, rounded at apex, entire, smooth, glabrous, stiff, yellow. Flowers in terminal ovoid heads, unisexual, non-fragrant; peduncles 2–6 cm long, thick, fleshy, glabrous; pedicels stout, slender, glabrous, *c.* 0.3 cm long. Male flowers at the top. Tepals fused; lobes ovate-elliptic, *c.* 2 × 1 mm, rounded at apex, entire, glabrous. Stamens 4; filaments *c.* 2 mm long, glabrous. Female flowers fully covering. Tepals campanulate; lobes elliptic, *c.* 3 × 2 mm, rounded at apex, entire, glabrous; ovary ovoid; stigma sticky. Fruits obovoid with a narrow basal and upper portion.

Distribution: The native range of this species is Congo, Comoros, Madagascar, Tropical Asia, Society Islands (POWO, 2023); *Habitat*: Shola forests; *Fl. & Ft.:* January-March.

Specimen examined: Nakshathrakuthu, Mankulam 23.09.2018, *Vishnu Mohan & Santhosh Nampy* 173346 (CALI).

Balanophora fungosa subsp. **indica** (Arn.) B.Hansen, Dansk Bot. Ark. 28(1): 100. 1972. *Langsdorffia indica* Arn. in Ann. Nat. Hist. 2: 37 1838.



Fleshy, dioecious, parasitic herbs, 10 cm tall. Rootstock warted with lenticels. Stems stout, short, cylindric. Leaves simple, alternate, ovate, 2.5–3.5 × 1.5–2 cm, obtuse at apex, entire, scaly, smooth, glabrous. Flowers in terminal heads; peduncles 3–6 cm long, fleshy, glabrous; pedicels stout, short, reduced. Male inflorescence obovoid. Perianth lobes 2–6, elliptic, *c.* 2 × 1 mm, rounded at apex, entire, glabrous.

Stamens 2–6; filaments united at base, glabrous. Female inflorescence in globose heads, bright red. Perianth 0. Ovary ellipsoid, minute.

Distribution: The native range of this subspecies is Tropical & Subtropical Asia to W. Pacific (POWO, 2023); *Habitat*: Shola forests; *Fl.* & *Ft.*: October-February.

Specimesns examined: Meesapulimala, 21.11.2018, *Vishnu Mohan & Santhosh Nampy* 168829; Mathikettan Shola National Park (Perattakkalam), 29.12.2014, *Syam Radh S* 137876 (CALI); PTR, 09.02.1994, *Jomy Augustine* 13197 (KFRI).

BUXACEAE Dumort.

Commentat. Bot. 54. 1822.

Trees, shrubs or rarely herbs. Flowers unisexual, monoecious or dioecious. Sepals 0–4, imbricate. Petals absent. Stamens 4–6, more rarely 7–10; the male flowers often have a rudimentary ovary. Ovary superior, 3-locular; styles 3, entire or grooved; ovules 1 or 2 per loculus, pendulous. Fruit a capsule or a drupe. Seeds black and shining; endosperm fleshy. The family includes 128 species in the world under six genera (POWO, 2023); only a single species in the study area.

Sarcococca Lindl.

Bot. Reg. 12: t. 1012. 1826.

Sarcococca coriacea (Hook.) Sweet, Hort. Brit. 491. 1826; *Pachysandra coriacea* Hook., Exot. Fl. 2: t. 128. 1825.



Scandent shrubs up to 7 m tall. Stems terete, glabrous, smooth. Leaves simple, alternate, estipulate; lamina lanceolate, 5–12 × 3–5 cm, caudate-acuminate at apex, acute at base, entire, recurved, glabrous, shiny above, coriaceous; petioless 1–1.5 cm long, glabrous. Flowers in axillary racemes, non-fragrant, green; peduncles 1–1.7 cm long, slender, glabrous; pedicels *c.* 0.3 cm long, narrow, short, glabrous. Bracts ovate, 1.5–2 × *c.* 1 mm, acute at apex, entire, glabrous. Perianth fused; lobes 4, unequal, ovate, 1–1.5 × *c.* 1 mm, acute at apex, entire, glabrous. Stamens 12; filaments 5–8 mm long, glabrous, erect. Ovary inferior, ovate, style *c.* 4 mm long, glabrous; stigma capitate.

Distribution: The native range of this species is Indian Subcontinent to China (W. & S. Yunnan) and N. Indo-China (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: October-January.

Specimens examined: Anamudi Shola National Park, 25.01.2018, *Vishnu Mohan & Santhosh Nampy* 158261 (CALI); Near Subran shed, Pettimudi, 30.12.2019, *Vishnu Mohan & Santhosh Nampy* 170054 (CALI); Periyar Tiger Reserve, 23.10.1993, *N. Sasidharan* 12603 (KFRI); Way to Marayoor from Munnar, 24.01.2005, *P. Prabitha* 110564 (CALI).

EUPHORBIACEAE Juss.

Gen. Pl. 384. 1789.

Monoecious or dioecious herbs, shrubs, or trees. Stems sometimes succulent and/or with latex. Stipules free, deciduous or persistent. Leaves alternate or opposite. Inflorescence terminal or axillary, basically cymose. Flowers solitary or in glomerules. Bracts often glandular. Flowers unisexual. Perianth segments free or connate, sometimes reduced or absent. Sepals and petals sometimes distinctly coloured. Fruit shizocarpic with mericarps elastically dehiscent from a persistent columella.

The family includes 228 accepted genera (POWO, 2023); 29 genera and 61 species in the study area.

Key to the genera

1. Locules 2-ovuled……..…….…….2
1. Locules single-ovuled……..……..……...14
2. Flowers not distinct with involucre……...…..*Euphorbia*
2. Flowers distinct, not contained an involucre……..……3
3. Leaves unifoliate…….. ……...……..4
3. Leaves trifoliate……..……*Bischofia*
4. Petals present…. ……..……..5
4. Petals wanting……6
5. Calyx valvate, filaments united into a column……..……..*Bridelia*
5. Calyx imbricate, stamens free……..….…….*Actephila*
6. Disk present, usually conspicuous and of glands…….……...7
6. Disk inconspicous……..……...11
7. Male flowers in clusters…….……8

7. Male flowers in spikes or racemes, often panicled…….……*Antidesma*

8. Fruit a dry capsule of 2–3 cocci…….…….…….…….……9

8. Fruit a fleshy or if dry capsule it with 6-cocci…….…*Fluggea*

9. Calyx lobes 4 in both male and female flowers…….…*Prosorus*

9. Calyx lobes 5 in both male and female flowers…..……..…….…10

10. Plant shrubs; lamina more than 6 cm long; stamens 5……...*Meineckia*

10. Plant herbs or subshrubs; lamina less than 5 cm long; stamens 3……...…*Phyllanthus*

11. Stamens 4-many……*Drypetes*

11. Stamens 3 in a column……..…..…12

12. Disk combined with the calyx lobe……*Breynia*

12. Disk wanting…….…..…13

13. Stamens connate by a connective in column…….*Glochidion*

13. Stamens free or rarely connect by filaments…….……*Aporosa*

14. Filaments reflexed……*Croton*

14. Filaments erect…….……...15

15. Calyx in male flowers valvate…….……....16

15. Calyx in male flowers imbricate…….25

16. Petals present in male flowers…….*Agrostistachys*

16. Petals absent in male flowers ……..……...17

17. Filaments not branched…….……..18

17. Filaments much branched……..….*Homonoia*

18. Style free or slightly connate……..……19

18. Style connate……..…..*Tragia*

19. Anthers vermiculate or linear……...*Acalypha*

19. Anthers not vermiculate or linear……..…..……20

20. Plants herbs; anther cells discrete…….. ……...……..*Micrococca*

20. Plants trees; anther cells pendulous or adnate…….……21

21. Anther 2-celled……..……..23

21. Anthers 4-celled……...……...22

22. Leaves peltate…….……..*Macaranga*

22. Leaves not peltate……..……..…*Cleidion*

23. Stamens 2–9……*Epiprinus*

23. Stamens numerous…….…. *Mallotus*

24. Petals present in male flowers ……..……26

24. Petals absent in male flowers……..……25

25. Seeds caruncled……*Microstachys*

25. Seeds not caruncled……*Exocoecaria*

26. Tepals connate…….....*Givotia*

26. Tepals free……..……27

27. Leaves lobed…….……..……..*Jatropha*

27. Leaves entire……..……28

28. Flowers in axillary fascicles……..... *Tritaxis*

28. Flowers in terminal umbels……..……*Blachia*

Acalypha L.

Sp. Pl. 2: 1003 1753.

Key to the species

1a. Flowers in panicles ……..…….. *A. paniculata*

1b. Flowers in spikes……..*A. fruticosa*

Acalypha fruticosa Forssk., Fl. Aeg.-Arab. 161. 1775; Hook.f., Fl. Brit. India 5: 415. 1887; Gamble, Fl. Madras 2: 1331. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 125. 2007.

Strongly aromatic erect shrubs, up to 2 m tall. Stems terete, smooth, silky hairy, woody at base. Leaves simple, alternate; lamina ovate, 1–5 × 0.7–3 cm, acuminate at apex, rounded-acute at apex, crenate, hairy, glandular below, aromatic; petioless 1–3 cm long, slender, hairy. Flowers unisexual, in axillary short spikes, non-fragrant; male flowers on top, female flowers on bottom; peduncles 0.4–14 mm long, pubescent; pedicels obscure. Bracts reniform, *c.* 1 × 2 mm, rounded at apex, entire, glabrous. Male flowers tepals 5, free, orbicular, *c.* 2 × 1 mm, rounded at apex, tomentose. Stamens many; filaments very short, glabrous; anthers linear. Female flowers as same as male flowers. Ovary ovate, sparsely pubescent; style *c.* 1 mm long, erect, glabrous; stigma capitate. Capsules trilobed.

Distribution: The native range of this species is Eritrea to S. Africa, Yemen, S. India, Sri Lanka and Myanmar (POWO, 2023); *Habitat*: Dry deciduous forests and wastelands; *Fl.* & *Ft.*: June-November.

Specimens examined: Chinnar, 09.06.2017, *Vishnu Mohan* & *Santhosh Nampy* 152190 (CALI), *Ibid.,*16.11.1994, *K.K. Sajeev* 11595 (KFRI).

Acalypha paniculata Miq., Fl. Ned. Ind. 1: 406. 1859; Hook.f., Fl. Brit. India 5: 415. 1887; Gamble, Fl. Madras 2: 1330. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 126. 2007.

Erect herbs, up to 1 m tall. Stems terete, minutely pubescent, erect. Leaves simple, alternate; lamina broadly ovate, 3–6 × 2–4 cm, acuminate at apex, rounded at base, serrate at margins, sparsely hispid on both sides, membranous; petioless 1–3 cm long, slender, hispid. Flowers non-fragrant, green, monoecious; peduncles erect 5–20 cm long, hispid, terete; pedicels reduced. Male flowers on slender axillary panicle; peduncles 1–3 cm long; pedicels obscure. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire. Tepals 3–6, orbicular, *c.* 2 × 1 mm, rounded at apex, entire, glabrous. Stamens 8; filaments *c.* 2 mm long, glabrous; anthers linear. Female flowers on terminal panicles; peduncles erect, 5–20 cm long, hispid, terete; pedicels reduced. Ovary 3-lobed; style *c.* 2 mm long; stigma sticky. Capsules orbicular.

Distribution: The native range of this species is Tropical Africa, Arabian Peninsula, Maldives, S. India, Sri Lanka, Jawa to Lesser Sunda Islands (POWO, 2023); *Habitat*: Semi-evergreen and dry deciduous forests, also in the plains; *Fl. & Ft.*: August-December.

Specimens examined: Meenmutty, 29.09.1993, *N. Mohanan* 11565 (CALI); PTR, 11.12.1994, *K.P. Rajesh* 14334 (KFRI).

Actephila Blume

Bijdr. Fl. Ned. Ind. 12: 581. 1826.

Actephila excelsa (Dalzell) Müll.Arg., Linnaea 32(1): 78. 1863; Gamble, Fl. Madras 1283. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 125. 2007.

Trees, up to 10 m tall. Stems woody, terete, smooth, hispid; bark grey; branchlets glabrous. Leaves simple, opposite; lamina oblanceolate, 5–15 × 3–5 cm, acute at apex, attenuate at base, entire, glabrous; petioless *c.* 1 cm long, glabrous. Flowers unisexual in axillary clusters, fragrant; pedicels 4–10 mm long. Calyx campanulate; lobes 5, ovate, *c.* 4 × 2 mm, acute at apex, hairy without. Male flowers: Petals 5, ovate, *c.* 3 × 1 mm, acute at apex, glabrous, white; disc lobed; stamens 3–6. Pistillode within gonophore. Female flowers as same as male flowers, Ovary ovoid, 3-celled; styles 3; stigma 6-lobed. Capsules depressed globose, 6-lobed.

Distribution: The native range of this species is Indian Subcontinent to China (Yunnan, Guangxi) and W. & Central Malesia (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: April-May.

Specimen examined: Kariyilanthode (near karimala), 30.04.1994, *Jomy Agustine* 13696 (CALI).

Agrostistachys Dalzell

Hooker's J. Bot. Kew Gard. Misc. 2: 41. 1850.

Key to the species

1. Stipule *c.* 10 mm long; spikes 0.7–1.5 cm long; bracts closely arranged…… *A. indica*

1. Stipules *c.* 2 mm long; spikes 4–14 cm long; bracts distally placed…….*A. borneensis*

Agrostistachys borneensis Becc., Nelle For. Borneo 331. 1902. *Sarcoclinium longifolium* Wight, Icon. Pl. Ind. Oriet. 1887, 1888. 1852; *Agrostistachys meeboldii* Pax & Hoffm. in Engl., Pflanzenr. Euphorb.-Chrozoph. 100. 1912; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 157. 2007.

Dioecious trees, up to 20 m tall. Stems woody, terete, pilose; bark grey, smooth; exudation milky. Leaves simple, alternate, clustered at the tips of branchlets; lamina oblanceolate, 8–20 × 4–7 cm, acute-acuminate at apex, attenuate at base, entire, glabrous, coriaceous; petioles *c.* 1 cm long, stout, glabrous. Stipules lateral, ovate, *c.* 2 × 1.5 mm, acute at apex, caducous. Flowers unisexual, in axillary spikes, non-fragrant; peduncles 4–14 cm long, glabrous. Bracts distally arranged, broadly ovate, *c.* 4 × 3 mm, acute at apex, ciliate. Male flowers: Tepals 5 + 5; outer tepals connate at base, lobes ovate; inner tepals petalloid, ovate, *c.* 3 × 2 mm, obtuse at apex, entire, fleshy, fimbriate. Stamens 10, exserted; filaments *c.* 3 mm long, glabrous. Pistillode clefted. Female flowers as same as male flowers; Ovary superior, pubescent, 3-celled; styles thick, short, spreading; stigma capitate. Capsules 3-lobed, smooth.

Distribution: The native range of this species is S. India to Central New Guinea (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: December-March.

Specimens examined: Devikulam, Sholas Devicolam-Periyar road, mostly beyond the Gap, Cardamom Hills., 25.03.1980, *C.E.Ridsdale* 696 (CALI).

Agrostistachys indica Dalzell, Hooker's J. Bot. Kew Gard. Misc. 2: 41. 1850; Hook.f., Fl. Brit. India 5: 406. 1887; Gamble, Fl. Madras 1317. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 157. 2007.

Small trees, up to 10 m tall. Stems woody, terete, smooth; bark brownish grey. Leaves simple, sub-opposite-alternate; lamina oblanceolate, 10–18 × 5–9 cm, acute at apex, attenuate at base, serrate, glabrous, coriaceous; petioless *c.* 1 cm long, stout, glabrous. Stipules elliptic, *c.* 10 × 3–4 mm, acute at apex, entire, glabrous. Male flowers in axillary spikes, non-fragrant; peduncles *c.* 7–15 mm long, slender. Female flowers solitary, non-fragrant. Bracts closely arranged, broadly ovate, *c.* 4 × 3 mm, acute-rounded at apex, entire, densely tomentose. Male flowers: Outer tepals ovate, *c.* 4 × 2.5 mm, obtuse at apex; inner tepals petaloid, *c.* 3 × 2 mm, acute at apex. Stamens 12; filaments united at base. Female flowers as same as male flowers. Ovary inferior, ovate; style glabrous; stigma capitate. Capsule cocci minutely hispid. Seeds globose, glabrous.

Distribution: The native range of this species is SW. India, Sri Lanka to S. New Guinea (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: February-March.

Specimen examined: Mathikettan Shola National Park (Perattakkalam), 25.02.2016, *Syam Radh S* 145177 (CALI).

Antidesma L.

Gen. Pl. ed. 5. 1754.

Key to the species

1. Stamens 2…….*A. acidum*

1. Stamens 3 or 4……2

2. Axils of lower lateral nerves on the under surface of leaves with a tuft of hairs……...…….*A. bunius*

2. Axils of lower lateral nerves on the under surface of the leaves without tuft of hairs…… ……..….*A. montanum*

Antidesma acidum Retz., Observ. Bot. 5: 30. 1788. *Antidesma diandrum* (Roxb.) Spreng., Syst. Veg. 1: 826.1825; Hook.f., Fl. Brit. India 5: 361. 1887; Gamble, Fl. Madras 2: 1298. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 303. 2007.

Shrubs, up to 5 m tall. Stems woody, terete, glabrous, smooth. Leaves simple, alternate; lamina elliptic, 4–10 × 2–4 cm, acute-acuminate at apex, attenuate at base, entire, glabrous, recurved, coriaceous; petioless 0.3–0.6 cm long, glabrous, swollen at base. Flowers unisexual, in terminal spikes; peduncles 2–8 cm long, glabrous; pedicels short, glabrous.

Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Male flowers: Perianth campanulate; lobes 4, ovate, brown hairy within, glabrous out. Stamens 2; filaments *c.* 3 mm long, attached on the disc. Female flowers as same as male flowers; Ovary obovoid, 1-loculed; style *c.* 2 mm long, glabrous; stigma curved, sticky. Drupes globose.

Distribution: The native range of this species is Indian Subcontinent to S. Central China and Indo-China and Jawa (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests and sacred groves; *Fl. & Ft.*: June-December.

Specimens examined: Kulamavu, 01.06.1982, *V.S. Ramachandran* 74120 (MH); Thannikudy, 20.10.1993, *N. Sasidharan* 12564 (KFRI); Thekkady, 16.10.1993, *Jomy Agustine* 125644 (CALI).

Antidesma bunius (L.) Spreng., Syst. Veg., ed. 16. 1: 826. 1824; Hook.f., Fl. Brit. India 5: 358. 1887; Gamble, Fl. Madras 1298. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 304. 2007.

Trees, up to 10 m tall. Stems woody, terete, lenticellate, brown-tomentellous or sparsely white pilose when young; bark dark brown. Leaves simple, alternate; lamina elliptic-oblong or elliptic-obovate 7–19 × 3–8 cm, acuminate at apex, cuneate at base, entire, glossy above, glabrous; axils of lower lateral nerves on the under surface of leaves with a tuft of hairs; petioless 0.3–1 cm long, slender, puberulous, glabrous when mature. Stipules lateral, linear, 4–5 × *c.* 1 mm, acuminate at apex, entire, glabrous. Flowers unisexual, reddish. Male flowers in terminal spikes; peduncles tawny puberulous or tomentellous. Bracts ovate-lanceolate, 1–1.5 × *c.* 1 mm, acute at apex, entire, glabrous. Perianth cupular, 1 mm long, sparsely puberulous; lobes 4, shallow, sub-orbicular, ciliate. Stamens 3; anthers orbicular. Pistillode capitate, *c.* 1 mm in diam.; disc sub-globose, lobed. Female flowers terminal and axillary, solitary or in pair; peduncles scattered puberulous; pedicels 0.5–2 mm long, puberulous, glabrous. Bracts deltoid, conduplicate, deciduous. Perianth campanulate, glabrous, 4-lobed; lobes deltoid, ciliate. Ovary ovoid, glabrous; styles 3, terminal, erect. Drupes sub-orbicular, slightly compressed, glabrous, red when ripe.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Evergreen forests, also in sacred groves; *Fl. & Ft.*: February-May.

Specimen examined: Near Meenmutty, 18.02.1982, *V.S. Raju* 71250 (MH).

Antidesma montanum Blume, Bijdr. Fl. Ned. Ind. 1124. 1827; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 305. 2007.

Antidesma menasu (Tul.) Miq. ex Muell sensu Hook.f., Fl. Brit. India 5: 364. 1887; Gamble, Fl. Madras 1297. 1925.

Trees, up to 20 m tall. Stems woody, terete, glabrous; bark brown, grooved. Leaves simple, alternate; lamina oblong-elliptic, 6–20 × 2–8 cm, acuminate at apex, acute at base, entire, glabrous; axils of lower lateral nerves on the under surface of the leaves without tuft of hairs; petioless *c.* 1 cm long, slender, tomentose. Stipules lanceolate, 5–10 × 0.5–3 mm, acuminate at apex, entire, puberulous. Flowers unisexual, in racemes; peduncles puberulous, 5–10 cm long, erect slender, glabrous; pedicels *c.* 2 mm long, slender, glabrous. Bracts linear, *c.* 3 × 1 mm, acuminate at apex, entire, glabrous. Perianth campanulate; lobes orbicular, *c.* 0.6 × 1 mm, rounded at apex, entire, glabrescent. Stamens 4; filaments inserted on the disc; anthers *c.* 0.5 mm in diam.; pistillode capitate. Female flowers as same as male flowers; Ovary superior, ovoid; style terminal. Drupes ellipsoid, glabrous.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. Queensland (POWO, 2023); *Habitat*: Evergreen and shola forests, also in sacred groves; *Fl.* & *Ft.*: March-December.

Specimen examined: Enviorns Devikulam, 25.03.1980, *C.E.Ridsdale* 689 (CALI).

Aporosa Blume

Bijdr. Fl. Ned. Ind. 10: 514. 1826.

Key to the species

1. Leaves broadly obovate to sub orbicular…..……..……..*A. fusciformis*

1. Leaves narrow, elliptic-oblong ……..……...……..2

2. Femele flowers sessile…….....…….*A. acuminata*

2. Female flowers pedicelslate…….…..……..*A. cardiosperma*

Aporosa acuminata Thwaites, Enum. Pl. Zeyl. 288. 1861; Hook.f., Fl. Brit. India 5: 348. 1887; Gamble, Fl. Madras 2: 1309. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 310. 2007.

Small trees, up to 10 m tall. Stems woody, terete, glabrous, smooth, slender; bark brownish grey. Leaves simple alternate; lamina elliptic, 7–12 × 3–5 cm, acuminate at apex, acute at base, entire, glabrous; petioless *c.* 1 cm long, slender, glabrous, slightly grooved above. Stipules ovate, *c.* 2 × 1 mm, acute at apex, entire, tomentose above, glabrous below. Flowers unisexual, in axillary spikes, non-fragrant; peduncles up to *c.* 1 cm long; pedicels

obscure. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire. Male flowers: Perianth fused below; lobes 5, ovate, *c.* 3 × 2 mm, acute, entire, glabrous. Stamens 3; filaments *c.* 1 mm long, slender, glabrous. Female flowers sessile, same as male flowers. Ovary ovate, tomentose; styles bifid; stigma sticky. Capsules ovoid, glabrous; aril red.

Distribution: The native range of this species is SW. Sri Lanka (POWO, 2023); *Habitat* Evergreen forests; *Fl.* & *Ft.*: January-May.

Specimens examined: Edappalayam, 03.03.1998, *Jomy Augustine* 17967 (CALI); Kuttikkanam-Peerumenu, 21.01.1965, *K. Vivekananthan* 22920 (MH); Meenmutty, 13.02.1982, *C.N. Mohanan* 73210 (MH); Meenmutty-Kulamavu, 25.02.1984, *A.G. Pandurangan* 78093 (MH); PTR, 27.01.1995, *Jomy Augustine* 14701 (KFRI).

Aporosa cardiosperma (Gaertn.) Merr**.**, J. Arnold Arbor. 35: 139. 1954; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 310. 2007. *Croton cardiospermus* Gaertn. in Fruct. Sem. Pl. 2: 120 1790.

Aporosa lindleyana (Wight) Baill., Etud. Gen. Euphorb. 645. 1858; Hook.f., Fl. Brit. India 5: 349. 1887; Gamble, Fl. Madras 2: 1309. 1925.

Trees, up to 15 m tall. Stems woody, terete, glabrous; bark greyish-brown, vertical striations shallow, glabrous. Leaves simple, alternate; lamina, elliptic-oblong, 7–15 × 3–8 cm, acuminate at apex, obtuse at base, entire, glabrous, coriaceous; petioless *c.* 1 cm long, glabrous; petioless 1–2 cm long, stout, grooved above, glabrous. Stipules lanceolate, *c.* 4 × 2 mm, acuminate at apex, caducous. Flowers unisexual, in axillary spikes, non-fragrant; peduncles 1–5 cm long, glabrous, terete; pedicels very short. Bracts ovate, *c.* 3 × 2 mm, acute at apex, ciliate. Male flowers: Perianth fused; lobes 4, ovate, *c.* 4 × 2 mm, acute-rounded at apex, ciliate, glabrous. Stamens 3; filaments free, *c.* 2 mm long, glabrous. Female flowers as same as male flowers. Ovary superior, flask-shaped, thinly hispid; styles 3, connate into a column; stigmas plumose, spreading, recurved. Capsules globose, yellow, glabrous; aril orange-yellow.

Distribution: The native range of this species is W. & S. India, Sri Lanka (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests, also in the plains; *Fl.* & *Ft.*: December-June.

Specimen examined: Kallar, 22.06.2018, *Vishnu Mohan* & *Santhosh Nampy* 158554 (CALI).

Aporosa fusiformis Thwaites, Enum. Pl. Zeyl. 288. 1861; Hook.f., Fl. Brit. India 5: 351. 1887; Gamble, Fl. Madras 2: 1309. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 310. 2007.

Trees, up to 10 m tall. Stems woody, terete, smooth; bark brown, smooth, glabrous. Leaves simple, alternate; lamina broadly obovate to sub-orbicular, 3–18 × 1.5–8 cm, apiculate at apex, cuneate at base, entire, glabrous, often glossy above, coriaceous; petioless 0.5–2 cm long, slender, grooved above, glabrous. Stipules falcate, *c.* 6 mm long, acuminate, glabrous. Flowers unisexual, in 1–3 cm long axillary dense flowersed spikes, non-fragrant; peduncles *c.* 5 cm long, glabrous. Bracts broadly ovate-orbicular, 0.3–2 × 0.5–3.5 mm, rounded-acute at apex, entire, ciliate. Male flowers: Tepals fused below; lobes ovate, *c.* 1 × 0.6 mm, acute at apex, entire, glabrous. Stamens 2 or 3; filaments free; anthers sub-orbicular. Female flowers same as male flowers. Ovary ovoid-ellipsoid, puberulous, 2-locular; style 2; stigma 2-lobed, coarsely plumose. Capsules fusiform, glabrous. Seeds 1 or 2.

Distribution: SW. India and SW. Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: January-June.

Specimens examined: Kallar, 22.06.2018, *Vishnu Mohan* & *Santhosh Nampy* 158555 (CALI); PTR, 13.04.1994, *Jomy Augustine* 13561 (KFRI).

Bischofia Blume

Bijdr. Fl. Ned. Ind. 17: 1168. 1827.

Bischofia javanica Blume, Bijdr. Fl. Ned. Ind. 17: 1168. 1827; Hook.f., Fl. Brit. India 5: 345. 1887; Gamble, Fl. Madras 1312. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 315. 2007.

Large trees, up to 30 m tall. Stems woody, terete; bark brown, thin, scaly; exudation red, watery. Leaves tri-foliate, alternate; leaflets elliptic, 5–15 × 3–9 cm, acuminate at apex, acute at base, serrate, glabrous, membranous; petiolule 1–4 cm long, slender. Stipules ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous, caducous. Flowers unisexual, in axillary and lateral racemes, non-fragrant; peduncles 4–8 cm long, slender, glabrous; pedicels 3–6 mm long, glabrous, stout. Male flowers: Tepals 5, obovate-lanceolate, *c.* 5 × 3 mm, acute at apex, entire. Stamens 5; filaments *c.* 2 mm long, glabrous. Pistillode *c.* 3 mm long, broad. Female flowers as same as male flowers: Ovary superior, globose, 3-celled; style 3, linear; stigma globose, sticky. Berries, globose, reddish-brown. Seeds 3, trigonous.

Distribution: The native range of this species is Tropical & Subtropical Asia to Pacific (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl. & Ft.*: February-October.

Specimens examined: Kulamavu, 02.06.1982, *C.N. Mohanan* 74155 (MH); Meenmutty, 14.02.1982, *C.N. Mohanan* 73259 (MH); Panamkutty, 03.05.1984, *C.N. Mohanan* 81750 (MH); Thekkady, 20.03.1998, *Jomy Augustine* 17968 (CALI).

Blachia Baill**.**

Étude Euphorb. 385. 1858, *nom. cons*.

Blachia umbellata Baill**.**, Étude Euphorb. 387. 1858; Hook.f., Fl. Brit. India 5: 402. 1887; Gamble, Fl. Madras 1338. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 202. 2007.

Shrubs, up to 5 m tall. Stems woody, terete, stiff, glabrous, smooth; branchlets smooth. Leaves simple, alternate; lamina elliptic-lanceolate, 5–9 × 3–5 cm, acuminate at apex, acute at base, entire, glabrous, coriaceous; petioless *c.* 1 cm long, stout, glabrous, swollen. Flowers unisexual, in terminal umbels; peduncles 2–4 cm long, slender, glabrous; pedicels *c.* 1.5 cm long, glabrous. Tepals ovate, *c.* 3 × 2 mm, acute at apex, glabrous. Stamens many; filaments 4–6 mm long, slender, glabrous. Female flowers same as male flowers; Ovary glabrous; styles 3, *c.* 8 mm long, bifid; stigma sticky. Capsules 3-lobed, glabrous.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl.* & *Ft*.: February-April.

Specimen examined: Arjunankotta, 22.02.1994, *Jomy Agustine* 13385 (CALI).

Breynia J.R.Forst. & G.Forst.

Char. Gen. Pl. ed. 2. 145. 1776, *nom. cons*.

Key to the species

1. Calyx of female flowers thin and membraneous…….*B. retusa*

1. Calyx of female flowers chartaceous……..……..……*B. vitis-idaea*

Breynia retusa (Dennst**.)** Alston, Ann. Roy. Bot. Gard. (Peradeniya) 11: 204. 1929. *Phyllanthus retusus* Dennst. in Schlüssel Hortus Malab.: 31 1818.

Breynia patens (Roxb.) Rolfe, J. Bot. 11: 359. 1882; Hook.f., Fl. Brit. India 5: 329. 1887; Gamble, Fl. Madras 2: 1304. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 340. 2007.

Shrubs, up to 2 m tall. Stems stiff, slightly woody at base, terete, glabrous; bark grey, smooth. Leaves imparipinnate, alternate; leaflets elliptic-ovate, 1–2 × 0.7–1 cm, obtuse at

apex, rounded at base, entire, glabrous, glaucous below; petioless 5–10 cm long, slender, glabrous, zigzag; petiolule *c.* 2 mm long, glabrous. Flowers unisexual, solitary, on leaflet axil, non-fragrant; pedicels 2–4 mm long, drooping, glabrous. Male flowers: Perianth fused at base, turbinate; lobes 6, widely orbicular, *c.* 4 × 6 mm, rounded at apex, glabrous. Stamens 3; filaments reduced. Female flowers calyxmembranous, same as male flowers. Ovary globose; style 3, erect, *c.* 3 mm, glabrous; stigma bifid, sticky. Capsules depressed globose.

Distribution: The native range of this species is Réunion, India to S. China and Peninsula Malaysia (POWO, 2023); *Habitat*: Semi-evergreen and deciduous forests, also in the plains; *Fl. & Ft.*: February-September.

Specimens examined: Ambari, 25.05.1995, *Jomy Augustine* 15390 (CALI); Chinnar-Marayur, 19.04.1964, *K.M. Sebastine* 18306 (MH); Marayur, 18.06.1963, *K.M. Sebastine* 16554 (MH); Meenmutty, 09.06.1983, *A.G. Pandurangan* 76767 (MH); Karimutty, 27.04.1995, *K.K. Sajeev* 15572 (KFRI).

Breynia vitis-idaea (Burm.f.) C.E.C.Fisch., Bull. Misc. Inform. Kew 1932(2): 65. 1932. *Rhamnus vitis-idaea* Burm.f. in Fl. Indica: 61 1768.

Breynia rhamnoides (Retz.) Muell.-Arg. in DC., Prodr. 15: 440. 1866; Hook.f., Fl. Brit. India 5: 330. 1887; Gamble, Fl. Madras 2: 1304. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 340. 2007.

Large shrubs, up to 3 mm tall. Stems terete, slightly woody, glabrous, zigzag, woody at base. Leaves imparipinnate; leaflets alternate, ovate, 2–3 × 1.5–2 cm, acute at apex, obtuse at base, entire, glabrous; petioless 7–15 cm long, slender, glabrous, zig zag; petiolule *c.* 2 mm long, stout, glabrous. Flowers unisexual, solitary in the axil of leaflets, non-fragrant; pedicels 3–5 mm long, slender, drooping, glabrous. Male flowers: Perianth turbinate, fused at base; lobes 5, widely orbicular, *c.* 5 × 4 mm, rounded at apex, entire, glabrous. Stamens 3; filaments free, glabrous. Female flowers as same as male flower; calyx chartaceous. Ovary 3-celled; style short, glabrous; stigmas 3, sunk at top of ovary. Berries globose. Seed 1.

Distribution: The native range of this species is Indian Subcontinent to S. China and Sumatera (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests, also in the plains; *Fl. & Ft.*: February-August.

Specimens examined: Marayur, 18.06.1963, *K.M. Sebastine* 16561 (MH); Thekkady, 28.05.1999, *Jomy Agustine* 15303 (CALI); Vallakkadavu, 07.09.1994, *K.K. Sajeev* 15572 (KFRI).

Bridelia Willd.

Sp. Pl., ed. 4. 4(2): 978. 1805, *nom. cons*.

Key to the species

1. Trees; fruit globose……..…*B. retusa*

1. Climbers; fruit oblong……....*B. stipularis*

Bridelia retusa (L.) A.Juss**.**, Euphorb. Gen. 109. 1824; Hook.f., Fl. Brit. India 5: 268. 1887*p.p*.; Gamble, Fl. Madras 1280. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 319. 2007.



Small trees, up to 10 m tall. Stems woody, terete, glabrous, smooth; bark grey; branchlets glabrous. Leaves simple, alternate; lamina obovate-elliptic, 4–15 × 2.5–6 cm, retuse at apex, rounded-acute at base, entire, glabrous above, glaucous beneath, coriaceous; petioless 0.3–0.6 mm long, glabrous, stout, swollen. Stipules lanceolate, *c.* 7 × 3 mm, acuminate at apex, glabrous, deciduous. Flowers unisexual, sessile, crowded in dense axillary or terminal paniculate spikes, non-fragrant. Bracts ovate, *c.* 3 × 2 mm, acute at apex, scaly. Male flowers: Tepals 5 + 5, ovate-lanceolate, shortly connate at base; lobes acute. Stamens 5, monadelphous; staminal column *c.* 0.7 mm long. Pistillode bifurcate. Female flowers same as male flowers. Ovary half inferior, globose; styles 2, forked, *c.* 2 mm long. Drupes globose. Seed 1 in each pyrene.

Distribution: The native range of this species is Indian Subcontinent to S. China and W. Malesia (POWO, 2023); *Habitat*: Semi-evergreen and deciduous forests, also in the plains; *Fl. & Ft.*: June-December.

Specimens examined: Puliyanmala, 25.12.1983, *A.G. Pandurangan* 66486 (MH); Marayur, 18.06.1963, *K.M. Sebastine* 16559 (MH); Meenuliyanpara, 12.12.2016, *Vishnu Mohan & Vishnu Mohan* 151412 (CALI).

Bridelia stipularis (L.) Blume, Bijdr. Fl. Ned. Ind. 12: 597. 1826; Hook.f., Fl. Brit. India 5: 270. 1887; Gamble, Fl. Madras 1281. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 320. 2007.

Shrubby climbers, spiny, up to 4 m tall. Stems woody, terete, brown tomentose. Leaves

simple, alternate; lamina elliptic-oblong, 4–7 × 2–4 cm, obtuse at apex, rounded at base, entire, glabrous above, minutely tomentose below, coriaceous; petioles *c.* 0.5 cm long, stout, glabrous, swollen. Flowers unisexual, sessile, in axillary fascicles, non-fragrant. Male flowers: Tepals 5 + 5, orbiculate, *c.* 4 × 4 mm, rounded at apex, entiret, glabrous in, densely tomentose out. Stamens 5, monadelphous; staminal column *c.* 4 mm long, glabrous, free. Female flowers same as male flowers. Ovary superior; style *c.* 3 mm long, erect, glabrous; stigma sticky, curved. Drupes oblong, calyx persistent.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests and sacred groves; *Fl. & Ft.*: December-February.

Specimen examined: Near Valara waterfalls, 27.12.2017, *Vishnu Mohan & Santhosh Nampy* 156396 (CALI).

Cleidion Blume

Bijdr. Fl. Ned. Ind. 12: 612. 1826.

Cleidion javanicum Blume, Bijdr. Fl. Ned. Ind. 12: 613. 1826; Hook.f., Fl. Brit. India 5: 444. 1887; Gamble, Fl. Madras 1325. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 134. 2007.

Trees, up to 15 m tall. Stems woody, terete, glabrous; bark greenish-white, smooth. Leaves simple, alternate; lamina elliptic-oblongly lanceolate, 5–16 × 3–7 cm, acuminate at apex, acute at base, serrate, glabrous, coriaceou; petioless 1.5–5 cm long, slender, grooved above, swollen, glabrous. Stipules ovate, *c.* 4 × 2 mm, acute at apex, entire. Flowers unisexual, in axillary racemes, non-fragrant; peduncles 5–12 cm long, stout, glabrous; pedicels *c.* 2 mm long, glabrous. Male flowers. perianth campanulate at base; lobes ovate, *c.* 3 mm long, acute at apex, entire, glabrous. Stamens many; filaments *c.* 3 mm long, glabrous, free. Female flowers same as male flowers. Ovary superior, 2-celled; styles 2, connate at base. Capsules bilobed, broader than long. Seeds 1 in each cell.

Distribution: The native range of this species is Tropical & Subtropical Asia to Vanuatu (POWO, 2023); *Habitat*: Semi-evergreen forests; *Fl. & Ft.*: November-April.

Specimen examined: Mullakkodi, 06.01.1995, *Jomy Agustine* 14560 (CALI).

Croton L.

Sp. Pl. 2: 1004. 1753.

Key to the species

1. Inflorescence stellate hairy……..……...*C. tiglium*

1. Inflorescence scaly……..……2

2. Leaves stellate scaly abaxially…….…..……..3

2. Leaves glabrous ……....*C. caudatus*

3. Shrubs; leaves elliptic; filaments glabrous…….……...…….*C. zeylanicus*

3. Trees; leaves ovat-lanceolatee; filaments villous……*C. malabaricus*

Croton caudatus Geiseler, Croton. Monogr. 73. 1807; Hook.f., Fl. Brit. India 5: 388. 1887; Gamble, Fl. Madras 2: 1315. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 213. 2007.

Scandent shrubs, up to 40 cm tall. Stems terete, glandular hairy. Leaves simple alternate; lamina ovate, 4–8 × 3–5 cm, acuminate at apex, cordate at base, irregularly crenate, glabrous; petioless 2–3 cm long, terete, stellate hairy. Stipules ovate, apex 2–5-lobed. Flowers unisexual, in terminal scaly racemes, non-fragrant; peduncles up to 20 cm long, densely tomentose; pedicels *c.* 4 mm long, slender. Male flowers: Tepals lanceolate, petaloid, *c.* 5 × 2 mm, acute at apex, entire, hispid. Stamens many; filaments, *c.* 3 mm long, glabrous, slender. Female flowers as same as male flowers. Ovary densely stellate hairy; style linear, *c.* 5 mm long; stigma sticky. Capsules obovoid, retuse, densely stellate hairy.

Distribution: The native range of this species is China (SW. Yunnan) to Tropical Asia and N. Queensland (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl.* & *Ft.*: March-May.

Specimen examined: Pambla dam, 08.03.2017, *Vishnu Mohan* & *Santhosh Nampy* 152008 (CALI).

Croton malabaricus Bedd**.**, Fl. Sylv. S. India Forester's Man. Bot.: p. 204 1873; Hook.f., Fl. Brit. India 5: 386. 1887; Gamble, Fl. Madras 1314. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 214. 2007.

Trees, up to 20 m tall. Stems woody, terete, smooth; bark greyish-white, smooth. Leaves simple, alternate; lamina ovate-lanceolate, 5–16 × 3–7 cm, acuminate at apex, cuneate at base, entire, stellate hairy below, stellate scaly above; petioless 1–6 cm long, slender, stellate scaly. Stipules lanceolate, 1–2 × *c.* 0.5 cm, lateral, filiform, scarious. Flowers unisexual, in erect terminal scaly racemes, non-fragrant; peduncles 5–10 cm long, slender, glandular hairy; pedicels slender, *c.* 1 cm long. Bracts ovate, *c.* 5 × 2 mm, acute, entire, pubescent. Male flowers: Perianth 5 + 5, ovate, *c.* 6 × 2 mm, acute at apex, entire, glandular at base. Stamens many; filaments slender, villous. Female flowers as same as male flowers. Ovary stellate hairy, 3-celled; styles slender. Capsules obovoid, depressed above, brown tomentose.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests; *Fl. & Ft.*: March-November.

Specimen examined: Puthussery, 25.03.1994, *Jomy Augustine* 13503 (CALI).

Croton tiglium L., Sp. Pl. 2: 1004. 1753; Hook.f., Fl. Brit. India 5: 398. 1887; Gamble, Fl. Madras 1315. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 215. 2007.

Shrubs to small trees, up to 8 m tall. Stems woody, terete, younger parts stellate hairy; bark grey, smooth. Leaves simple, alternate; lamina ovate-elliptic, 6–13 × 3–6 cm, acute at apex, rounded at base, crenulate, glabrous, coriaceous; petioless 2–5 cm long, slender, erect. Flowers unisexual, in terminal glabrous racemes; peduncles up to 12 cm long, sparsely stellate hairy; pedicels 4–6 mm long, slender. Male flowers: Tepals ovate, *c.* 6 × 3 mm, acute at apex, entire, tomentose at tip. Stamens 15; filaments slender *c.* 4 mm long, narrow, glabrous. Female flowers as same as male flowers. Ovary superior, ovate; *c.* style 4 mm long, glabrous; stigma sticky. Capsules obovoid. Seeds dull white.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Forest margins; *Fl. & Ft.*: November-January.

Specimen examined: Pamba Valley, 22.12.1996, *Jomy Augustine* 17077 (CALI).

Croton zeylanicus Müll.Arg., Linnaea 34(1): 107. 1865.

Croton reticulatus Heyne ex Muell.-Arg. in DC., Prodr. 15: 580. 1866; Hook.f., Fl. Brit. India 5: 380. 1887; Gamble, Fl. Madras 2: 1314. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 216. 2007.

Shrubs, up to 5 m tall. Stems woody, terete, densely covered with brown, fimbriate scales. Leaves simple, sub-opposite; lamina elliptic, 6–18 × 3–6 cm, acuminate at apex, rounded at base, entire, stellate scaly above; petioles 3 cm long, stout, glabrous. Flowers unisexual, in terminal scaly racemes, non-fragrant; peduncles slender, *c.* 6 cm long, stellate hairy. Male flowers: Tepals ovate, *c.* 6 × 3 mm, obtuse at apex, entire, glabrous. Stamens many; filaments slender, erect, *c.* 3 mm long, glabrous. Female flowers as same as male flowers. Ovary superior, stellate hairy; styles 3; stigma 3-fid. Capsules ovoid. Seeds oblong, mottled with brown.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forest margins; *Fl. & Ft.*: March-October.

Specimens examined: Edathattu, 13.09.2018, *Vishnu Mohan & Santhosh Nampy* 159481; Mankulam, 10.10.2021, *Vishnu Mohan & Santhosh Nampy* 176171; Pachakkanam, 10.08.1993, *Jomy Augustine* 12279 (CALI).

Drypetes Vahl.

Eclog. Amer. 3: 49. 1807.

Key to the species

1. Flowers sessile……..…….*D. oblongifolia*

1. Flowers pedicellate……..……..*D. malabarica*

Drypetes malabarica (Bedd.) Airy Shaw, Kew Bull. 23(1): 56. 1969. *Cyclostemson malabaricus* Bedd., Fl. Sylv. 199. 1873; Hook.f., Fl. Brit. India 5: 341. 1887; Gamble, Fl. Madras 1302. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 332. 2007.

Small trees, up to 20 m tall. Stems woody, terete; bark grey, smooth, tomentose. Leaves simple, alternate; lamina narrowly elliptic, 8–26 × 3–6 cm, acuminate at apex, acute at base, distantly serrate, glabrous above, brown tomentose beneath, coriaceous; petioles , *c.* 8 mm long, stout, tomentose. Stipules orbicular-ovate, *c.* 4 × 3 mm, rounded at apex, entire, glabrous, caducous. Flowers unisexual, on axillary cymes, non-fragrant; peduncles compressed, brownish tomentose; pedicels slender, narrow, 5–9 mm long. Male flowers: Tepals 5, orbicular-ovate, *c.* 4 × 4 mm, rounded at apex, entire, glabrous. Stamens numerous; filaments *c.* 4 mm long, slender, glabrous. Female flowers: Tepals ovate, *c.* 5 × 5 mm, acute at apex, entire, glabrous. Ovary pubescent; style erect, *c.* 4 mm long; stigma sticky. Drupes subglobose, 2-locular.

Distribution: The native range of this species is SW. India (Tirunelveli Hills) (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft*.: December-June.

Specimen examined: Arjunankotta, 02.03.1997, *Jomy Augustine* 17719 (CALI).

Drypetes oblongifolia (Bedd.) Airy Shaw, Kew Bull. 23(1): 57. 1969. *Laneasagum oblongifolium* Bedd., Madras J. Lit Sci. ser. 3, 6: 71. 1861; *Cyclostemson macrophyllus sensu* Gamble, Fl. Madras 1302. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 332. 2007.

Large trees, up to 30 m tall. Stems woody, terete; bark brownish grey, lenticellate, exudation yellow. Leaves simple, alternate; lamina elliptic, 7–16 × 3–16 cm, acuminate at apex, rounded at base, entire, glabrous, coriaceous, lateral nerves 5–11 pairs, pinnate; petioless 3–10 mm long, stout, grooved above, pubescent. Stipules lateral, small, caducous. Flowers unisexual, axillary, solitary, sessile, non-fragrant. Male flowers: Tepals 5, ovate, 8–10 × 4–5 mm, rounded at apex, acute at base, entire, glabrous. Stamens numerous, filaments 5–10 mm long, slender, narrow, inserted around the disc; anthers oblong; disc disciform, pubescent. Female flowers: Tepals elliptic-ovate, *c.* 4 × 4 mm,

acute at apex, entire, glabrous. Ovary globose, 2-celled; style short, glabrous; stigma sticky. Drupes sessile, globose, densely pubescent.

Distribution: The native range of this species is SW. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft.*: January-April.

Specimen examined: Arjunankotta, 20.04.1995, *Jomy Augustine* 15067 (CALI).

Epiprinus Griff.

Not. Pl. Asiat. 4: 487. 1854.

Epiprinus mallotiformis (Müll.Arg.) Croizat, J. Arnold Arbor. 23: 53. 1942; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 170. 2007. *Symphyllia mallotiformis* Müll.Arg. in Linnaea 34: 156 1865.

Symphyllia mallotiformis Muell.-Arg., sensu Gamble, Fl. Madras 1323. 1925.
Adenochlaena indica (Bedd.) sensu Bedd. ex Hook.f., Fl. Brit. India 5: 418. 1887.



Trees, up to 12 m tall. Stems woody, terete, smooth, stellate tomentose; bark brownish. Leaves simple, alternate; lamina elliptic-lanceolate, 6–20 × 3–8 cm, acuminate at apex, round at base, entire, glabrous, coriaceous; petioles 5–8 mm long, stout, glabrous. Stipules 2, lateral, minute, ovate, *c.* 2 × 1 mm, glabrous. Flowers unisexual, in terminal racemes, non-fragrant; peduncles 3–8 cm long, pubescent; pedicels 3–5 mm long, pubescent. Male flowers: Tepals 5, free, ovate, *c.* 6 × 3 mm, acute at apex, entire, thinly tomentose out, glabrous within. Stamens 5, free, inflexed in bud; filaments 3 mm long, erect, glabrous. Female flowers: Tepals ovate, *c.* 4 × 3 mm, rou nded at apex, entire, pubescent out, glabrous within. Ovary superior, globose, pubescent, 3-locular; styles 3, stout, forked. Capsules 3-lobed; lobes globular, densely stellate hairy.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat* Semi-evergreen and evergreen forests; *Fl.* & *Ft.*: February-April.

Specimens examined: Edamalakkudi, 17.03.2019, *Vishnu Mohan* & *Santhosh Nampy* 168975 (CALI); near Thannikudy, 08.02.1981, *N.C. Nair* 70140 (MH).

Euphorbia L.

Sp. Pl. 1: 450. 1753.

Key to the species

1. Plants succulent; leaves early caducous……*E. tortilis*

1. Plants not succulent; leaves persistent……2

2. Stipules usually present; involucral glands with petaloid limbs…..……3

2. Stipules absent; involucral glands without petaloid limbs.....5

3. Limbs of glands indistinct ……..……4

3. Limbs of glands distinct and little to much larger than the glands……..…*E. indica*

4. Plants prostrate; cyathia 2–3 together……..……..…..*E. thymifolia*

4. Plants erect; cyathia with 3–5 glomerules.…….…….…….*E. hirta*

5. Cyathia red ……..……*E. tithymaloides*

5. Cyathia green……..……6

6. Leaves usually of 3-types; cyathia always arranged in pesudoumbels…..…*E. rothiana*

6. Leaves usually 2-types; cyathia never in pueudoumbels..……*E. heterophylla*

Euphorbia heterophylla L., Sp. Pl. 1: 453. 1753; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 278. 2007.

Euphorbia prunifolia Jacq., *sensu* Hook.f., Fl. Brit. India 5: 266. 1887.

Euphorbia geniculata Ortega., sensu Gamble, Fl. Madras 1884.1936.

Annual herbs, up to 50 cm tall. Stems terete, glabrous, smooth; glaucous. Leaves simple, alternate below, clustered at apex; lamina 2-types, vate-lanceolate, 4–8 × 2–4 cm, acute at apex, short-acuminate at base, entire, glabrous, papery; petioless 1–4 cm long, glabrous, grooved above. Cyathea in dense terminal cymes, glabrous, glandular, cup-shaped. Involucre bracts ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Stamens 3; filaments *c.* 3 mm long, thick, glabrous. Ovary superior, trilobed, glabrous; style *c.* 3 mm long, curved downwards, glabrous; involucral glands without petaloid limbs. Capsules sub-globose, glabrous. Seeds dark brownish gray.

Distribution: The native range of this species is Central & S. U.S.A. to Tropical & Subtropical America (POWO, 2023); *Habitat*: Weed in waste places and degraded deciduous forests; *Fl. & Ft.*: June-August.

Specimen examined: Thekkady, 16.10.1993, *Jomy Augustine* 12551 (CALI).

Euphorbia hirta L., Sp. Pl. 1: 454. 1753; Gamble, Fl. Madras 1275. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 205. 2007.



Erect herbs, up to 20 cm tall. Stems terete, pubescent. Leaves simple, decussate; lamina lanceolate, 1–2.5 × 0.7–1.5 cm, acute at apex, obliquely truncate at base, serrulate, hispid, basally 3-nerved; petioles *c.* 3 mm long, puberulous. Cyathia with 3–5 glomerules. Involucre bracts ovate, *c.* 2 × 1 mm, acute at apex, entir e, sparsely pubescent; glands 5, red petaloid, obcordate, clefted at apex, entire, glabrous. Stamens 3; filaments *c.* 2 mm long, glabrous, slender. Ovary trilobed, glabrous; style *c.* 2 mm long; stigma sticky Capsules pubescent; seeds minute.

Distribution: The native range of this species is Tropical & Subtropical America (POWO, 2023); *Habitat*: Degraded forest areas and plantations, also in the plains; *Fl*. & *Ft*.: Throughout the year.

Specimen examined: Thekkady, 16.10.1993, *Jomy Augustine* 15313 (CALI).

Euphorbia indica Lam. Encycl. 2: 423. 1788; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 257. 2007.

Euphorbia hypericifolia sensu Hook.f., Fl. Brit. India 5: 249. 1887, *non* L. 1753; Gamble, Fl. Madras 1275. 1925.

Erect herbs, up to 30 cm tall. Stems terete, slender, bulged at nodes, hispid. Leaves simple, opposite; lamina elliptic-oblong, *c.* 2 × 1.5 cm, obtuse at apex, oblique at base, crenulate, glaucous beneath, glabrous above; petioles *c.* 3 mm, stout, pubescent. Cyathia axillary; stalk up to 1.5 cm long, slender, pubescent. Involucral glands 5, petaloid, obcordate, clefted at apex, entire, glabrous; limbs of glands larger than glands. Male flowers 4 or 5; pedicels *c.* 0.5 mm, slender, glabrous; anthers elliptic. Female laterally pendulous. Ovary orbicular, pubescent; style 2–4 mm long, glabrous; stigma sticky. Capsules orbicular, pubescent.

Distribution: The native range of this species is S. Iran to S. China and Indo-China (POWO, 2023); *Habitat*: Moist deciduous forests; *Fl*. & *Ft*.: May-August.

Specimen examined: Chinnar, 26.08.1995, *K.K. Sajeev* 15819 (KFRI).

Euphorbia rothiana Spreng. Syst. Veg., ed. 16. 3: 796 1826; Hook.f., Fl. Brit. India 5: 263. 1887; Gamble, Fl. Madras 1278. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 270. 2007.



Sub-shrubs, up to 1 m tall. Stems terete, glaucous, glabrous. Leaves simple, alternate-whorled; lamina 3-types narrowly elliptic-lanceolate, 6–10 × 1–2 cm, acute at apex, attenuate at base, entire, glabrous, glaucous below, glabrous above; petioless 1–3 cm long, glabrous, grooved above. Cyathium in terminal pseudo umbels, glandular around involucre; peduncles 3–7 cm long, slender, glabrous; involucral glands without petaloid limbs; pedicels 4–7 mm long, slender. Bracts ovate, 2–3 × *c*. 1.5 mm, acute at apex, entire, glabrous. Male flowers 3; filaments glabrous, erect. Ovary trilobed, glabrous, long-stalked; style *c.* 2 mm long, glabrous; stigma sticky. Capsule globular, smooth; Seeds obovoid, smooth.

Distribution: The native range of this species is India, Sri Lanka, China (Yunnan, Guizhou), Jawa, Lesser Sunda Islands, Sulawesi (POWO, 2023); *Habitat*: Margins of evergreen forests and grasslands; *Fl.* & *Ft.*: March-April.

Specimen examined: Anamudi Shola National Park, 04.04.2017, *Vishnu Mohan* & *Santhosh Nampy* 152085 (CALI).

Euphorbia thymifolia L., Sp. Pl. 1: 454. 1753; Hook.f., Fl. Brit. India 5: 252. 1887; Gamble, Fl. Madras 1276. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 261. 2007.

Creeping prostrate herbs. Stems spreading, terete, glabrous; exudation milky. Leaves simple, opposite, distichous; lamina elliptic, 2–7 × 2–4 mm, obtuse-rounded at apex, obliquely cordate at base, entire, glabrous, glaucous beneath, 1-nerved, sub-sessile. Cyathia 2–3 together in axillary clusters; involucre campanulate, ovate, *c.* 8 × 4 mm, rounded at apex, entire, glabrous; involucral glands without petaloid limbs. Male flowers

3, filaments *c.* 2 mm long, slender, glabrous. Ovary tomentose; style 3-forked; stigma sticky. Capsules obtusely angled, glabrescent. Seeds angular, minutely tuberculate.

Distribution: The native range of this species is Tropical & Subtropical America (POWO, 2023); *Habitat*: Riverbeds in moist deciduous forests, also in plains; *Fl.* & *Ft.*: May- November.

Specimens examined: Lakshmi estate, 12.09.1968, *D.B. Deb* 30788 (MH); Vellappara, 05.08.2017, *Vishnu Mohan* & *Santhosh Nampy* 154155 (CALI).

Euphorbia tortilis Rottler ex Ainslie, Mater. Ind. 2: 424. 1826; Hook.f., Fl. Brit. India 5: 256. 1887; Gamble, Fl. Madras 1277. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 277. 2007.

Succulent thick fleshy shrubs or small trees, up to 10 m tall. Stems spirally twisted, 3-angled, glabrous; spines hard, *c.* 1 cm long, glabrous; exudation white, milky. Leaves small, deciduous; lamina narrowly elliptic, 1–2 × *c.* 0.5 mm, rounded at apex, entire, glabrous. Cyathia in axillary clusters; peduncles *c.* 0.5 cm long, terete, glabrous; pedicels *c.* 5 mm long, stout, glabrous; involucre copular; glands 5, thick. Male flowers 3; filaments *c.* 1 mm long, stout, glabrous. Ovary sharply 3-angled; style curved, glabrous, *c.* 2 mm long; stigma sticky. Capsules 3-angular.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl.* & *Ft.*: February-August.

Specimen examined: Chinnar, 09.02.2021, *Vishnu Mohan* & *Santhosh Nampy* 175982 (CALI).

Euphorbia tithymaloides L. Sp. Pl.: 453 1753.

Pedilanthus tithymaloides (L.) Poit., Ann. Mus. Natl. Hist. Nat. 19: 390 1812; Hook.f., Fl. Brit. India 5: 239. 1887; Gamble, Fl. Madras 2: 1346. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 281. 2007.



Erect sub-shrubs, up to 1 m tall. Stems terete, fleshy, glabrous-sparsely hairy; exudation milky. Leaves simple, alternate;

lamina ovate, 5–8 × 3–5 cm, acute at apex, rounded-acute at base, wavy, fleshy, variegated, deciduous; petioless 4–7 mm long, stout, grooved above. Cyathia terminal, cymose, subtended by petaloid bracts; peduncles 4–8 mm long. Bracts lanceolate, *c.* 8 × 3 mm, acuminate at apex, rounded at base, entire, glabrous. Glands 4, unequal, fleshy. Stamens 5; filaments *c.* 6 mm long, sl ender, glabrous. Ovary 3-locular. Capsules bivalved.

Distribution: The native range of this species is Florida, Mexico to Tropical America (POWO, 2023); *Habitat*: Introduced as garden plant, also runs wild; *Fl. & Ft.*: April-August.

Specimen examined: Painavu, 04.04.2018, *Vishnu Mohan & Santhosh Nampy* 158439 (CALI).

Excoecaria L.

Syst. Nat., ed. 10. 2: 1288. 1759.

Excoecaria oppositifolia var. **crenulata** (Wight) Chakrab. & M.Gangop., J. Econ. Taxon. Bot. 18(1): 208. 1994; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 205. 2007. *Excoecaria crenulata* Wight, Icon. Pl. Ind. Orient. 5: t. 1865. 1852; Hook.f., Fl. Brit. India 5: 473. 1888; Gamble, Fl. Madras 1345. 1925.

Small trees, up to 8 m tall. Stems woody, terete; bark greyish brown, smooth; branchlets glabrous. Leaves simple, opposite; lamina oblong-lanceolate, 8–17 × 2–6 cm, acuminate at apex, acute at base, shallowly crenate-serrate, glabrous, coriaceous, glossy above; petioless 0.5–3 cm long, stout, grooved above, glabrous. Stipules ovate-lanceolate, *c.* 15 × 6 mm, acuminate at apex, entire, glabrous. Flowers unisexual, in terminal or axillary spikes, non-fragrant; peduncles 5–10 cm long, glabrous; pedicels obscure. Bracts broadly ovate, 1.5–2 × 0.8–2 mm, deltoid, triangular. Male flowers: Tepals 3, ovate, 1–1.5 × 1–1.4 mm, acute, glabrous. Stamens 3; filaments *c.* 2 mm long, stout, glabrous. Female flowers as same as male flowers. Ovary superior, 3-celled; styles 3; stigma sticky. Capsules 3-lobed. Seeds globose.

Distribution: The native range of this variety is S. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: December-April.

Specimen examined: Way to Kanketty, Mankulam, 20.12.2018, *Vishnu Mohan & Santhosh Nampy* 164584 (CALI).

Flueggea Willd.

Sp. Pl., ed. 4, 4: 637, 757. 1806.

Flueggea virosa (Roxb. ex Willd.) Royle, Ill. Bot. Himal. Mts. 9: 328. 1836; Gamble, Fl. Madras 2: 1296. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 342. 2007.

Flueggea microcarpa Blume, sensu; Hook.f., Fl. Brit. India 5: 328. 1887.



Dioecious shrubs. Stems woody, terete; branchlets glabrous. Leaves simple, alternate; lamina obovate, 1.5–3.5 × 1–2 cm, obtuse at apex, cuneate at base, entire, glabrous, glaucous below, chartaceous; petioless 3–5 mm long, glabrous. Flowers unisexual, in axillary clusters, non-fragrant; peduncles 1–3 mm long, stout, glabrous; pedicels 5–15 mm long, slender, glabrous. Male flowers: Tepals 5, obovate *c.* 1 × 1 mm, rounded at apex, cuneate at base, crenulate, glabrous. Stamens 5, free; filaments *c.* 4 mm long, slender, glabrous. Pistillodes 3, free. Female flowers as same as male flowers. Ovary ovate; style *c.* 3 mm long, slender, erect; stigma sticky. Capsules globose, white.

Distribution: The native range of this species is Africa to Australia (POWO, 2023); *Habitat*: Dry and moist deciduous forests and wastelands; *Fl. & Ft.*: March-September.

Specimen examined: Peerumedu, 27.04.2018, *Vishnu Mohan & Santhosh Nampy* 159215 (CALI).

Givotia Griff.

Calcutta J. Nat. Hist. 4: 388. 1844.

Givotia moluccana (L.) Sreem., Taxon 24: 696. 1975; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 233. 2007. *Croton moluccanus* L. in Sp. Pl.: 1005 1753.

Givotia rottleriformis Griff. ex Wight, Icon. Pl. Ind. Orient. 5: 24. 1852; Hook.f., Fl. Brit. India 5: 395. 1887; Gamble, Fl. Madras 1342. 1925.

Dioecious trees, up to 20 m tall. Branchlets densely stellate-tomentose. Leaves simple, alternate; lamina broadly ovate or orbicular, 6–18 × 5–20 cm, acute or shortly acuminate apex, cordate at base, coarsely repand-dentate, glabrous above except nerves, white stellate

tomentose beneath; petioless 8–12 cm long, stout, swollen at base, stellate-tomentose, 2 prominent glands near the tip. Flowers unisexual, in axillary racemes. Bracts linear, conspicuous. Male flowers: Tepals 5+5; lanceolate, 5–7 × 3–4 mm, sub-acute at apex. Stamens 8–20, exserted; filaments free, villous at base; disc 4, free. Female flowers as same as male flowers. Ovary globose, stellate tomentose; styles short, 2-fid, spreading. Drupes sub-globose, densely stellate tomentose. Seeds 3, oblong; testa bony.

Distribution: The native range of this species is India, Sri Lanka (POWO, 2023); *Habitat*: Dry and moist deciduous forests and wastelands; *Fl. & Ft.*: March-September.

Specimen examined: Peerumedu, 27.04.2018, *Vishnu Mohan & Santhosh Nampy* 159215 (CALI).

Glochidion J.R.Forst. & G.Forst.

Char. Gen. Pl., ed. 2. 113. 1776, *nom. cons*.

Key to the species

1. Branchlets and/ or under surface of leaves pubescent…….……2

1. Branchlets and/ or under surface of leaves glabrous……3

2. Female tepals cupular, campanulate or obconic, with 4–6 irregular lobes……..…….……*G. candolleanum*

2. Female tepals free…...……*G. heyneanum*

3. Infloresence supra-axillary and/or pedunculate…….*G. zeylanicum*

3. Infloresence axillary and sessile……..*G. ellipticum*

Glochidion candolleanum (Wight & Arn.) Chakrab. & M.Gangop., J. Econ. Taxon. Bot. 19: 191. 1995; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 347. 2007.

Small trees, up to 8 m tall. branchlets woody, terete, tomentose. Leaves simple, alternate; lamina ovate-oblong, 5–8 × 3–4 cm, acute at apex, obtuse at base, entire, glabrous above, tomentose along veins below, coriaceous. Flowers unisexual, in axillary clusters, non-fragrant; pedicels *c.* 5 mm long. Male flowers: Tepals 3 + 3, ovate, 2–4 × *c*. 0.5 mm, rounded at apex, attenuate at base, entire, glabrous. Stamens 6; filaments *c.* 1.5 mm long. Female flowers: Tepals cupular, ovate, 5–6 × 2.5–3 mm, acute at apex, entire, glabrous. Ovary superior, sub-globose, densely hispid; style elongate. Capsules depressed, 6-lobed, hirsute.

Distribution: The native range of this species is India and Sri Lanka (POWO, 2023); *Habitat* Evergreen and shola forests; *Fl. & Ft.*: December-June.

Specimen examined: Idukki Reservior, 14.06.1983, *A.G. Pandurangan* 79226 (MH)

Glochidion ellipticum Wight, Icon. Pl. Ind. Orient. t. 1606. 1852; Hook.f., Fl. Brit. India 5: 321. 1887; Gamble, Fl. Madras 2:1308. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 348. 2007.

Trees, up to 15 m tall. Stems woody, terete, glabrous, smooth; bark blackish-grey; branchlets glabrous. Leaves simple, alternate, distichous; lamina oblong-elliptic, 4–17 × 2–6 cm, acuminate at apex, acute at base, entire, glabrous, coriaceous, glossy above; petioless *c.* 1 cm long, stout, glabrous. Flowers unisexual, in dense clusters, non-fragrant, axillary and sessile; pedicels 5–15 mm long, filiform. Male flowers: Tepals 3 + 3, ovate, 2–5 × 0.5–2 mm, rounded at apex, attenuate at base, entire, glabrous. Stamens 6; filaments *c.* 1.5 mm long. Female flowers: Tepals 5, ovate, *c.* 6 × 3 mm, acute at apex, entire, glabrous. Ovarysub-globose, densely hispid; style *c.* 3 mm long. Capsules depressed, deeply lobed, hirsute. Seeds brown, glabrous.

Distribution: The native range of this species is Indian Subcontinent to Taiwan (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: January-August.

Specimens examined: Devicolam, Kerala Sholas Devicolam-Periyar Road, Cardamom Hills., 23.03.1980, *C.E.Ridsdale* 711 (CALI); Meenmutty, 16.02.1982, *C.N. Mohanan* 73296 (MH); Pachakanam, 18.08.1943, *N. Sasidharan* 12275 (KFRI).

Glochidion heyneanum (Wight & Arn.) Wight ex Müll.Arg., Linnaea 32: 67 .1863; Hook.f., Fl. Brit. India 5: 323. 1887; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 348. 2007.

Small trees, up to 7 m tall. Stems woody, terete; bark brown, rough, pubescent. Leaves imparipainnate, alternate, distichous; lamina elliptic-oblong 3–7 × 1.5–3 cm, acute at apex and base, entire, glabrous above, pubescent beneath, coriaceous; petioless *c.* 0.6 cm long, slender, tomentose. Stipules ovate, *c.* 4 × 2 mm, acute at apex, entire, pubescent. Flowers unisexual, solitary or few together in axillary clusters; peduncles reduced; pedicels 5 mm long, filiform. Male flowers: Tepals 3+3, oblong, 2–4 × 1–2 mm, rounded at apex, entire, glabrous above, tomentose beneath. Stamens 3; filaments 1–2 mm long, connate. Female tepals free. Ovary sub-globose, 3–6 locular; style *c.* 3 mm long. Capsules depressed, deeply lobed with bilobulate lobes, tomentose. Seeds grey, smooth.

Distribution: The native range of this species is Pakistan to China (Yunnan) and Indo-China (POWO, 2023); *Habitat*: Evergreen forests, sholas and grasslands; *Fl. & Ft.*: March-November.

Specimen examined: Kokkara, 07.07.1993, *Jomy Augustine* 12052 (CALI).

Glochidion zeylanicum (Gaertn.) A.Juss., Euphorb. Gen. 107. 1824; Hook.f., Fl. Brit. India 5: 310. 1887; Gamble, Fl. Madras 2: 1306. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 353. 2007.

Shrubs, up to 5 m tall. Stems woody, terete; bark brown, smooth, longitudinally cracked, glabrous. Leaves simple, alternate; lamina oblong-lanceolate, 4–8 × 2–4 cm, apiculate at apex, oblique at base, entire, glabrous, coriaceous, glossy; petioless *c.* 0.5 cm long, slender, glabrous. Stipules ovate-orbicular, *c.* 5 × 4 mm rounded at apex, entire, glabrous within, pubescent out. Flowers unisexual, supra-axillary, non-fragrant; peduncles 8–10 mm long. Male flowers: Tepals 3 + 3, oblong, 1–3 × 0.7–2 mm, rounded at apex, entire, smooth. Stamens 6; filaments 1–2 mm long, connate. Female flowers: Tepals 5, ovate, 6–7 × 3–4 mm, acute at apex, entire, glabrous. Ovary sub-globose or depressed, tomentose; styles 3.5 mm long, free. Capsules depressed, lobed.

Distribution: The native range of this species is Indian Subcontinent to Japan and Vanuatu (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, also in the plains; *Fl. & Ft.*: February-September.

Specimens examined: Meenmutty, 19.04.1982, *Vastavaya* 71269 (MH); near Thannikudy, 08.02.1981, *P. Bhargavan* 70155 (MH); Thekkday, 29.09.1972, *B.D. Sharma* 42348 (MH); Vallakkadavu, 30.04.1999, *Jomy Augustine* 13654 (CALI).

Homonoia Lour.

Fl. Cochinch. 2: 636. 1790.

Homonoia riparia Lour., Fl. Cochinch. 2: 637. 1790; Hook.f., Fl. Brit. India 5: 455. 1887; Gamble, Fl. Madras 2: 1333. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 137. 2007.



Large shrubs, up to 3 m tall. Stems woody, terete; bark brownish grey, pubescent. Leaves simple, spiral, closely packed; lamina linear lanceolate, 10–18 × 1–2 cm, acute at both ends, entire, glaucous below, glabrous, shiny above; petioless *c.* 1 cm long, tomentose. Stipules lanceolate, *c.* 2 × 1 mm, acuminate at apex, filiform. Flowers unisexual, in axillary racemes, non-fragrant; peduncles 5–10 cm long, stout; pedicels *c.* 3 mm long, slender. Bracts ovate, *c.* 5 × 2 mm, acute, sparsely pubescent. Male flowers: Tepals 5,

ovate, 3–6 × 2–3 mm, acute at apex, entire, glabrous, ciliate. Stamens many, free; filaments glabrous, erect, much branched. Female flowers as same as male flowers. Ovary densely hairy; styles 3, spreading, linear. Capsules globose, hairy.

Distribution: The native range of this species is Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Along riverbanks and streams; *Fl.* & *Ft.*: December-May. *Specimens examined*: PTR, 18.03.1995, *K.K . Sajeev* 15541 (KFRI); Vellakayam, 04.04.2018, *Vishnu Mohan* & *Santhosh Nampy* 158458 (CALI).

Jatropha L.

Sp. Pl. 2: 1008. 1753.

Jatropha curcas L., Sp. Pl. 2: 1006. 1753; Hook.f., Fl. Brit. India 5: 383. 1887; Gamble, Fl. Madras 2: 1340. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 223. 2007. Shrubs, up to 5 m tall. Stems woody terete, glabrous; bark brownish grey, smooth; exudation milky. Leaves alternate; lamina orbicular, 5-lobed, 5–14 × 6–12 cm, acute at apex, truncate-cordate at base, sparsely serrate; petioless 5–15 c m long, terete, glabrous, glaucous. Flowers unisexual, in terminal or axillary panicled cymes; peduncle 6–12 cm long, glabrous; pedicels 6 mm long, glabrous. Male flowers: Tepals 5 + 5, biseriate, obovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Stamens 10; filaments unequal, united into a central column, 5–8 mm long, glabrous. Female flowers as same as male flowers. Ovule solitary in each cell; styles 3, 2-fid. Disc 5-lobed. Capsules ellipsoid.



Distribution: The native range of this species is Mexico to Tropical America (POWO, 2023); *Habitat*: Often grown as live fence posts; *Fl.* & *Ft.*: May-August.

Specimen examined: Pius Nagar, 22.06.2018, *Vishnu Mohan* & *Santhosh Nampy* 159327 (CALI).

Macaranga Thouars

Gen. Nov. Madagasc. 26, no. 88. 1806.

Macaranga indica Wight, Icon. Pl. Ind. Orient. 5. t. 1883. 1852; Hook.f., Fl. Brit. India 5: 446. 1887; Gamble, Fl. Madras 1326. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 141. 2007. Trees, up to 10 m tall. Stems woody, terete, glabrous, glaucous; bark grey, smooth; exudation red, watery. Leaves simple, alternate; lamina deltoid-ovate, 15–30 × 12–25 cm, acuminate at apex, peltate at base, toothed, glabrous above, tawny-pubescent below; two large glands near the petiolar insertion above, coriaceous; petioles 12–20 cm long, stout, glaucous. Stipules triangular, *c.* 10 × 4 mm, sharply acuminate at apex, entire, glaucous. Flowers unisexual, in axillary panicles having zig-zag branches, non-fragrant. Bracts ovate, *c.* 8 × 4 mm, acute at apex, falcate, glaucous. Male flowers: perianth lobe 3, ovate, connate at base, *c.* 5 × 3 mm, acute at apex, entire, glandular. Stamens 8, shortly connate below, exserted. Female flowers as same as male flowers. Ovary globose; style lateral; stigma acute. Capsules globose, echinate. Seeds black.



Distribution: The native range of this species is Indian Subcontinent to S. China and Sumatera (POWO, 2023); *Habitat*: Degraded forest areas; *Fl. & Ft.*: September-December.

Specimen examined: Neriyamangalam, 28.10.1028, *Vishnu Mohan & Santhosh Nampy* 167543; Uppupara, 09.09.1994, *Jomy Augustine* 14134 (CALI).

Mallotus Lour.

Fl. Cochinch. 2: 635. 1790.

Key to the species

1. Fruit glabrous……...…….. *M. nudiflorus*

1. Fruit spiny or glandular pubescent……..2

2. Young parts covered with rusty lepidote scales……...…… *M. tetracoccus*

2. Young parts not as above……...…….3

3. Leaves 3-ribbed at base……...….*M. philippinensis*

3. Leaves penninerved…….…….. *M. resinosus*

Mallotus nudiflorus (L.) Kulju & Welzen Blumea 52: 124 2007. *Trevia nudiflora* L., Sp. Pl. 2: 1193. 1753; Hook.f., Fl. Brit. India 5: 423. 1887; Gamble, Fl. Madras 1319. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 155. 2007.

Deciduous trees, up to 20 m tall. Stems woody, terete; bark greyish-brown, smooth. Leaves simple, alternate-sub-opposite; lamina ovate, 6–17 × 9–15 cm, acuminate at apex, truncate at base, entire, glabrous above, glaucous beneath; petioless 8–12 cm long, slender, glabrous. Flowers unisexual, in axillary racemes, non-fragrant; peduncles 4–9 cm long, Bracts ovate, *c.* 3 × 2 mm, acuminate at apex, entire, pubescent. Male flowers: Tepals ovate, 3–5 × 3–4 mm, rounded at apex. Stamens many; filaments *c.* 1.5 mm long, free, slender. Female flowers as same as male flowers. Ovary 4-loculed; styles 3. Capsules woody, 3-loculed. glabrous. Seeds globose, ovoid.

Distribution: The native range of this species is Indian Subcontinent to China (S. Yunnan, SE. Guangxi) and Philippines (POWO, 2023); *Habitat*: Along riverbanks in evergreen and semi-evergreen forests; *Fl. & Ft.*: February-November.

Specimen examined: Vallakkadavu, 25.02.1994, *Jomy Augustine* 13407 (CALI).

Mallotus philippensis (Lam.) Müll.Arg., Linnaea 34(2): 196. 1865; Hook.f., Fl. Brit. India 5: 442. 1887; Gamble, Fl. Madras 2: 1322. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 150. 2007.



Trees, up to 10 m tall. Stems woody, terete, brownish pubescent; bark pale brown. Leaves simple, alternate; lamina ovate, 5–15 × 3–8 cm, acuminate at apex, rounded at base, entire, glabrous above, greyish pubescent to fulvous tomentose, coriaceous, 3-ribbed at base; petioless 1–5 cm long, stout, swollen at base, fulvous-pubescent. Stipules lateral, lanceolate, acute at apex, caducous. Flowers unisexual, in rusty puberulous terminal spicate panicles, non-fragrant; peduncles 6–17 cm long, stout; pedicels *c.* 5 mm long, slender. Male flowers: Tepals 4, lanceolate, *c.* 6 × 3 mm, acute at apex, entire,

glabrous. Stamens many; filaments *c.* 5 mm long, glabrous. Female flowers as same as male flowers. Ovary with red glands, 3-celled; styles 3. Capsules globose, 3-lobed, loculicidally 3-valved, densely red-glandular, pubescent. Seeds globose, glabrous, black.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. & E. Australia (POWO, 2023); *Habitat*: Semi-evergreen, moist deciduous, evergreen and dry deciduous forests, also in the plains; *Fl. & Ft.*: October-March.

Specimen examined: Mankulam, 14.10.2018, *Vishnu Mohan & Santhosh Nampy* 176543; Thekkady, 16.10.1993, *Jomy Augustine* 12562 (CALI).

Mallotus resinosus (Blanco) Merr., Sp. Blancoan. 222. 1918; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 150. 2007. *Adelia resinosa* Blanco in Fl. Filip., ed. 2.: 562. 1845.

Erect shrubs, up to 1 m tall. Stems terete, rusty tomentose. Leaves simple, alternate; lamina oblanceolate 8–12 × 4–5 cm, acuminate at apex, acute at base, distantly serrate, glabrous above, glandular hairy below, penninerved; petioless 3–10 cm long, glabrous, glaucous, slightly swollen at base. Flowers unisexual, in axillary-terminal racemes, non-fragrant; peduncles 1–4 cm long, rusty tomentose; pedicels *c.* 5 mm long. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, tomentose. Male flowers: Tepals orbicular, *c.* 4 × 4 mm, rounded at apex, entire, glabrous. Stamens many; filaments *c.* 3 mm long, glabrous. Female flowers as same as male flowers. Style slender; stigma sticky. Capsules covered with curved spines and yellow glands. Seeds 5, globose.

Distribution: The native range of this species is Tropical Asia to N. Queensland (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: Decerber-May.

Specimen examined: Arjunankotta, 26.011.994, *Jomy Agustine* 13158; Chinnar Wildlife Sanctuary, 19.05.1999, *Satheesh George* 79250 (CALI).

Mallotus tetracoccus (Roxb.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42(4): 245. 1874; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 147. 2007.

Rottlera albus var. *occidentalis* Hook.f., Fl. Brit. India 5: 429. 1887; Gamble, Fl. Madras 1321. 1925.

Trees, up to 20 m tall. Stems woody, terete; young parts covered with rusty lepidote scale. bark surface grey, smooth, tomentose. Leaves simple, alternate; lamina deltoid-ovate, 9–20 × 8–20 cm, acuminate at apex, tru ncate at base, entire, peltate, glabrous above,

tomentose below, coriaceous; petioles 5–10 cm long, stout, swollen at base, stellate tomentose. Stipules ovate *c.* 4 × 3 mm, acute at apex, entire. Flowers unisexual, in terminal tomentose spicate panicles. Male flowers: Tepals 4, ovate, *c.* 4 × 3 mm, acute at apex, entire. Stamens many; filaments to *c.* 3 mm long. Female flowers as same as male flowers. Ovary densely stellate hairy; style *c.* 3 mm long; stigma acute. Capsules globose, 3–4-valved, tomentose. Seeds angular, black.



Distribution: The native range of this species is Indian Subcontinent to China (SW. Yunnan) and Indo-China (POWO, 2023); *Habitat*: Evergreen, semi-evergreen and shola forests, also in the plains; *Fl. & Ft.*: July-April.

Specimen examined: Mangaladevi Hills, 15.07.2017, *Vishnu Mohan & Santhoh Nampy* 152877 (CALI).

Meineckia Baill.

Étude Euphorb. 586. 1858.

Meineckia longipes (Wight) G.L.Webster, Acta Bot. Neerl. 14: 352. 1965; *Peltandra longipes* Wight, Icon. Pl. Ind. Orient. t. 1891. 1852; N.P.Balakr. & Chakrab., Fam. *Euphorbiaceae India* 360. 2007. *Phyllanthus longipes* (Wight) Muell.-Arg., Linnaea 32: 10. 1863; Hook.f., Fl. Brit. India 5: 287. 1887. *Neopeltandra longipes* (Wight) Gamble, Fl. Madras 1286. 1925.

Shrubs, up to 5 m tall. Stems woody, terete, smooth; bark grey. Leaves simple, alternate; lamina lanceolate-ovate, 6–11 × 2–4 cm, acuminate at apex, acute at base, entire, glabrous; petioles *c.* 1 cm long, glabrous, slightly swollen at base. Stipules ovate, *c.* 3 × 2 mm, acute at apex, cordate at base, smooth. Flowers unisexual, in axillary racemes, non-fragrant; peduncles compressed; pedicels 15–25 mm long, slender, filiform, glabrous. Bracts orbicular, *c.* 1 × 1 mm, rounded at apex, ciliate. Male flowers: Tepals 5, orbicular, *c.* 1 × 1 mm, rounded at apex, entire, glabrous. Stamens 5; filaments combined into a column at base. Female flowers as same as male flowers. Ovary 3-celled; styles 3, bifid. Capsules globose, glabrous. Seeds reniform, rugose.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Semi-evergreen forests; *Fl.* & *Ft.*: August-January.

Specimen examined: Pachakkanam, 07.08.1993, *Jomy Augustine* 12609 (CALI).

Micrococca Benth.

Niger Fl. 503. 1849.

Micrococca beddomei (Hook.f.) Prain, Ann. Bot. 25: 630. 1911; Gamble, Fl. Madras 2: 1328. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 130. 2007.

Herbs, up to 40 cm tall. Stems terete, glabrous. Leaves simple, alternate; lamina ovate-lanceolate, 3–4 × 2–3 cm, acuminate at apex, acute at base, serrate, puberulous below, glabrous above; petioles *c.* 2 cm long, glabrous, smooth, slightly swollen at base. Flowers unisexual, in lax axillary spikes, non-fragrant; peduncles slender, glabrous, 5–8 cm long; pedicels *c.* 5 mm long, stout. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Male flowers: Perianth campanulate at base; lobes lanceolate, *c.* 4 mm long, acute. Stamens 5; filaments *c.* 5 mm long, glabrous; anther cells discrete. Female flowers as same as male flowers. Style *c.* 3 mm long, glabrous; stigma sticky. Capsules 3-lobed, glabrescent.

Distribution: The native range of this species is S. India (Kerala, Tamil Nadu) (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft.*: December-April.

Specimen examined: Way to Kanketty, Mankulam, 20.12.2019, *Vishnu Mohan* & *Santhosh Nampy* 164587 (CALI).

Microstachys A.Juss.

Euphorb. Gen. 48. t. 15. 1824.

Microstachys chamaelea (L.) Müll.Arg., Linnaea 32(1): 95. 1863; *Sebastiana chamaelea* (L.) Muell.-Arg. in DC., Prodr. 15: 1175. 1866; Hook.f., Fl. Brit. India 5: 475. 1888; Gamble, Fl. Madras 2: 1344. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 293. 2007.



Erect herbs, up to 30 cm tall. Stems terete, glabrous. Leaves simple, alternate; lamina elliptic-obovate, 2–3 × *c.* 0.5 cm, obtuse at apex and base, entire, glabrous above, glaucous below; petioles *c.* 3 mm long, swollen, glabrous.

Flowers unisexual, in slender axillary spikes, non-fragrant. Male flowers: Tepals 5, connate; lobes orbicular, *c.* 3 × 3 mm, entire, glabrous. Stamens 4; filaments reduced. Female flowers: Tepal ovate, *c.* 4 × 3 mm, acute at apex, entire, glabrous. Ovary 3-lobed; style 3, connate at base. Capsules 3-lobed. Seeds oblong, carunculate. 3-lobed.

Distribution: The native range of this species is W. Tropical Africa to S. Chad, Tropical & Subtropical Asia to Solomon Islands (POWO, 2023); *Habitat*: Moist and dry deciduous forests and grasslands, also in the plains; *Fl.* & *Ft.*: July-December. *Specimen examined*: Kattappana, 08.08.2019, *Vishnu Mohan* & *Santhosh Nampy* 164501 (CALI).

Phyllanthus L.

Sp. Pl. 2: 981. 1753.

Key to the species

1. Fruits more or less fleshy drupes or berries……...*P. reticulatus*
1. Fruits dry dehiscent capsule……..…2
2. Annual herbs, sometimes slightly woody at base…….3
2. Perennial sub-shrubs……*P. beddomei*
3. Leaves white hispidulous beneath along the margins; female flowers sub-sessile (pedicels up to 0.5 mm long in fruit)……*P. urinaria*
3. Leaves glabrous beneath; female flowers pedicelslate (pedicels more than 1 mm long in fruit)……..…….4
4. Cymules mostly (*c.* 90 %) containing of one male and one female flowers…*P. amarus*
4. Cymules otherwise…….5
5. Stipules peltate …… *P. virgatus*
5. Stipules lanceolate…….6
6. Tepals 5; stamens 5…….*P. tenellus*
6. Tepals 6; stamens 3……..*P. rheedei*

Phyllanthus amarus Schumach. & Thonn., Beskr. Guin. Pl. 421. 1827; *Phyllanthus niruri* sensu Hook.f., Fl. Brit. India 5: 298. 1887, non L. 1753; Gamble, Fl. Madras 2: 1290. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 386. 2007.

Erect herbs, to 30 cm tall. Stems terete, glabrous. Leaves imparipinnate, alternate; leaflets elliptic, 6–8 × 3–4 mm, obtuse at apex, rounded at base, entire, glabrous, glaucous below; petiolule *c.* 2 mm long, slender; petioless 4–6 cm long, glabrous, swollen at base. Stipules lanceolate, *c.* 3 × 2 mm, acute at apex, scarious. Flowers unisexual, axillary, solitary; pedicels 6–9 mm long, slender, glabrous. Male flowers: Tepals 5, ovate, *c.* 2 × 1 mm, acute

at apex, entire, glabrous. Stamens 3, exserted; filaments connate at base; anther cell dehiscing transversely; disc 5-lobed. Female flowers as same as male flowers. Ovary globose; style erect, recurved. Capsules globose; pedicel *c.* 1.2 mm long. Seeds 6, trigonous, vertically muriculate.



Distribution: The native range of this species is S. Mexico to Tropical America (POWO, 2023); *Habitat*: Degraded moist deciduous for ests, plantations and also in plains; *Fl.* & *Ft.*: July-October.

Specimens examined: Adimali, 07.08.2019, *Vishnu Mohan* & *Santhosh Nampy* 170220 (CALI); PTR, 05.06.1995, *K.P. Rajesh* 15473 (KFRI).

Phyllanthus beddomei (Gamble) M.Mohanan, J. Econ. Taxon. Bot. 6(2): 480. 1985; *Reidia beddomei* Gamble, Bull. Misc. Inform. Kew 1925: 331. 1925, Gamble, Fl. Madras 1293. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 372. 2007.

Subshrubs, up to 30 cm tall. Stems terete, glabrous. Leaves alternate, imparipinnate; leaflets, ovate, 4–5 × 3 cm, acute at apex, rounded at base, entire, glabrous; petioless *c.* 0.3 cm long, slender. Stipules ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous, green. Flowers unisexual, in the axil of leaflets, non-fragrant. Male flowers: Tepals 5, connate at base, ovate, *c.* 5 × 2 mm, acute at apex, entire, glabrous; pedicels *c.* 10 mm long, slender, glabrous. Stamens 4; filaments fused at base, glabrous. Female flowers as same as male flowers. Style *c.* 2 mm long; stigma recurved, sticky. Capsules globose, glabrous. Seeds trigonous.

Distribution: The native range of this species is SW. India (POWO, 2023); *Habitat*: Margins of evergreen forests; *Fl.* & *Ft.*: February-May.

Specimen examined: Udumbatheri, 16.02.1994, *Jomy Augustine* 13332 (CALI).

Phyllanthus reticulatus Poir., Encycl. 5: 298. 1804; Hook.f., Fl. Brit. India 5: 288. 1887; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 382. 2007.

Kirganelia reticulata (Poir.) Baill., Etud. Gen. Euphorb. 613. 1858; Gamble, Fl. Madras 1294. 1925



Erect shrubs, up to 50 cm tall. Stems rigid, terete, branches glabrous. Leaves imparipinnate, alternate; leaflets elliptic, *c.* 2 × 1.5 cm, acute at apex and base, entire, glabrous, coriaceous; petioless 4–8 cm, slender, glabrous; petiolule *c.* 3 mm long, slender, glabrous. Stipules lanceolate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Flowers unisexual, in axillary fascicles, non-fragrant; pedicels 7–13 mm long, slender, glabrous. Male flowers: Tepals 5, obovate, *c.* 4 × 3 mm, acute - rounded at apex, entire, glabrous. Stamens 5; filaments *c.* 5 mm long, slender, filiform. Female flowers same as male flowers. Ovary globose; styles 3, bifid. Berries globose, black.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat*: Stream banks, lake shores and also in moist deciduous and semi-evergreen forests; *Fl.* & *Ft.*: August-January.

Specimens examined: Neymakkad, 8th mile, 24.01.2018, *Vishnu Mohan* & *Santhosh Nampy* 158217 (CALI); Thekkady, 18.09.1993, *N. Sasidharan* 12415 (KFRI).

Phyllanthus rheedei Wight, Icon. Pl. Ind. Orient. 5: t. 1895. 1852; Hook.f., Fl. Brit. India 5: 293. 1887; Gamble, Fl. Madras 2: 1289. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 379. 2007.



Erect stout herbs, up to 30 cm tall. Stems terete, glabrous. Leaves imparipinnate, alternate; leaflets obovate, 5–20 × 3–12 mm, obtusely acute at apex, rounded at base, entire, glabrous, glaucous beneath; petioless 4–7 cm long, glabrous, swollen at bas e; petiolule *c.* 3 mm long glabrous, stout. Stipules lanceolate, *c.* 4 × 2 mm, acuminate at apex, entire, glabrous. Flowers

unisexual, solitary. in the leaflet axils; pedicels *c.* 4 mm long, slender, glabrous. Male flowers: Tepals 6, obovate, 3–4 × 2 mm, obtuse at apex, entire, smooth, glabrous. Stamens 3; filaments *c.* 3 mm long; anther cell dehiscing vertically. Female flowers as same as male flowers. Ovary globose; styles 3, bifid. Capsules glabrous, smooth; pedicel *c.* 1.4 mm long. Seeds trigonous.

Distribution: The native range of this species is Indian Subcontinent (POWO, 2023); *Habitat*: Moist deciduous, semi-evergreen and shola forests, also in forest plantations; *Fl. & Ft.*: November-May.

Specimens examined: Chokrimudi, Devikulam, 04.05.2017, *Vishnu Mohan & Santhosh Nampy* 152139; way to Marayur, 22.01.2005, *V.K. Sreelekha* 110605 (CALI); Thekkady, 20.08.1995, *Jomy Augustine* 16366 (KFRI)

Phyllanthus tenellus Roxb., Fl. Ind. 3: 668. 1832. *Diasperus tenellus* (Roxb.) Kuntze in Revis. Gen. Pl. 2: 601. 1891.

Erect annual herbs, up to 30 cm tall. Stems sub-terete, glabrous. Leaves imparipinnate, alternate; leaflets obovate, 5–8 × 3–5 mm, acute-rounded at apex, entire at margins, glabrous on both sides, glaucous below; petioless *c.* 1 mm long, glabrous. Stipules lanceolate-acuminate, *c.* 1 × 0.3 mm, acuminate at apex, entire. Flowers unisexual, non-fragrant; pedicels 4–7 mm long, slender. Male flowers: Tepals 5, broadly obovate, *c.* 1 × 0.5 mm, acute at apex, entire, membraneous. Stamens 5, free, alternate with the disk segments; filaments filiform, *c.* 0.4 mm long. Female flowers as same as male flowers. Ovary smooth; style 3, appressed. Capsules depressed-globose; pedicel *c.* 1.4 mm long. Seeds trigonous.

Distribution: The native range of this species is Tanzania to Mozambique, SW. Arabian Peninsula, W. Indian Ocean (POWO, 2023); *Habitat*: Waste places and plantations; *Fl. & Ft.*: July-December.

Specimen examined: Mankulam, 06.08.2019, *Vishnu Mohan & Santhosh Nampy* 170233 (CALI).

Phyllanthus urinaria L., Sp. Pl. 2: 982. 1753; Hook.f., Fl. Brit. India 5: 293. 1887; Gamble, Fl. Madras 2: 1289. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 389. 2007.

Erect herbs, up to 40 cm tall. Stems terete, glabrous, reddish. Leaves imparipinnate, alternate; leaflets obovate-elliptic, *c.* 5 × 3 mm, acute at apex, oblique at base, ciliate, white hispidulous beneath along the margins; petioless *c.* 5 cm long, glabrous; petiolule *c.* 2 mm long. Stipules linear *c.* 1 mm long. Flowers unisexual, solitary from the axil of leaflets.

Male flowers: Tepals 6, orbicular, *c.* 2 × 1 mm, acute, entire. Stamens 5; filaments united, glabrous; anther cell dehiscing vertically; disc 6-lobed. Female flowers sub-sessile & same as male flowers. Ovary warted without; stigma 3. Capsules globose, 3-lobed; pedicel 0.5 mm long. Seeds 6, trigonous.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat*: In the plains, also in degraded deciduous forests; *Fl. & Ft.*: July-December.

Specimen examined: Puthukkad, Mankulam, 06.08.2019, *Vishnu Mohan* & *Santhosh Nampy* 170230 (CALI).

Phyllanthus virgatus G.Forst., Fl. Ins. Austr. 65. 1786.

Phyllanthus simplex Retz., Obs. Bot. 5: 29. 1788; Hook.f., Fl. Brit. India 5: 295. 1887; Gamble, Fl. Madras 1289. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 380. 2007.



Erect herbs, up to 40 cm tall. Stems rigid, terete, glabrous. Leaves simple, alternate; leaflets narrowly obovate, *c.* 1 × 0.6 cm, acute at apex and base, entire, glabrous; petioles *c.* 2 mm long, glabrous, slender. Stipules peltate, acuminate at apex, entire, glabrous. Flowers unisexual, solitary, axillary, non-fragrant. Male flowers: Tepals 5, free, orbicular, *c.* 3 × 2 mm, acute at apex, rounded at base, entire, glab rous. Stamens 3; filaments *c.* 3 mm long, free; anther cell dehiscing transversely. Female flowers as same as male flowers. Styles 3, spreading; disc saucer-shaped, wavy. Capsules depressed-globose, verrucose; pedicel 3–6 mm long. Seeds minutely tubercled.

Distribution: The native range of this species is Tropical & Subtropical Asia to Pacific (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests and grasslands; *Fl. & Ft.*: July-November.

Specimens examined: Kozhiyalakudi, Anakulam, 18.09.2017, *Vishnu Mohan* & *Santhosh Nampy* 161982; Neriyamangalam, 11.09.2018, *Vishnu Mohan* & *Santhosh Nampy* 159459 (CALI)

Tragia L.

Sp. Pl. 2: 980. 1753.

Key to the species

1. Perianth lobes oblong…….*T. bicolor*

1. Perianth lobes broadly ovate……..…….*T. montana*

Tragia bicolor Miq., Linnaea 26(2): 222. 1854; Hook.f., Fl. Brit. India 5: 465. 1888; Gamble, Fl. Madras 1332. 1925; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 181. 2007.

Hispid twiners. Stems parts fulvous-tomentose, terete. Leaves simple, alternate; lamina ovate, 5–10 × 3–6 cm, acuminate at apex, cordate at base, serrate, densely hispid below, sparsely above; petioless 1–1.8 cm long, slender, pubescent. Stipules lanceolate, *c.* 8 × 4 mm, acuminate, ciliate. Flowers unisexual, in axillary racemes, non-fragrant; peduncles up to 7 cm long, hispid. Bracts ovate, *c.* 4 × 1 mm, acuminate at apex, cordate at base, glandular-ciliate. Male flowers: Tepals fused; lobes oblong *c.* 4 × 4 mm, rounded at apex, glabrous. Stamens 3, filaments free. Female flowers tepals ovate, 4–5 × 2 mm, acute at apex, entire, hispid. Ovary trilobed; style connate, *c.* 4 mm long, hispid; stigma sticky, capitate. Capsules trilobed, compressed.

Distribution: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen forests; *Fl.* & *Ft*.: May-December.

Specimen examined: Kottamala, 15.05.1995, *Jomy Augustine* 15296 (CALI)

Tragia montana Müll.Arg., Linnaea 34(2): 183. 1865; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 182. 2007.

Tragia involucrata L. var. *cordata* Muell. sensu Hook.f., Fl. Brit. India 5: 465. 1888.

Tragia muelleriana Pax & Hoffm. in Engl. sensu Gamble, Fl. Madras 1332. 1925.

Slender twiners. Stems terete, densely hirsute. Leaves simple, alternate; lamina ovate, 7–10 × 4–6, acuminate at apex, cordate at base, dentate, hispid; petioless 0.5–3 cm long, hispid, stout. Stipules lanceolate, *c.* 4 × 3 mm, acuminate at apex, entire, hispid. Flowers unisexual, in leaf opposed racemes, non-fragrant; peduncles up to 6 cm long. Male flowers: Tepals fused; lobes broadly ovate, *c.* 1 × 1 mm, acute at apex. Stamens 3; filaments *c.* 4 mm long, glabrous. Female flowers as same as male flowers. Ovary sub-globose, 3-lobed, densely hispid; style connate, *c.* 3 mm long; stigma capitate, sticky. Capsules depressed globose, 3-lobed. Seeds 3, globose.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen and moist deciduous forests; *Fl.* & *Ft.*: May-January.

Specimen examined: Anakulam, 27.06.2017, *Vishnu Mohan* & *Santhosh Nampy* 165467 (CALI)

Tritaxis Baill.

Étude Euphorb.: 342 1858

Tritaxis glabella var. **praetervisa** Chakrab. & G.Krishna Pl. Sci. Today 7: 303 2020. *Dimorphocalyx glabellus* var. *lawianus* (Hook.f.) Chakrab. & N.P.Balakr., Proc. Indian Acad. Sci. Pl. Sci. 100(5): 296. 1990; N.P.Balakr. & Chakrab., Fam. Euphorbiaceae India 205. 2007.

Dimorphocalyx lawianus (Muell.-Arg.) Hook.f., Fl. Brit. India 5: 404. 1887; Gamble, Fl. Madras 1337. 1925.

Small trees, up to 8 m tall. Stems woody, terete; bark smooth, grey; branchlets glabrous. Leaves simple, alternate; lamina lanceolate 5–15 × 2–7 cm, acute at apex and base, crenate, glabrous, coriaceous; petioles 1–2 cm long, slender, grooved above, glabrous. Stipules ovate, *c.* 7 × 4 mm, acute at apex, entire, glabrous. Flowers unisexual, in axillary fascicles; peduncles compressed, 3–7 mm long, stout; pedicels *c.* 3 mm long, glabrous. Male flowers: Perianth fused at base, unequally 5-lobed; lobes ovate, *c.* 5 × 3 mm, acute-rounded at apex, entire, glabrous. Stamens many; filaments slender, *c.* 4 mm, erect, glabrous, erect. Female flowers same as male flowers. Tepals *c.* 3–6 × 2.5–3 mm. Ovary superior, ovoid, 3-celled, densely hairy; styles 3, connate at base. Capsules obovoid, 3-lobed. Seeds yellowish, mottled with brown.

Distribution: The native range of this variety is India (Karnataka, Kerala) (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests; *Fl.* & *Ft.*: March-October.

Specimen examined: Puthussery, 21.03.1994, *Jomy Augustine* 13499 (CALI).

ULMACEAE Mirb.

Elém. Physiol. Vég. Bot. 2: 905 (1815), *nom. cons*.

Trees or shrubs, unarmed, andromonoecious or dioecious. Leaves alternate, distichous, simple, margins entire or serrate, venation pinnate, rarely trinerved, cystoliths sometimes present, deciduous or persistent, stipules lateral. Inflorescence axillary, racemose, fasciculate or paniculate. Flowers hermaphrodite or unisexual, little showy, white, yellowish or greenish; perianth 4–5 (–9) lobed; stamens 4–16, opposite to the perianth lobes; anthers longitudinally dehiscent, ovary superior, sessile or stipitate;

carpels 2, 1 (–2) locular, locule 1-ovulate; placentation pendulous. Fruit a samara or drupe; seeds with thin testa.

This family includes seven genera and 59 species (POWO, 2023); three genera and four species in the study area.

Key to the genera

1. Flowers appearing before the leaves; fruit a samara…… *Holoptelea*

1. Flowers appearing after the leaves; fruit a drupe……..…..……..2

2. Flowers shortly pedicelslate (less than 1 cm); fruit 1.5−4 mm in diam., with persistent tepals and stigmas,……...……*Trema*

2. Flowers long pedicelslate (more than 1 cm); fruit 5−15 mm in diam., without persistent tepals and stigmas…… ……..*Celtis*

Celtis L.

Sp. Pl. 2: 1043. 1753.

Key to the species

1. Lamina obliquely ovate, with one or more strong primary nerves; stipules absent ……..…… *C. tetrandra*

1. Lamina elliptic-oblong, without strong primary nerve; stipules present ……..……..

……...*C. philippensis*

Celtis philippensis Blanco, Fl. Filip. 197. 1837.

Celtis wightii Planch., Ann. Sci. Nat., Bot., sér. 3, 10: 307. 1848; Hook.f., Fl. Brit. India 5: 483. 1888; Gamble, Fl. Madras 1349. 1928.

Small trees, up to 15 m tall. Stems woody, terete, glabrous; bark brown, smooth. Leaves simple, alternate; lamina elliptic-oblong, 5–10 × 3–6 cm, acuminate at apex, rounded at base, entire, glabrous, coriaceous; 3-nerved from base, not as much strong; petioless 0.5–1 cm long, slender, pubescent. Stipules elliptic-ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous, scaly. Flowers polygamous, in axillary cymes, non-fragrant; peduncles 1–2 cm long, slender, puberlous; pedicels 1.3–1.5 cm long, slender, narrow, glabrous. Male flowers: Tepals 5, ovate, *c.* 2 × 1 mm, acute at apex, entire, concave, ciliate, membranous, caducous. Stamens 5, free; filaments glabrous, membranous, inserted round a woolly torus. Female and bisexual flowers as same as male flowers. Ovary superior, sessile, ovoid; style *c.* 8 mm long, pubescent; stigma hairy, sticky, caducous. Drupes ovoid, smooth.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: February-April.

Specimen examined: Damsite, 08.04.1995, *Jomy Augustine* 15121 (CALI).

Celtis tetrandra Roxb. Fl. Ind. 2: 63. 1824; Hook.f., Fl. Brit. India 5: 482. 1888; Gamble, Fl. Madras 1348. 1928.

Trees, up to 30 m tall. Stems woody, terete; bark smooth, grey, lenticellate, pubescent. Leaves simple, alternate, estipulate; lamina obliquely ovate, 5–9 × 3–5 cm, acuminate at apex, oblique at base, serrate, glabrous above, puberulent beneath, membranous, 3-nerved from base, prominent; petioless 0.5–1 cm long, slender, pubescent, shallowly grooved above. Flowers polygamous, non-fragrant; male flowers in axillary clusters, born on leafless shoots; female flowers on leaf axils. Male flowers: Pedicels *c.* 1.2 cm long, filiform. Tepals 4, ovate, *c.* 1.5 × 1 mm, acute at apex, entire at margins, ciliate, concave, caducous. Stamens 4; filaments *c.* 4 mm long, wooly. Female flowers: Tepals 4, ovate, *c.* 2 × 1 mm, acute at apex, entire at margins, ciliate, concave. Ovary sessile, obovoid, pubescent; style ciliate; stigma caducous. Drupes ovoid, glabrous.

Distribution: The native range of this species is N. Pakistan to S. China and W. Malesia (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: January-March.

Specimen examined: Koruthode, 23.01.1997, *Jomy Augustine* 17186 (CALI).

Holoptelea Planch.

Ann. Sci. Nat., Bot. sér. 3, 10: 259. 1848.

Holoptelea integrifolia (Roxb.) Planch., Ann. Sci. Nat. Bot. ser. 3, 10: 259. 1848; Hook.f., Fl. Brit. India 5: 481. 1888; Gamble, Fl. Madras 3: 1348. 1928.

Large deciduous trees. Stems woody, terete, glabrous; bark brownish grey, smooth, lenticellate. Leaves simple, alternate; lamina ovate-oblong, 6–12.5 × 2.5–6.5 cm, acuminate at apex, rounded or sub-cordate at base, entire, glabrous above, appressed pubescent below, coriaceous; petioless *c.* 0.5 cm long, slender, glabrous, pulvinate, slightly grooved above. Stipules lanceolate, 4–7 × *c.* 2 mm, lateral, scarious. Flowers non-fragrant, green, on axillary fascicles, appearing before the leaves; peduncles 0.5–0.8 cm long, glabrous; pedicels slender *c.* 1 cm long, narrow. Tepals 5, free, ovate, *c.* 4 × 2 mm, acute at apex. Anthers 5; filaments pubescent, *c.* 3 mm long, erect, slender, glabrous. Ovary superior, compressed, 2-winged; style reduced; stigma two, sticky. Samara broadly orbicular.

Distribution: The native range of this species is Indian Subcontinent to Indo-China, E. Borneo (POWO, 2023); *Habitat*: Semi-evergreen forests, also in the plains; *Fl. & Ft.*: December-March.

Specimen examined: Thekkady, 10.02.1997, *Jomy Augustine* 17198 (CALI).

Trema Lour.

Fl. Cochinch: 562. 1790.

Trema orientale (L.) Blume, Mus. Bot. 2: 62. 1856; Hook.f., Fl. Brit. India 5: 484. 1888; Gamble, Fl. Madras 3: 1350. 1928. *Celtis orientalis* L. in Sp. Pl.: 1044 1753.



Dioecious trees, up to 20 m tall. Stems woody, terete, puberulous; bark smooth, brown, lenticellate. Leaves simple, alternate, estipulate; lamina ovate-lanceolate, 7.5–15 × 2.5–6 cm, acuminate at apex, obliquely cordate at base, denticulate, scabrid above, tomentose beneath, membranous; petioles 0.5–1.5 cm, stout, pubescent. Flowers unisexual, in axillary fascicles, non-fragrant; peduncles *c.* 0.5 cm long, stout, scabrid; pedicels *c.* 0.6 cm long, slender, sticky. Tepals 4, equal, ovate-orbicular, *c.* 5 × 3 mm, rounded at apex, entire, ciliate. persistant. Stamens 5; filaments *c.* 6 mm long slender, glabrous. Female flowers as same as male. Ovary superior, sessile, 1-celled; style bifid, villous; stigma plumose, persistant. Drupes globose.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Dry and moist deciduous forests, also in the plains; *Fl. & Ft.*: September-December.

Specimen examined: Kattappana, 19.11.2016, *Vishnu Mohan* & *Santhosh Nampy* 145231 (CALI).

MORACEAE Gaudich.

Gen. Pl. 13. 1835, *nom. cons*.

Trees, shrubs or herbs, dioecious or monoecious; sap milky, sometimes watery (but not turning black). Leaves in spirals or distichous, sometimes sub-opposite or sub-verticillate, entire or sometimes pinnately or palmately incised, stipulate. Inflorescences bisexual or

unisexual, spicate, globose, clavate or discoid-capitate, urceolate or uniflorous. Staminate flowers with 2–6 tepals or perianth lacking; stamens 1–4. Pistillate flowers with 2–6 tepals or perianth lacking; pistil 1; ovary free or adnate to the perianth; stigmas 1–2; ovule 1, attached apically. Fruit achene-like, drupaceous.

The family includes 48 genera (POWO, 2023); five genera and 19 species in the study area.

1. Fruits echinate ……..……*Artocarpus*

1. Fruits not echinate ……..……. 2

2. Herbs; sap watery ……...……..*Dorstenia*

2. Trees; sap milky ……..…….. 3

3. Flowers in synchonia ……..……..*Ficus*

3. Flowers in heads on in spikes……. 4

4. Tepals stalked……..……..…….…… *Antiaris*

4. Tepals sessile……...…….…….. *Streblus*

Antiaris Lesch.

Ann. Mus. Hist. Nat. 16: 478. 1810.

Antiaris toxicaria (J.F.Gmel.) Lesch., Ann. Mus. Hist. Nat. 16: 478. 1810; Hook.f., FI. Brit. India 5: 537. 1888; Gamble, FI. Madras 3: 1367. 1925.

Slender deciduous trees, up to 30 m tall. Stems woody, terete; bark thick, greyish-white, smooth, lenticellate; exudation milky. Leaves simple, alternate; lamina ovate-elliptic, 8–12 × 3–5 cm, obtusely acuminate at apex, rounded at base, entire, coriaceous, glabrous above, scabrous beneath; petioles 5–10 mm long, stout, pubescent. Flowers unisexual, non-fragrant, greenish-yellow; male in axillary spikes, female solitary. Male flowers: Tepals spathulate, stalked, lobes ovate, *c.* 5 × 3 mm, imbricate. Stamens 3–8; filaments slender, glabrous. Female flowers: Tepals absent. Ovary superior; style two armed, recurved; stigma sticky. Drupes obovoid, fleshy, scarlet, velvety.

Distribution: The native range of this species is S. India, Sri Lanka, S. China to W. & Central Malesia (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, also in the sacred groves; *Fl. & Ft.*: January-April.

Specimen examined: Edamalakkudi, 25.03.2018, *Vishnu Mohan* & *Santhosh Nampy* 145236 (CALI).

Artocarpus J.R.Forst. & G.Forst.

Char. Gen. Pl. 101. 1776.

Artocarpus zeylanicus (F.M.Jarrett) E.M.Gardner & Zerega, Gard. Bull. Singapore 72: 208 2020. *Artocarpus gomezianus* Wall. ex Trecul ssp. *zeylanicus* F.M.Jarrett, J. Arnold Arbor. 41: 90. 1960.

Large trees, up to 30 m tall. Stems woody, terete; bark brownish black, tomentose, exudation milky. Leaves simple, alternate; lamina elliptic, 8–16 × 6–8 cm, acuminate at apex, truncate at base, entire, glabrous above, scabrous below; petioles 2–2.5 cm long, stout, glabrous, shallowly grooved above. Stipules not seen. Flowers unisexual, axillary; male spike globose. Male flowers: Tepals ovate-orbicular, *c.* 4 × 2 mm, rounded at apex, entire. Stamens many; filaments erect, filiform, glabrous. Female flowers: Ovary inferior; style fleshy, glabrous; stigma sticky. Fruit echinate sub-globose, uneven, fleshy, greenish yellow.

Distribution: The native range of this species is E. India and Sri Lanka (POWO, 2023); *Habitat* Semi-evergreen and moist deciduous forests, also in the plains; *Fl. & Ft.*: December-March.

Specimen examined: Adimali, 01.10.2017, *Vishnu Mohan & Santhosh Nampy* 154235 (CALI).

Dorstenia L.

Sp. Pl. 121. 1753.

Dorstenia indica Wight, Icon. Pl. Ind. Orient. 6: 8. 1853; Hook.f., FI. Brit. India 5: 494. 1988; Gamble, FI. Madras 3: 1370. 1928.



Erect herbs, up to 25 cm tall. Stems terete, smooth, glabrous. Leaves simple, alternate; lamina oblanceolate, 4–9 × 1–2 cm, acute at apex, attenuate at base, entire, membranous, sparsely hirsute along the nerves beneath, glabrous above; petioles 0.7–1.2 cm long, stiff, terete, glabrous. Stipules absent. Flowers unisexual, non-fragrant, green, on obconical axillary solitary, angled receptacle; peduncles 1–2 cm long, glabrous, fleshy. Bracts absent. Male flowers towards the periphery of the receptacle. Perianth connate and adnate with receptacle.

Stamens 3; filaments stout, erect, glabrous. Female flowers grouped at the center. Perianth as same as male. Ovary sunken; style lateral, stigmas 2, capitate. Achene, sunken in the receptacle.

Distribution: The native range of this species is S. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen forests and wet rocky areas in moist deciduous forests; *Fl. & Ft.*: February-April.

Specimen examined: Mankulam, 09.07.2018, *Vishnu Mohan & Santhosh Nampy* 165214 (CALI).

Ficus L.

Sp. Pl. 1059. 1753.

Key to the species

1. Leaves opposite……..……..……*F. hispida*
1. Leaves alternate……...……2
2. Syconia on short branched peduncles……..……3
2. Syconia not as above ……..……4
3. Climbers; leaves ovate, 6–12 cm wide……..…..…..…… *F. laevis*
3. Trees; Leaves elliptic, 3–6 cm wide…….……...…..*F. racemose*
4. Syconia 3–6 per axil……..…….…….5
4. Syconia paired or solitary…….6
5. Lowest pair of nerves rib like…….…….…….*F. tsjahela*
5. Lowest pair of nerves not rib like……..……..……*F. mollis*
6. Receptacle peduncled…….…….……7
6. Receptacle sessile…….……..……...12
7. Bracts near the base of peduncles……...……8
7. Bracts near the apex of peduncles…….……10
8. Leaves glabrous……..……...……..*F. nervosa*
8. Leaves scabrous……..……9
9. Lamina ovate; peduncles 15−17 cm long; syconia 15 mm ac□oss……..*F. exasperata*
9. Lamina rhomboid; peduncles 1.5−10 mm long; syconia 6−7 mm across……...*F. tinctoria subsp. gibbosa*
10. Syconia solitary……..…….*F. callosa*
10. Syconia paired……...……11
11. Leaves 5−9 cm b□oad, co□iaceous; stipules 5−10 mm long……..…..*F. beddomei*
11. Leaves 8−13 cm b□oad; non co□iaceous; stipules 15−30 mm long……..…*F. costata*

12. Syconium 1.5–2 cm across……..……*F. drupaceae*

12. Syconium less than 1 cm across……..…….13

13. Leaves with strong pair of nerves…….……..*F. microcarpa*

13. Leaves nerves not as above……..……..14

14. Syconia 10−13 mm ac□oss; leaves with 16–19 pairs of nerves…..…..….*F. amplissima*

14. Syconia 6−8 mm ac□oss; leaves with 10–12 pairs of nerves……..……..*F. talbotii*

Ficus amplissima Sm. in Rees, Cyclop. 14: n.1. 1810. *Ficus tsiela* Roxb. in Hort. Bengal.: 66 1814, nom. superfl.; Hook.f., Fl. Brit. India 5: 515. 1888; Gamble, Fl. Madras 1362. 1928.

Large monoecious trees, up to 25 m tall. Stems woody, terete, glabrous; bark grey, smooth; exudation milky. Leaves simple, alternate; lamina to ovate-oblong 5–12 × 3–6 cm, acute at apex, entire, glabrous, coriaceous; 3-ribbed from base, lateral nerves 16–19 pairs. Stipules lanceolate, *c.* 10 × 5 mm, acuminate at apex, entire, glabrous; petioless terete, 1–3 cm long, slender, grooved above, glabrous. Flowers unisexual, non-fragrant, in axillary sessile syconia; syconia 10−13 mm across. Bracts broadly ovate, *c.* 3 × 2 mm, obtuse at apex, glabrous. Male tepals ovate, *c.* 4 × 2 mm, acute at apex, free, scarious. Stamen 1; filaments *c.* 1 mm. Female tepals ovate, *c.* 5 × 2 mm, acute at apex, free, scarious. Ovary superior, bean shaped; style filiform, *c.* 2 mm long. Syconium red or purple when ripe; achenes smooth.

Distribution: The native range of this species is Maldives, India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen, moist and dry deciduous forests; *Fl. & Ft.*: September-December.

Specimens examined: PTR, 22.10.1993, *Jomy Augustine* 12573 (KFRI); Thannikkudy, 04.09.1993, *Jomy Augustine* 12340 (KFRI).

Ficus beddomei King, Ann. Roy. Bot. Gard. 1: 26. 1887; Hook.f., Fl. Brit. India 5: 513. 1888; Gamble, Fl. Madras 1364. 1928.

Evergreen trees, up to 30 m tall. Stems woody, terete; bark brown, smooth; exudation milky white. Leaves simple, alternate; lamina broadly ovate, 10–18 × 5–9 cm, acuminate at apex, acute at base, entire, glabrous, coriaceous; petioless 3–6 cm long, slender, glabrous, grooved above. Stipules triangular, 5–10 × *c.* 2 cm, leafy, golden yellow, glabrous. Flowers unisexual, non-fragrant, in axillary paired syconia; syconia 2–3 cm across; peduncles *c.* 2 cm long, stout, angled. Bracts 3, near the apex of peduncles, ovate, 6–7 × 3–4 mm, acuminate at apex, persistent. Perianth cupular, lobed, glabrous. Stamen

1; filament twisted, *c.* 2 mm long. Ovary obovoid; style straight, *c.* 2 mm long. Syconium green, spotted with yellow.

Distribution: The native range of this species is India (POWO, 2023); *Habitat*: Semi-evergreen forests; *Fl. & Ft.*: July-February.

Specimens examined: Cheeyappara waterfalls, 21.08.1965, *K.M. Sebasine* 25342 (MH); Periyacanal estate, 27.03.1980, *K. Ramamurty* 66539 (MH); Uppupara, 08.11.1993, *Jomy Augustine* 12695 (CALI); way to Mangaladevi, 10.10.1976, *K. Vivekananthan* 48665 (MH).

Ficus callosa Willd., Mém. Acad. Roy. Sci. Hist. (Berlin) 1798: 102. 1798; Hook.f., Fl. Brit. India 5: 516. 1888; Gamble, Fl. Madras 1364. 1928.

Large trees, up to 40 m tall. Stems woody, terete; bark grey, smooth, lenticellate, exudation watery, turning yellowish-white. Leaves simple, alternate-spiral; lamina ovate-oblong, 10–30 × 8–13 cm, obtusely acute at apex, round at base, entire, slightly recurved, coriaceous, glabrous, glossy above, scabrid beneath; 3–5-ribbed from base; petioless 2–7 cm long, stout, grooved above, glabrous. Stipules ovate 15–30 × *c.* 5 mm, pubescent. Flowers unisexual, non-fragrant, in axillary solitary syconia; peduncles *c.* 1.5 cm long, pubescent. Bracts 3, near the apex of peduncle, broadly ovate, 1.5–4 × 1–2 mm long, rounded at apex, entire, pubescent, persistent, yellow. Male tepals lanceolate, *c.* 3 × 1 mm, acuminate at apex, entire, free, glabrous. Stamen 1; filament short, thin. Female tepals lanceolate, 3–4 × 1–2 mm, acuminate at apex, entire, free, glabrous. Ovary superior, obovoid; style elongate; stigma bifid. Syconium greenish-yellow when ripe.

Distribution: The native range of this species is China (Yunnan, Guangdong) to Tropical Asia (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests, also in the plains; *Fl. & Ft.*: March-October.

Specimens examined: Kanchiar, 18.10.1982, *V.S. Ramachandran* 74655 (MH); Kattappana, 17.07.2021, *Vishnu Mohan & Santhosh Nampy* 176058; Kokkara, 06.04.1994, *Jomy Augustine* 13522 (CALI); Vandanmedu, 26.08.1977, *K. Vivekananthan* 50534 (MH).

Ficus costata Aiton, Hort. Kew. 3: 453. 1789; *Ficus caudiculata* Trimen, J. Bot. 23: 243. 1885; Hook.f., Fl. Brit. India 5: 510. 1888.

Trees, up to 13 m tall. Stems woody, terete; bark brown, smooth; exudation white. Leaves simple, alternate, spiral; lamina elliptic-oblong 6–15 × 4–7 cm, obtusely acuminate at apex, sub-cordate at base, entire, glabrous, thick; lateral nerves 9–18 pairs, parallel, slender, prominent; petioless 1.5–4 cm long, not articulated, slender, glabrous, grooved

above; stipules puberulous, *c.* 40 × 5 mm, leafy, deciduous. Flowers non-fragrant, unisexual in axillary paired syconia; syconia 0.8–1.4 mm across; peduncles 5–8 mm long, glabrous. Bracts 3, near the apex of peduncle, ovate, *c.* 2.5 × 4.5 mm, connate at base. Male tepals 3, fleshy, orbicular, *c.* 5 × 4 mm, connate at base. Stamen 1; filaments *c.* 1 mm long, glabrous. Female tepals ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Ovary sessile; stigma simple. Syconium yellow, turning to red when ripe.

Distribution: The native range of this species is SW. India, Sri Lanka and Indo-China (POWO, 2023); *Habitat*: Evergreen forests; *Fl. & Ft.*: November-December.

Specimens examined: Pamba, 28.12.1996, *Jomy Augustine* 17072 (CALI); PTR, 23.11.1993, *N. Sasidharan* 12742 (KFRI).

Ficus drupacea Thunb., Ficus 11. 1786. *Ficus mysorensis* Roth in J.J.Roemer & J.A.Schultes, Syst. Veg., ed. 15. 1: 508. 1817; Hook.f., Fl. Brit. India 5: 500. 1888; Gamble, Fl. Madras 1361. 1928.

Small trees, up to 25 m tall. Stems woody, terete, smooth, tomentose; bark greyish-brown, smooth; exudation milky. Leaves simple, alternate, spiral, sub-distichous; lamina ovate, 10–20 × 6–14 cm, acuminate at apex, rounded at base, entire, tender leaves tomentose below, glabrous above, coriaceous; 3–5-ribbed from base, lateral nerves 9–13 pairs, parallel, prominent beneath; petioless 1–3 cm long, stout, grooved above, tomentose. Stipules lanceolate, 10–25 × *c.* 5 mm long, tomentose. Flowers unisexual, non-fragrant, in axillary paired sessile; syconia 1.5–2 cm across. Bracts ovate, 2–6 × *c.* 3 mm, acute at apex, concave, brown-pilose without. Male tepals 2–3, free, ovate, *c.* 6 × 3 mm, acute at apex, entire. Stamen 1, exserted; filament stout. Female tepals as same as male. Ovary superior, obovoid, *c.* 0.7 mm long, brown; style filiform, *c.* 2 mm long. Syconium orange red when ripe.

Distribution: The native range of this species is China (S. Yunnan, Guangdong) to Tropical Asia and N. Queensland (POWO, 2023); *Habitat*: Semi-evergreen and moist deciduous forests, also in the plains; *Fl. & Ft.*: March-October.

Specimens examined: Erattayar, 15.10.1982, *C.N. Mohanan* 74672 (MH); Kokkara, 12.07.1993, *Jomy Agustine* 12196 (CALI); Meenmutty, 14.02.1982, *C.N. Mohanan* 73260 (MH).

Ficus exasperata Vahl, Enum. Pl. 2: 197. 1805.

Ficus asperrima Roxb., Fl. Ind. 3: 554. 1832; Hook.f., Fl. Brit. India 5: 522. 1888; Gamble, Fl. Madras 1366. 1928.

Trees, up to 15 m tall. Stems woody, terete, smooth; bark smooth, lenticellate, fibrous; exudation watery. Leaves simple, laxly alternate; lamina ovate, 5–15 × 3–9 cm, acute at apex and base, denticulate, scabrid, coriaceous; 3-ribbed from base, glands at nerve axils, lateral nerves 3–6 pairs. Stipules short, paired, cauducous; petioless 1–6.5 cm long, slender, not articulated. Flowers unisexual, non-fragrant, in axillary solitary syconia, harshly scabrid; syconia 15 mm wide. peduncles 1.5−1.7 cm. Bracts near the base of peduncles; ovate, 3–5 × *c.* 2 mm, acute at apex, entire. Male tepals 3–6, oblong-spathulate, *c.* 6 × 3 mm, rounded at apex, white hairy. Stamen 1; filament *c.* 0.5 mm long. Female tepals as same as male. Ovary superior, obovoid; style filiform, lateral, puberulous, stigma clavate. Syconium yellow or purple when ripe; achene oblong, slightly keeled, reticulate.

Distribution: The native range of this species is Tropical Africa, SW. Arabian Peninsula, India to Sri Lanka (POWO, 2023); *Habitat*: Moist deciduous forests, also in the plains; *Fl. & Ft.*: February-October.

Specimens examined: Kumily, 24.12.1974, *K. Vivekananthan* 45687 (MH); Kurisumala, 22.01.1994 *Jomy Agustine* 13053 (CALI); Meenmutty, 30.05.1982, *C.N. Mohanan* 74107 (MH); Puliyanmala, 25.12.1983, *A.G. Pandurangan* 66482 (MH).

Ficus hispida L.f., Suppl. Pl. 442. 1782; Hook.f., Fl. Brit. India 5: 522. 1888; Gamble, Fl. Madras 1367. 1928.

Small trees, up to 10 m tall. Stems woody, terete, smooth; bark grey, smooth; exudation milky. Leaves simple, opposite; lamina obovate, 7–20 × 6–10 cm, abruptly acute at apex, rounded at

base, sub-entire, membranous, scabrid, hispid-pubescent; 3–5-ribbed from base, lateral nerves 5–6 pairs, pinnate, prominent; petioless 1–4 cm long, stout, hispid. Stipules lanceolate, *c.* 10 × 4 mm, acuminate at apex, cauducous. Flowers unisexual, non-fragrant, in axillary syconia; peduncles 5–15 mm long, stout. Bracts 3, ovate, *c.* 1.5 × 1 mm. Male tepals 3, broadly ovate, *c.* 6 × 5 mm, rounded at apex, entire, glabrous. Stamen 1, sub-sessile.



Female tepals as same as male. Ovary depressed-globose, superior; style *c.* 1.5 mm long, hairy; stigma clavate. Syconium yellow.

Distribution: The native range of this species is S. China to Tropical Asia and N. Australia (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests, also in the plains; *Fl. & Ft.*: September-June.

Specimens examined: Kuttikkanam, 21.09.1964, *K. Vivekananthan* 20343 (MH); Mankulam, 15.06.2018, *Vishnu Mohan & Santhosh Nampy* 164607; Painavu, 04.04.2018, *Vishnu Mohan & Santhosh Nampy* 158446; Valara, 10.10.2018, *Vishnu Mohan & Santhosh Nampy* 170398 (CALI)

Ficus laevis Blume, Bijdr. Fl. Ned. Ind. 9: 437. 1825.

Ficus macrocarpa (Miq.) Wight ex King, sensu. Hook.f., Fl. Brit. India 5: 534. 1888, non Blume 1825; Gamble, Fl. Madras 1365. 1928.



Large climbers. Stems woody, terete, smooth; bark grey, lenticellate, smooth; exudation milky. Leaves simple, alternate; lamina ovate, 10–20 × 6–12 cm, acuminate at apex, shallowly cordate at base, entire, recurved on the mature leaves; 3–5-ribbed from base, lateral nerves 5–6 pairs, pinnate, prominent; petioless 3–6 cm long, pubescent, erect, shallowly grooved above, smooth. Bracts ovate 5 × 3 cm, acute at apex, entire, hispid. Flowers unisexual, non-fragrant, in axillary tubercled syconium; peduncles 2–5 cm long, stout, hispid. Male tepals ovate, *c.* 4 × 2 mm, acut e at apex, entire. Stamen 1; filaments stout, glabrous. Female tepals ovate, *c.* 5 × 2 mm, acute at apex, entire. Ovary superior; style stout; stigma sticky. Syconium spotted, globose.

Distribution: The native range of this species is Indian Subcontinent to China (Yunnan, Guangxi, Guizhou) and W. Malesia (POWO, 2023); *Habitat*: Evergreen and shola forests; *Fl. & Ft.*: August-April.

Specimen examined: Koymanchola, 10.02.2021, *Vishnu Mohan & Santhosh Nampy* 188766 (CALI).

Ficus microcarpa L.f., Suppl. Pl. 442. 1781.

Ficus retusa var. *nitida sensu* Hook.f., Fl. Brit. India 5: 511. 1888; Gamble, Fl. Madras 1362. 1928.

Trees, up to 18 m tall. Stems woody, terete, glabrous; bark greyish-brown, smooth; exudation milky. Leaves simple, alternate-spiral; lamina elliptic-ovate, 7–12 × 2–5 cm, acute at apex and base, entire, glabrous, coriaceous; 3–5- strong pairs of nerves from base, lateral nerves 5–9 pairs; petioless 1–1.5 cm long, glandular, glabrous. Stipules 10–15 mm long, ovate–lanceolate, *c.* 30 × 8 mm, glabrous, cauducous. Flowers unisexual, non-fragrant, in axillary sessile syconia. Bracts 3, ovate, 1.5–3.5 × *c.* 2 mm, obtuse at apex, persistent. Male tepals 3, spathulate, *c.* 6 × 3 mm, rounded at apex, entire, free. Stamen 1; filament *c.* 0.3 mm long. Female tepals as same as male. Ovary superior, smooth; stigma cylindric. Syconium globose, glabrous.

Distribution: The native range of this species is Tropical & Subtropical Asia to W. Pacific (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests, also in the plains; *Fl. & Ft.*: March-June.

Specimens examined: Chinnar, 09.06.2017, *Vishnu Mohan & Santhosh Nampy* 152191; Kottamala, 26.04.1995, *Jomy Augustine* 15359; Vallakkadavu, 06.06.1995, *Jomy Augustine* 15416 (CALI).

Ficus mollis Vahl, Symb. Bot. 1: 82. 1790.

Ficus tomentosa Roxb. ex Willd., Sp. Pl. 4: 1136. 1806; Hook.f., Fl. Brit. India 5: 501. 1888; Gamble, Fl. Madras 1361. 1928.

Trees, up to 15 m tall. Stems woody, terete, smooth; bark greyish-white, smooth; exudation milky. Leaves simple, alternate-spiral; lamina elliptic-ovate, 6–10 × 3–7 cm, obtuse at apex, rounded-cordate at base, entire, tomentose when young, becoming glabrescent, coriaceous; 3–7-ribbed from base; lateral nerves 5–6 pairs, pinnate, prominent beneath, lowest pair of nerves not rib like; petioless 1–5 cm long, stout, tomentose. Stipules lateral, ovate-lanceolate, *c.* 8 × 2 mm, acuminate at apex, densely appressed, brown-strigose, cauducous. Flowers unisexual, in axillary syconium. Syconia 3–6 per axil. Male tepals 4, lanceolate, *c.* 5 × 2 mm. Stamen 1; filament *c.* 1 mm long. Female tepals as same as male. Ovary superior, ellipsoid-globose; style 1.5 mm long. Syconium fleshy, grey, tomentose.

Distribution: The native range of this species is India to Bangladesh, Sri Lanka and Nicobar Islands (POWO, 2023); *Habitat*: Dry deciduous forests; *Fl. & Ft.*: June-December-February.

Specimens examined: Chinnar, 09.02.2021, *Vishnu Mohan & Santhosh Nampy* 175927 (CALI); Chinnar, 06.01.1995, *N. Sasidharan* 11656 (KFRI).

Ficus nervosa Heyne ex Roth in Roem. & Schult., Syst. Veg. 1: 513. 1817; Hook.f., Fl. Brit. India 5: 512. 1888; Gamble, Fl. Madras 1364. 1928.

Large trees, up to 30 m tall. Stems woody, terete, smooth; bark grey to greyish-brown, smooth; exudation milky. Leaves simple, alternate, spiral; lamina oblong-lanceolate, 10–17 × 4–8 cm, acuminate at apex, round at base, entire, glabrous, glossy, coriaceous; 3–5-ribbed from base, lateral nerves 5–12 pairs, pinnate; petioless 1–2 cm long, stout, grooved above, glabrous. Stipules 10–12 mm long, ovate-lanceolate, 18 × 6 mm, acuminate at apex, membranous, puberulous, caducous. Flowers unisexual, non-fragrant, in axillary paired syconia; peduncles *c.* 1 cm long, slender. Bracts near the base of peduncles, orbicular-ovate, *c.* 4 × 3 mm, entire. Male tepals ovate, *c.* 6 × 2 mm, acute at apex, free. Stamen 1; filaments *c.* 1 mm long. Female tepals as same as male tepals. Ovary superior, ovoid, smooth; style stout. Syconium depressed globose, red, glabrous.

Distribution: The native range of this species is India to Taiwan and Indo-China (POWO, 2023); *Habitat*: Semi-evergreen and evergreen forests; *Fl. & Ft.*: January-May.

Specimens examined: Arjunankotta, 21.04.1995, *Jomy Agustine* 15080, Kokkara, 06.04.1994, *Jomy Agustine* 13526 (CALI); Valara, 26.01.1982, *K. Ramamurty* 72991 (MH).

Ficus racemosa L., Sp. Pl. 1060. 1753.

Ficus glomerata Roxb., Pl. Coromandel 2: 13. 1799; Hook.f., Fl. Brit. India 5: 535. 1888; Gamble, Fl. Madras 1364. 1928.



Large trees, up to 30 m tall. Stems woody, terete, smooth; bark yellowish-brown smooth, coarsely flaky; exudation milky. Leaves simple, alternate; lamina elliptic, 6–15 × 3–6 cm, acute at apex and base, entire, membranous, glabrous; petioless 1–5 cm long, slender, grooved above. Stipules lanceolate, *c.* 15 × 5 mm, pubescent. Flowers unisexual, non-fragrant, in axillary tubercled syconium; peduncles 3–12 mm long, stout. Bracts 3, ovate-triangular, *c.* 6 × 2 mm, persistent. Male tepals dentate-lacerate, lobes jointed below, glabrous. Stamens 2, exserted; filaments *c.* 1 mm long, connate below. Female tepals as same as male. Ovary superior, sessile; style *c.* 3 mm long, glabrous; stigma clavate. Syconium dark crimson coloured.

Distribution: The native range of this species is Pakistan to N. Queensland (POWO, 2023); *Habitat*: Semi-evergreen and deciduous forests, also in the plains; *Fl. & Ft.*: January-April.

Specimens examined: Kattappana, 04.04.2018, *Vishnu Mohan & Santhosh Nampy* 164606 (CALI); Lower Periyar, 28.01.1983, *A.G. Pandurangan* 76659 (MH); Panamkutty, 22.02.1983, *C.N. Mohanan* 77923 (MH).

Ficus talbotii King, Ann. Roy. Bot. Gard. (Calcutta) 1: 51. 1887; Hook.f., Fl. Brit. India 5: 512. 1888; Gamble, Fl. Madras 1363. 1928.

Trees, upto 20 m tall. Stems woody, terete, glabrous; bark green, smooth; exudation milky. Leaves simple, alternate-spiral; lamina elliptic-ovate, 8–12 × 3–5 cm, acuminate at apex, cuenate at base, entire, glabrous, coriaceous; 3-ribbed from base; lateral nerves 10–12 pairs, parallel, looped near margin; petioless 1–3 cm long, slender, glabrous, grooved above. Stipules ovate, *c.* 20 × 5 mm, acute at apex, pubescent, caducous. Flowers unisexual in axillary sessile syconia; syconia 6–8 mm across. Bracts 3, ovate, 3–5 × *c.* 2 mm, obtuse at apex, glabrous, persistent. Male tepals free, spathulate, *c.* 5 × 2 mm, rounded at apex, glabrous. Stamen 1; filament *c.* 0.3 mm long. Female tepals as same as male. Ovary superior, globose; style *c.* 1 mm long; stigma simple. Syconium globose.

Distribution: The native range of this species is India to Indo-China (POWO, 2023); *Habitat*: Shola and semi-evergreen forests; *Fl. & Ft.*: December-April.

Specimens examined: Way to Karimutty, 29.12.2017, *Vishnu Mohan & Santhosh Nampy* 158008 (CALI); way to Moolamattam, 18.02.1982, *C.N. Mohanan* 73347 (MH).

Ficus tinctoria subsp. **gibbosa** (Blume) Corner, Gard. Bull. Singapore 17: 476 1960.

Ficus gibbosa Blume var. *parasitica* (Koenig ex Willd.) King, Ann. Roy. Bot. Gard. (Calcutta) 1: t.2, 16. 1887; Hook.f., Fl. Brit. India 5: 497. 1888; Gamble, Fl. Madras 1365. 1928.

Small trees, up to 15 m tall. Stems woody, terete, smooth; bark grey, lenticellate, grey; exudation milky. Leaves simple, alternate; lamina rhomboid, 5–12 × 3–5 cm, acuminate at apex, acute at base, entire, gibbous, scabrous, coriaceous; 3-ribbed from base, lateral nerves 3–7 pairs, pinnate, prominent beneath; petioless *c.* 1 cm long, slender, grooved above, scabrous. Stipules lateral, lanceolae, *c.* 15 × 5 cm, acute at apex. Flowers unisexual in axillary solitary syconia, 6–7 mm ac□oss; peduncles 1.5–10 mm long, slender, scabrous. Bracts near the base of peduncles, lanceolate, entire. Male tepals 6, ovate, *c.* 2 × 1 mm, white, scabrous, puberulous. Stamen 1; filament *c.* 0.6 mm long. Female tepals 6, ovate,

c. 3 × 2 mm, white, scabrous, puberulous. Ovary superior, sessile; style *c.* 2 mm long. Syconium yellow when ripe.

Distribution: The native range of this subspecies is Himalaya to S. China and Lesser Sunda Islands (Bali) (POWO, 2023); *Habitat*: Moist deciduous and semi-evergreen forests, also in the plains; *Fl. & Ft.*: March-April.

Specimen examined: Thekkady, 22.10.1993, *Jomy Agustine* 12544 (CALI).

Ficus tsjakela Burm. f., Fl. Ind. 227. 1768; Hook.f., Fl. Brit. India 5: 514. 1888; Gamble, Fl. Madras 1362. 1928.

Trees, up to 15 m tall. Stems woody, terete, smooth; bark dark brown, rough; exudation milky. Leaves simple, alternate spiral; lamina ovate-oblong, 10–18 × 3–9 cm, acuminate at apex, rounded at base, entire, glabrous, coriaceous, glossy above; 3–5-ribbed from base, lateral nerves 7–14 pairs, pinnate, prominent, looped near the margin, lower pair of nerves rib like; petioless 3–10 cm long, slender, grooved above. Stipules lanceolate, 4–6 × *c.* 3 mm, foliaceous. Flowers unisexual in axillary syconia. Syconia 3–6 per axil. Bracts 3, ovate, *c.* 2 × 1 mm, acute at apex, concave, persistent. Male tepals ovate, *c.* 4 × 2 mm, acute at apex, smooth. Stamen 1; filaments *c.* 0.5 mm long, filiform. Female tepals as same as male. Ovary superior, obovate; style erect; stigma cylindric. Syconia yellowish-white and dotted.

Distribution: The native range of this species is S. Pakistan to Indo-China and Sri Lanka (POWO, 2023); *Habitat*: Moist deciduous forests, also in the plains; often epiphytic and later becoming independent; *Fl. & Ft.*: October-April.

Specimens examined: Anchuruly, 04.10.1972, *B.D. Sharma* 42410 (MH); Mlappara, 25.10.1993, *Jomy Augustine* 12574 (CALI); Pooyamkutty, 19.12.1988, *P. Bhargavan* 90014 (MH).

Streblus Lour.

Fl. Cochinch. 614. 1790.

Streblus asper Lour., FI. Cochinch. 615. 1790; Hook.f., FI. Brit. India 5: 489. 1888; Gamble, F1. Madras 3: 1353. 1928.

Shrubs or small trees, up to 10 m tall. Stems woody, terete; bark light grey, smooth, lenticellate; exudation milky white. Leaves simple, alternate; lamina; petioless 0.3–0.5 cm long, stout; lamina rhomboid, 5–10 × 2–5 cm, acute at apex, cuenate at base, entire, glabrous above, scabrid. Stipules lanceolate, *c.* 5 × 2 mm long, acute at apex, caducous. Flowers unisexual, in axillary heads, greenish-yellow. Male in axillary heads; peduncles *c.* 10 mm long, sparsely puberulous. Tepals 4, free, sessile, lanceolate, *c.* 2.5 × 1 mm, acute

at apex, entire, puberulous without. Stamens 4; filaments 2.5 mm long, glabrous. Female flowers axillary, solitary. Male tepals 4, ovate, *c.* 4 × 2 mm, rounded at apex, entire, concave, puberulous. Female tepals as same as male. Ovary ovoid; style *c.* 1 mm long; stigmatic arms 4 mm long, glabrous. Drupes globose; seed 1, globose, greyish-white.

Distribution: The native range of this species is S. China to Tropical Asia (POWO, 2023); *Habitat*: Moist and dry deciduous forests, also in the plains; *Fl. & Ft.*: January-October.

Specimen examined: Kanthallor, 09.10.2017, *Vishnu Mohan & Santhosh Nampy* 161210 (CALI).

URTICACEAE Juss.

Gen. Pl. 400. 1789.

Herbs, undershrubs, or rarely soft-wooded trees, rarely climbing, often armed with stinging hairs; epidermal cells mostly with prominent cystoliths; stems often fibrous. Leaves alternate or opposite, simple; stipules present or absent. Flowers very small, unisexual, usually cymose, sometimes crowded on a common enlarged receptacle. Male flowers with a 4–5-lobed calyx, lobes imbricate or valvate. Petals absent. Stamens as many as and opposite the calyx-lobes; filaments inflexed in bud; anthers 2-celled. Rudimentary ovary usually present. Female calyx like that of the male, often enlarged in fruit. Staminodes scale-like or absent. Ovary free or adnate to the calyx, 1-celled; style simple; ovule solitary, erect. Fruit a dry achene or fleshy drupe.

The family includes 60 accepted genera (POWO, 2023); 11 genera and 21 species in the study area.

Key to the genera

1. Plants with stinging hairs…….……..…….. 2
1. Plants without stinging hairs…...……4
2. Leaves deeply lobed: flowers in dense spikes……...…….… *Girardinia*
2. Leaves not lobed, serrulate or entire, flowers not in dense spikes…….…….. ..3
3. Leaves penninerved; large shrubs or small trees……..…….. *Dendrocnide*
3. Leaves 3-ribbed from base; herbs or sub-shrubs…….……. *Laportea*
4. Plant succulent, and epiphytic…….....……. *Procris*
4. Plants non succulent and terrestrial……..…….…… .5
5. Fruiting perianth fleshy……...……. ..6
5. Fruiting perianth scaly or thin……..……..…..7
6. Leaves densely white tomentose beneath…….…..……*Debregeasia*

6. Leaves not white tomentose beneath……..…*Oreocnide*

7. Flowers clustered on fleshy receptacles……..……..…8

7. Flowers desiccated receptacle……..…… …..9

8. Receptacle fleshy……..*Lecanthus*

8. Receptacle scaly……...……. *Elatostemsa*

9. Flowers in peduncled erect cymes…… ..*Pilea*

9. Flowers in axillary clusters or drooping…….…… ..10

10. Leaves entire……...…….…. ……..11

10. Leaves serrate…….……12

11. Inflorescence sessile …… *Droguetia*

11. Inflorescence peduncled…….…… *Boehmeria*

12. Phyllotaxy whorled; leaves petiolate and inflorescence sessile…….*Gonostegia*

12. Phyllotaxy alternate, opposite or whorled; if whorled leaves will be sessile and inflorescence pedincled……*Pouzolzia*

Boehmeria Jacq.

Enum. Syst. Pl. 9. 1760.

Key to the species

1. Flowers on long drooping spikes …….……*B. macrophylla*

1. Flowers on compressed fascicles…… *B. depauperata*

Boehmeria depauperata Wedd**.**, Ann. Sci. Nat., Bot. sér. 4, 1: 202. 1854. *Boehmeria malabarica* Wedd., Arch. Mus. Hist. Nat. 8: 355. 1856; Hook.f., Fl. Brit. India 5: 575. 1888; Gamble, Fl. Madras 3: 1387. 1928.

Erect shrubs, up to 2 m tall. Stems terete, pilose, green, smooth. Leaves simple, alternate; lamina ovate, 10–15 × 6–8 cm, acuminate at apex, rounded at base, serrate, pubescent below, glabrous above, coriaceous; petioless erect, 3–5 cm long, pilose. Flowers unisexual, non-fragrant, green, 10–20 together in axillary compressed fascicles; Male perianth united below; lobes ovate, *c.* 3 × 2 mm, acuminate at apex, entire, glabrous. Stamens 4, free; filaments *c.* 2 mm long, glabrous. Female perianth lobes ovate, 5–6 × *c.* 3 mm, acute at apex, entire, hispid out, glabrous within. Ovary adnate to perianth tube; style short, *c.* 1 mm long, glabrous; stigma sticky, curved, persistent. Achenes obovoid; fruiting perianth scaly.

Distribution: The native range of this species is China (S. Yunnan, SW. Guangxi) to Tropical Asia (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests: *Fl. & Ft.*: December-May.

Specimens examined: Mannankudy, 06.01.2017, *Vishnu Mohan & Santhosh Nampy* 151622 (CALI); Meenmutty, 11.11.1981, *C.N. Mohanan* 72468 (MH); Thooval, Near Erattayar, 04.04.2018, *Vishnu Mohan & Santhosh Nampy* 158479 (CALI).

Boehmeria virgata var. **macrostachya** (Wight) Friis & Wilmot-Dear, Blumea 58: 162. 2013.

Boehmeria platyphylla D.Don, Prodr. Fl. Nepal. 60. 1825; Hook.f., Fl. Brit. India 5: 578. 1888; Gamble, Fl. Madras 1387. 1928.

Shrubs, up to 4 m tall. Stems not woody, terete, green, glabrous. Leaves simple, alternate; lamina ovate-lanceolate, 7–12 × 4–8 cm, acuminate at apex, acute-rounded at base, serrate, shortly pilose along the ribs, sparsely pilose; petioless erect, terete, *c.* 6 cm long, glabrous. Flowers unisexual, non-fragrant, brownish red, in axillary long drooping spikes; peduncles 10–15 cm long, drooping, sparsely pubescent; pedicels reduced. Male perianth-tube gibbous at base; lobes ovate, *c.* 3 × 2 mm, acute at apex, entire, smooth. Stamens 4; filaments *c.* 2 mm long, glabrous. Female perianth tube as same as male. Ovary adnate to the perianth tube; style *c.* 2 mm long, glabrous; stigma sticky. Achenes ovoid, beaked, puberulous; fruiting perianth scaly.

Distribution: The native range of this variety is Indian Subcontinent to Indo-China (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: November-May.

Specimens examined: Karimanal, 09.03.2017, *Vishnu Mohan & Santhosh Nampy* 152036; Pethotty, 06.01.2017, *Vishnu Mohan & Santhosh Nampy* 151590 (CALI); Periyar Tiger Reserve, 14.05.1995, *N. Sasidharan* 15278 (KFRI).

Debregeasia Gaudich.

Voy. Bonite, Bot. 3(Atlas): t. 90. 1844.

Key to the species

1. Leaves broadly ovate, orbicular; fruit enclosed by membranous perianth……
……. *D. wallichiana*

1. Leaves lanceolate; fruit enclosed by succulent perianth……... *D. longifolia*

Debregeasia longifolia (Burm.f.) Wedd. in DC., Prodr. 16: 235. 1869.

Debregeasia velutina Gaudich., Voy. Bonite, Bot. 3: t. 90. 1844; Hook.f., Fl. Brit. India 5: 590. 1888; Gamble, Fl. Madras 3: 1389. 1928.

Shrubs-small trees, up to 5 m tall. Stems woody, terete, pubescent; bark grey, lenticellate. Leaves simple, alternate; lamina elliptic-lanceolate, 6–12 × 2–4 cm, acuminate at apex,

rounded at base, crenate, tomentose below, scabrous above; petioless 0.8–2 cm long, terete, slender, pilose. Stipules linear-lanceolate *c.* 5 × 2 mm, acuminate at apex, entire, pubescent. Flowers unisexual, non-fragrant, in axillary fascic les; peduncles dichotomously branched, 1–3 cm long, slender, scabrid; pedicels obsc ure. Bracts and bracteoles ovate, *c.* 3 × 2 mm long, acute at apex, ciliate. Male perianth united at base; lobes ovate, *c.* 3 × 2 mm, acute at apex, densely woolly. Stamens 4, free; filaments *c.* 2 mm long, glabrous. Female perianth as same as male perianth. Ovary adnate to the perianth; style *c.* 2 mm long, glabrous. Drupes globose orange-yellow, enclosed by succulent perianth; fruiting perianth thin.



Distribution: The native range of this species is China to Tropical Asia and Vanuatu (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests: *Fl. & Ft.*: January-May.

Specimens examined: Anakkara, 17.03.2017, *Vishnu Mohan & Santhosh Nampy* 158391; way to Marayoor, 09.01.2004, *V.K. Sreenivas* 96559 (CALI).

Debregeasia wallichiana Wedd., Arch. Mus. Hist. Nat. 9: 464. 1857.

Debregeasia ceylanica sensu Hook.f., Fl. Brit. India 5: 592. 1888; Gamble, Fl. Madras 1389. 1928

Shrubs or small trees, up to 6 m tall. Branchlets stout, leaf scars conspicuous, smooth; branchlets and petioless appressed pubescent. Leaves simple, crowded at apex of branchlets; lamina broadly ovate to orbicular, 7–18 × 6–16 cm, acuminate at apex, broadly cuneate at base, sinuate-dentate, papery, white tomentose within, sparsely appressed pubescent on veins, sparsely appressed strigose out; petioless 3–15 cm long, slender, glabrous. Stipules oblong-lanceolate, 12–20 × 2.5–5 mm, 2-cleft at apex. Flowers unisexual, in axillary fascicles; peduncles 2.5–6.5 cm long. Bracts membranous, oblong-lanceolate, 0.5–1.3 × *c.* 0.3 mm long, acute at apex, entire, glabrous. Male flowers:

Perianth lobes 5, broadly ovate, *c*. 3 × 2 mm, acute at apex, entire, glabrous; rudimentary ovary stipitate, obovoid. Female flowers sessile; perianth tube membranous, 4-ribbed, denticulate at apex. Achenes enclosed by membranous perianth, but not adnate to it.

Distribution: The native range of this species is Nepal to Indo-China (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft*.: April-June.

Specimen examined: Painavu, 27.04.1984, *C.N. Mohanan* 81636 (MH).

Dendrocnide Miq.

Pl. Jungh. 1: 29. 1851.

Dendrocnide sinuata (Blume) Chew, Gard. Bull. Singapore 21: 206. 1965. *Laportea crenulata* (Miq.) Wedd., Arch. Mus. Hist. Nat. 9: 133. 1856, *nom. Illeg*.; Hook.f., Fl. Brit. India 5: 550. 1888; Gamble, Fl. Madras 3: 1373. 1928.



Large shrubs to small trees, up to 5 m tall. Stems woody, terete, smooth, covered with soft stinging hairs. Leaves simple, alternate; lamina elliptic-oblong, 10–20 × 4–6 cm, acute at apex,

acuminate at base, entire, glabrous, coriaceous; petioless 3–5 cm long, terete, grooved above, stinging hairy. Flowers unisexual, non-fragrant, green, in axillary fascicles; peduncles 4–9 cm long, stinging hairy; pedicels 3–5 mm long, stinging hairy. Male perianth united at base; lobes 4, ovate, *c.* 3 × 2 mm, acute at apex, entire, pubescent. Stamens 4, free; filaments *c.* 3 mm long, glabrous. Female peri anth as similar as male perianth. Ovary 1-celled; style *c.* 4 mm long, puberulous, persistent; stigma sticky. Achenes ovoid, white, glabrous.

Distribution: The native range of this species is E. Nepal to S. China and W. & S. Malesia (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft*.: September-January.

Specimens examined: Arjunankotta, 25.01.1994, *Jomy Augustine* 13172; Mankulam, 15.09.2018, *Vishnu Mohan & Santhosh Nampy* 156378 (CALI).

Droguetia Gaudich.

Voy. Uranie, Bot. 505 1830.

Droguetia iners (Forssk.) Schweinf., Bull. Herb. Boissier 4: 146. 1896.

Droguetia diffusa Wedd. *sensu* Hook.f., Fl. Brit. India 5: 593. 1888; Gamble, Fl. Madras 1386. 1928

Monoecious, slender, diffuse herbs, up to 40 cm tall. Stems slender, terete, glabrous, groobed. Leaves opposite, decussate; lamina ovate, 2–4 × 1–2 cm, acuminate at apex, acute-rounded at apex, coarsely crenate, membraneous, hispid above and on nerves below; petioless slender, *c.* 2 cm long, pubescent. Stipules linear-lanceolate, *c.* 3 × 2 mm, acute at apex, entire. Flowers unisexual, non-fragrant, white, in axillary sessile fascicles; peduncles *c.* 3 mm long, slender, glabrous; pedicels obscure. Bracts ovate, *c.* 4 × 3 mm, acute at apex, glabrous. Male perianth fused at base; lobes ovate, *c.* 4 × 3 mm, acute at apex, entire, glabrous. Stamen 1; filaments *c.* 2 mm long, glabrous. Female perianth as same as male. Ovary woolly, 1-celled; style erect, *c.* 3 mm long; stigma hispid. Achene ovoid, compressed, woolly.

Distribution: The native range of this species is Tropical Africa, SW. Arabian Peninsula, E. Cape Prov. to KwaZulu-Natal, Madagascar (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: November-December.

Specimen examined: Pambadum Shola National Park, 20.12.2018, *Vishnu Mohan & Santhosh Nampy* 167853 (CALI).

Elatostemsa J.R.Forst. & G.Forst.

Char. Gen. Pl. 105. 1776, *nom. cons.*

Key to the species

1. Plants herbs ……..……...2
1. Plants subshrubs …….…….3
2. Internodes strigose; leaves serration up to 8……..*E. lineolatum*
2. Internodes hispid; leaves serrations up to 4……*E. ranongense*
3. Leaves width more than 6 cm; margins entire……*E. heyneanum*
3. Leaves width less than 4 cm; margins crenate……4
4. Stems glabrous; male flowers pentamerous……..……..*E. acuminatum*
4. Stems hairy; male flowers tetramerous……..……5
5. Male inflorescence peduncled……..……*E. wightii*
5. Male inflorescence sessile……...….*E. sessile*

Elatostemsa acuminatum (Poir.) Brongn., Bot. Voy. Coquille 211. 1834; Hook.f., Fl. Brit. India 5: 566. 1888; Gamble, Fl. Madras 1377. 1928.

Glabrous subshrubs, up to 35 cm tall. Stems terete, erect, glabrous, smooth. Leaves simple, alternate; lamina oblong-lanceolate, 5–8 × 2–3 cm, caudate-acuminate at apex, rounded at base, slightly oblique, crenate, glabrous; lateral nerves 7–9 pairs, slender; petioles 2–3 mm long, glabrous, shallowly grooved above. Flowers unisexual, non-fragrant, white, in axillary solitary sessile cymes. Bracts obovate-obtuse, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Male flowers pentamerous. Perianth fused at base; lobes ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous. Stamens 5; filaments glabrous, smooth, white. Female flowers 4-merous. Perianth fused at base; lobes ovate, *c.* 5 × 3 mm, acute at apex, entire, glabrous. Ovary adnate to the perianth; style *c.* 3 mm long, glabrous; stigma sticky. Achenes ovate; fruiting perianth scaly.

Distribution: The native range of this species is India to S. China and N. Borneo (POWO, 2023); *Habitat*: Along sides of watercourses in evergreen forests: *Fl. & Ft.*: March-May.

Specimens examined: Chinnakanal – Lockhart gap, 02.05.2010, *Anoop P.B. & K.D. Prathapan* 1084; Pettimudi, 18.03.2019, *Vishnu Mohan & Santhosh Nampy* 159103(CALI).

Elatostemsa heyneanum (Wedd.) Hallierf., Ann. Jard. Bot. Buitenzorg 13: 316. 1896; Hook.f., Fl. Brit. India 5: 561. 1888; Gamble, Fl. Madras 3: 1380. 1928.

Subshrubs up to 30 cm tall. Stems arched, angled, densely lineolate. Leaves simple, distichous; lamina, obliquely ovate, 8–20 × 6–10 cm, acuminate at apex, acute at base, glabrous, coriaceous, 3-ribbed; petioless *c.* 5 mm long, stout, glabrous, grooved above. Stipules lanceolate, *c.* 5 × 2, sharply acuminate at apex, entire, glabrous. Flowers unisexual, non-fragrant, white-pink, in axillary peduncled cymes; peduncles 2–10 cm long, stout, erect, glabrous. Male flowers perianth united at base; lobes 4, equal, oblong, *c.* 2 × 1 mm, acute at apex, entire. Stamens 4, free; filaments *c.* 3 mm long, glabrous. Female flowers perianth united at base; lobes 5, unequal, oblong, *c.* 1.5 × 1 mm, rounded at apex. Ovary ovate; stigma sticky. Achenes obovate, acute, tubercled.

Distribution: The native range of this species is S. India, Sri Lanka, China (Yunnan, N. Guangxi) to Indo-China (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests: *Fl. & Ft.*: April-September.

Specimens examined: Anamudishola, 09.06.2018, *Vishnu Mohan & Santhosh Nampy* 159288 (CALI); PTR, 13.04.1994, *N. Sasidharan* 13565 (KFRI).

Elatostemsa lineolatum Wight, Icon. Pl. Ind. Orient. 6: t. 1984. 1853; Hook.f., Fl. Brit. India 5: 565. 1888; Gamble, Fl. Madras 1377. 1928.



Erect herbs, up to 40 cm tall. Stems terete, scandent, strigose, smooth. Leaves simple, alternate; lamina oblong-lanceolate, 5–8 × 3–5 cm, caudate-acuminate at apex, oblique at base, crenate-toothed, serrations up to eight, glabrous; lateral nerves 6–7 pairs, slender; petioles 1–2 mm long, glabrous, shallowly grooved above. Flowers unisexual, non-fragrant, white, in axillary sessile solitary clusters. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Male flowers: Perianth fused at base; lobes ovate, *c.* 2 × 1 mm, acuminate at apex, glabrous. Stamens 4; filaments *c.* 2 mm long, glabrous, slender, erect. Female flowers as same as male flowers. Ovary adnate with perianth; style *c.* 2 mm long, glabrous; stigma sticky. Achenes elliptic; fruiting perianth scaly.

Distribution: The native range of this species is Indian Subcontinent to Nansei-shoto (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: May-July.

Specimens examined: Mankulam, 09.06.2018, *Vishn u Mohan & Santhosh Nampy* 159292; Mangaladevi, 15.07.2017, *Vishnu Mohan & Santhosh Nampy* 152887 (CALI).

Elatostemsa ranongense Yahara, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 13: 492. 1984.

Bushy erect herbs, up to 20 cm tall. Stems terete, glabrous, fleshy, zig-zag, hispid. Leaves simple, alternate; lamina obliquely lanceolate, 6–10 × 1.5–3 cm, acuminate at apex, obtuse at base, serrations up to four; petioles *c.* 2 mm long, glabrous, stout. Stipules lanceolate, *c.* 4 × 1 mm, acuminate at apex, glabrous. Flowers unisexual, non-fragrant, white, in axillary sessile fascicles. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Male flowers:



Perianth fused at base; lobes ovate, 3–4 × *c.* 2 mm, acute at apex, entire, glabrous. Stamens 4; filaments *c.* 2 mm long, glabrous. Female flowers: Perianth as same as male. Ovary 1-celled; style *c.* 3 mm long, glabrous; stigma sticky. Achenes ovoid; fruiting perianth scaly.

Distribution: The native range of this species is Thailan d (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: November-December-January.

Specimen examined: Anamudishola N.P, 25.01.2018, *Vishnu Mohan & Santhosh Nampy* 158249 (CALI).

Elatostemsa sessile J.R.Forst. & G.Forst., Char. Gen. Pl. 106. 1776; Hook.f., Fl. Brit. India 5: 563. 1888; Gamble, Fl. Madras 1376. 1928.

Gregarious subshrubs, up to 30 cm tall. Stems woody, terete, zig-zag, hairy, smooth, green. Leaves simple, alternate; lamina obliquely lanceolate, 7–10 × 3–3.5 cm, acuminate at apex, obtuse at base, deeply crenate, thin, sparsely hairy; petioles 1–2 mm long, glabrous, grooved above. Stipules lanceolate, *c.* 3 × 1 mm, acuminate at apex, entire, glabrous. Flowers unisexual, non-fragrant, white, in axillary sessile solitary fascicle. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Male inflorescences sessile; Tepals 4, ovate, *c.* 4 × 2 mm, acute at apex, entire. Stamens 4; filaments *c.* 3 mm long, glabrous, entire. Female flowers perianth as same as male. Ovary 1-celled; style *c.* 3 mm; stigma penicillate. Achenes ovoid; fruiting perianth scaly.

Distributon: The native range of this species is Society Islands (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: October-November.

Specimen examined: Mankulam, 10.11.2018, *Vishnu Mohan & Santhosh Nampy* 177105 (CALI).

Elatostemsa wightii Hook.f., Fl. Brit. India 5: 570. 1888; Gamble, Fl. Madras 1377. 1928.

Small shrubs, up to 20 cm tall. Stems terete, hairy, fleshy, usually unbranched. Leaves simple, alternate; lamina obliquely ovate, 2–5 × 1–2 cm, acuminate at apex, acuminate-oblique at base, widely crenate, glabrous; petioles obscure. Flowers unisexual, non-fragrant, white, in axillary solitary sessile fascicle. Bracts ovate, *c.* 4 × 2 mm, acute at apex, cuspidate, sparsely hairy. Male inflorescence: Peduncle 1–2 cm long, slender. Perianth fused at base; lobes 4, ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Stamens 4, free; filaments *c.* 3 mm long, glabrous. Female perianth as same as male. Ovary adnate with

perianth; style *c.* 2 mm long, glabrous; stigma sticky. Achenes ovate; fruiting perianth scaly.

Distributon: The native range of this species is S. India (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: August-September.

Specimens examined: Edathattu, 13.09.2018, *Vishnu Mohan & Santhosh Nampy* 159492; *Ibid*., 13.09.2018, *Vishnu Mohan & Santhosh Nampy* 159495 (CALI).

Girardinia Gaudich.

Voy. Uranie, Bot. 498. 1830.

Girardinia diversifolia (Link) Friis, Kew Bull. 36: 145. 1981.

Subshrubs, up to 5 m tall. Stems terete, erect, stingig hairy. Leaves palmately lobed, alternate; lamina orbicular-widely ovate 8–15 × 10–17 cm, 3–7-lobed, cordate at base, densely strigose; petioless 4–8 cm long, strigose hairy, grooved above. Stipules broadly oblong, 5 × 4 mm, acute at apex, ciliate, sparsely pubescent. Male flowers in axillary drooping spikes; peduncles 10–20 cm long, glabrous, slender. Tepals 4, ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous within. Stamens 4; filaments *c.* 2 mm long, slender. Pistillode 4, globose. Female flowers in subterminal heads. Tepals connate; lobes 2–4, ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous within. Ovary flattened, ovate; style filiform. Achenes compressed.

Distribution: The native range of this species is Tropical & Subtropical Old World (POWO, 2023); *Habitat*: Evergreen, semi-evergreen, moist deciduous and shola forests, also in waste lands: *Fl. & Ft.*: October-May.

Specimen examined: Vellimala, 25.05.1995, *Vishnu Mohan & Santhosh Nampy* 15328 (CALI).

Gonostegia Turcz.

Bull. Soc. Imp. Naturalistes Moscou 19(II): 509 1846

Key to the species

1. Leaves sessile; lamina moderately acuminate at apex..……. *G. pentandra*
1. Leaves petiolate; lamina sharply acuminate at apex…….. *G. hirta*

Gonostegia hirta (Blume) Miq. Ann. Mus. Bot. Lugduno-Batavi 4: 303 1870. *Urtica hirta* Blume in Bijdr. Fl. Ned. Ind.: 495 1826. *Pouzolzia hirta* (Blume) Hassk., Cat. Hort. Bot. Bogor. 80. 1844.

Annual erect shrubs, up to 1 m tall. Stems terete, stiff, pubescent; nodes swollen. Leaves simple, opposite, decussate; lamina lanceolate, 5–10 × 1–2 cm, sharply acuminate at apex, rounded at base, entire, sparsely appressed hairy, 3-nerved; petioless 0.5–1 cm long, appressed hairy, grooved above, 3-veined. Stipules ovate, *c.* 3 × 2 mm, acuminate at apex, entire, glabrous. Flowers unisexual, non-fragrant, green, in dense axillary fascicles; peduncles 2–5 mm long, sparsely hairy; pedicels reduced. Male flowers perianth fused below; lobes deeply 5-lobed, ovate, *c.* 3 × 2 mm, acuminate, incurved, sparsely ciliate. Stamens 5; filaments glabrous. Female flowers perianth shallowly 4-lobed; lobes obovate, *c.* 3 × 2 mm, acute. Ovary adnate with perianth; style *c.* 3 mm long, glabrous. Achenes enclosed by persistent ribbed calyx; fruiting perianth scaly.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: November-December.

Specimens examined: Nallathanni Kallar, 14.09.2018, *Vishnu Mohan & Santhosh Nampy* 161908; way to Anamudi base camp, 10.12.2019, *Vishnu Mohan & Santhosh Nampy* 170032 (CALI).

Gonostegia pentandra (Roxb.) Miq.

Ann. Mus. Bot. Lugduno-Batavi 4: 302 1870.

Key to the verities

1. Phyllotaxy whorled; flowers on axillary raceme…….…….. *G. pentandra* var. *gracilis*

1. Phyllotaxy opposite; flowers on terminal spike…….…….. *G. pentandra* var. *wightii*

Gonostegia pentandra var. **gracilis** (Miq.) Pusalkar S.S.Dash & A.A.Mao (eds.), Fl. Pl. India Annot. Checkl. Dicot. 2: 523 2020. *Hyrtanandra gracilis* Miq. in Nieuwe Verh. Eerste Kl. Kon. Ned. Inst. Wetensch. Amsterdam, ser. 3, 5: 20 1852.

Pouzolzia meeboldii W.W. Smith & Ramaswami, Rec. Bot. Surv. India 6: 40.1914; Gamble, Fl. Madras 3: 1383. 1928.



Erect shrubs, up to 1 m tall. Stems terete, stiff, glaucous. Leaves simple, whorled; lamina linear lanceolate, 8–15 × 1–2 cm, acuminate at apex, rounded at base, entire, glabrous, sessile, 3-nerved. Flowers non-fragrant, reddish brown, in axillary racemes; peduncles up to 15 cm long, slender, narrow, thin, glabrous; pedicels reduced. Bracts ovate, *c.* 6 × 3 mm, acute at apex, entire, glabrous. Male flowers *c.* 2 mm across, perianth lobes 4, ovate, 3 × 2 mm, acute at apex, entire, glabrous. Stamens 4, filaments *c.* 3 mm long, glabrous. Female flowers smaller, perianth lobe 5, 2 × 1 mm, acute-rounded at apex, entire, glabrous. Ovary adnate with perianth; style *c.* 2 mm long; stigma sticky. Achenes ridged, brown; fruiting perianth scaly.

Distribution: The native range of this variety is SW. India (POWO, 2023); *Habitat*: Moist deciduous forests: *Fl. & Ft.*: August-November.

Specimens examined: Anakkulam, 18.09.2018, *Vishnu Mohan & Santhosh Nampy* 161984; Periyar Tiger Reserve, 13.09.1994, *N. Sasidharan* 14128 (KFRI); Vellappara, 05.08.2017 *Vishnu Mohan & Santhosh Nampy* 154130 (CALI).

Gonostegia pentandra var. **wightii** (Benn.) Pull. & Karupp. Fl. E. Ghats 5: 320 2019.

Pouzolzia wightii Benn. in Pl. Jav. Rar.: 66 1838; Hook.f., Fl. Brit. India 5: 584. 1888; Gamble, Fl. Madras 3: 1383. 1928.



Erect shrubs, up to 1 m tall. Stems terete, glabrous, pilose on tender parts. Leaves simple, opposite, decussate; lamina ovate-lanceolate, 6–10 × 2.5–3 cm, acuminate at apex, rounded at base, entire, glabrous, ciliate, 3-nerved; petioless reduced. Stipules ovate, *c.* 8 × 5 mm, acuminate at apex, entire, glabrous. Flowers unisexual, non-fragrant, white, in terminal spikes; peduncles 10–20 cm long; pedicels reduced. Bracts ovate, *c.* 4 ×

2 mm, acute at apex entire, glabrous. Male flowers perianth fused at base; lobes 4, ovate, *c.* 3 × 1.5 mm acute at apex, entire, glabrous. Stamens 4; filaments 2 mm long, puberulous. Female flowers perianth 5-lobed, obovate, *c.* 2 × 3 mm, rounded at apex, concave, glabrous. Ovary orbicular; style reduced, stigma 2, sticky. Achenes ovoid, wingless; fruiting perianth scaly.

Distribution: The native range of this variety is S. & E. India and Sri Lanka (POWO, 2023); *Habitat*: Evergreen and semi-evergreen forests: *Fl. & Ft.*: August-April.

Specimens examined: Anchuruli, 07.09.2017, *Vishnu Mohan & Santhosh Nampy* 152911; Chinnar, 12.01.1995, *K.K. Sajeev* 11824 (KFRI); Kattadikkadavu, 07.12.2018, *Vishnu Mohan & Santhosh Nampy* 167823; Vallakkadavu, 06.12.1993, *N. Sasidharan* 12792 (KFRI); Vellappara, 05.08.2017, *Vishnu Mohan & Santhosh Nampy* 154136; Vellathooval, 04.04.2018, *Vishnu Mohan & Santhosh Nampy* 158478 (CALI).

Laportea Gaudich.

Voy. Uranie 498. 1830, *nom. cons*.

Laportea interrupta (L.) Chew, Gard. Bull. Singapore 21: 200. 1965. *Fleurya interrupta* (L.) Gaud., Voy. Uranie 12: 497. t. 8. 1830; Hook.f., Fl. Brit. India 5: 548. 1888; Gamble, Fl. Madras 3: 1372. 1928. *Urtica interrupta* L. in Sp. Pl.: 985 1753.

Herbs, up to 40 cm tall. Stems terete, grooved, stinging hairy. Leaves simple, alternate; lamina broadly ovate, 4–10 × 3–5 cm, acuminate at apex, sub-cordate at base, crenate, sparsely hairy, membranous; petioless 4–8 cm long, slender, grooved above. Flowers unisexual, non-fragrant, green, in short axillary spikes; peduncles 5–10 cm long, slender, hispid hairy; pedicels obscure. Male flowers tepals 4, ovate, *c.* 4 × 2 mm, acute at apex, entire, glabrous, concave. Stamens 4; filaments unequal, 2–4 mm long, glabrous. Female flowers tepals 4, unequal, 2–4 × 1–2 mm, acute at apex. Ovary adnate with tepals; style slender; stigma sticky. Achenes ovoid.

Distribution: The native range of this species is Tropical & S. Africa, Arabian Peninsula, Mozambique, Tropical & Subtropical Asia to NW (POWO, 2023); *Habitat*: Degraded deciduous forests, also in the plains: *Fl. & Ft.*: August-September.

Specimens examined: Neriymangalam, 15.08.2017, *Vishnu Mohan & Santhosh Nampy* 178456 (CALI); Thekkady, 29.09.1972, *B.D. Sharma* 42354 (MH).

Lecanthus Wedd.

Ann. Sci. Nat., Bot. sér. 4, 1: 187. 1854.

Lecanthus peduncularis (Royle) Wedd. A.P.de Candolle, Prodr. 16(1): 164 1869.
Procris peduncularis Royle in Ill. Bot. Himal. Mts.: t. 83 1836.

Lecanthus wightii Wedd., Ann. Sci. Nat., Bot., sér. 4, 1: 187 1854, *nom. superfl.*; Hook.f., Fl. Brit. India 5: 559. 1888; Gamble, Fl. Madras 1374. 1928.

Erect herbs. Stems fleshy, terete, pale green, glabrous. Leaves simple, alternate; lamina ovate 3–10 × 1–4 cm, acute-acuminate at apex, obliquely acuminate at base, serrate, membranous, pilose; petioless slender, *c.* 1 cm long, glabrous, grooved above. Flowers unisexual, non-fragrant, green, in axillary fascicles; peduncles 1–3 cm long, slender, glabrous; pedicels absent. Receptacle up to 1 cm across, fleshy. Male flowers perianth lobes equal, ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Stamens 4; filaments *c.* 4 mm long, glabrous. Female flowers perianth lobes unequal, 2–5 × *c.* 2 mm, acute at apex, entire, glabrous. Ovary ovate; style *c.* 2 mm long, filiform; stigma sticky. Achenes oblong, red, flat.

Distribution: The native range of this species is Bioko to Ethiopia and Malawi, Tropical & Subtropical Asia to SW. Pacific (POWO, 2023); *Habitat*: Evergreen and shola forests: *Fl. & Ft.*: September-November.
Specimens examined: Edathattu, 13.09.2018, *Vishnu Mohan & Santhosh Nampy* 159476 (CALI); Erattayar, 28.09.1981, *C.N. Mohanan* 72155 (MH); Kuttikkanam-Peerumedu, 21.09.1964, *K. Vivekananthan* 20312 (MH); Nallathanni, Kallar, 16.09.2018, *Vishnu Mohan & Santhosh Nampy* 161930 (CALI).

Oreocnide Miq.

Pl. Jungh. 1: 39. 1851.

Oreocnide integrifolia (Gaudich.) Miq., Ann. Mus. Bot. Lugduno-Batavi 4: 306. 1870.
Villebrunea integrifolia Gaudich., Voy. Bonite Bot. 3: t. 91. 1844; Hook.f., Fl. Brit. India 5: 589. 1888; Gamble, Fl. Madras 3: 1388. 1928.

Small trees, up to 6 m tall. Stems woody, terete; bark brown, smooth, glabrous. Leaves simple, alternate; lamina elliptic-lanceolate 8–17 × 4–5 cm, acuminate at apex, acute-acuminate at base, entire, glabrous; nerves 4–6 pairs; petioless 1–2 cm long, glabrous, terete. Stipules lanceolate, *c.* 8 × 3 mm, acute at apex, entire. Flowers non-fragrant, white-

green, bisexual or unisexual in axillary fascicles. Male perianth united below; lobes 4, ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Stamens 4; filaments *c.* 4 mm long. Pistillode obovate. Female flowers perianth tube narrowed below. Ovary adnate to perianth tube; style absent; stigma discoid, fimbriate. Achenes adnate to the scaly perianth.

Distributoin: The native range of this species is SW. India, E. Nepal to China (W. Yunnan, W. Guangxi) and W. Malesia (POWO, 2023); *Habitat*: Along the stream sides in evergreen forests: *Fl. & Ft.*: June-April.

Specimens examined: Lockhert gap, 20.04.1964, *K.M. Sebastine* 18337 (MH); Meenmuttym, 14.02.1982, *C.N. Mohanan* 73236; Mathikettan Shola National Park (Choondal) 23.11.2014 *Syam Radh S*. 137858, Mangaladevi, 15.07.2017, *Vishnu Mohan & Santhosh Nampy* 152888 (CALI); PTR, 19.04.1976, *N. Sasidharan* 17323 (KFRI).

Pilea Lindl.

Coll. Bot. t. 4. 1821.

Key to the species

1. Plants prostrate creeping herbs……...*P. microphylla*

1. Plants erect herbs or shrubs……2

2. Leaves > 6 cm long…….……...…… *P. melastomoides*

2. Leaves < 6 cm long……..…… ……3

3. Perianth lobes spurred……...……..…… *P. wightii*

3. Perianth lobes spurless…….……. *P. kingii*

Pilea kingii C.E.C.Fisch., Bull. Misc. Inform. Kew 1927: 76. 1927; Gamble, Fl. Madras 3: 1376. 1928.

Slender erect herbs, up to 30 cm tall. Stems usually unbranched, terete, glabrous. Leaves simple, alternate; lamina ovate, 2–6 × 1.5–3 cm, acute at apex, rounded at base, serrate, sparsely hairy above, glabrous below, 3-ribbed; petioless slender, 2–4 cm long, glabrous. Flowers unisexual, non-fragrant, reddish brown, in axillary cymes; peduncles 2–4 cm long, dichotomous, slender, glabrous; pedicels very short. Bracts ovate, *c.* 2 × 1 mm, acute at apex, glabrous. Male flowers perianth fused at base; lobes 4, ovate. *c.* 3 × 2 mm, acute at apex, entire, glabrous, spurless. Stamens 4; filaments *c.* 2 mm long, glabrous. Female

flowers perianth as same as male. Ovary adnate to the perianth; style *c.* 2 mm long, glabrous; stigma sticky. Achenes biconvex, smooth; fruiting perianth scaly.



Distribution: The native range of this species is SW. India, Nepal to China (NW. Yunnan) (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: January-September.

Specimens examined: Anamudi Shola, 22.06.2018, *Vis hnu Mohan & Santhosh Nampy* 159360; Nallathanni Kallar, 16.09.2018, *Vishnu Mohan & Santhosh Nampy* 161937; Pettimudi, 19.03.2019, *Vishnu Mohan & Santhosh Nampy* 159115 (CALI).

Pilea melastomoides (Poir.) Wedd., Ann. Sci. Nat., Bot., sér. 4, 1: 186. 1854. *Pilea trinervia* (Roxb.) Wight, Icon. Pl. Ind. Orient. 6: t. 1973. 1853; Hook.f., Fl. Brit. India 5: 557. 1888; Gamble, Fl. Madras 3: 1379. 1928.

Dioecious erect subshrubs, up to 5 m tall. Stems terete, glabrous, fleshy. Leaves simple, opposite; lamina ovate-lanceolate, 6–20 × 3–9 cm, acuminate at apex, rounded at base, serrate, glabrous, 3-ribbed; petioless unequal, 3–10 cm long, slender, glabrous. Flowers unisexual, non-fragrant, white, in axillary fascicles; peduncles 3–8 cm long, glabrous; pedicels reduced. Male flowers perianth fused at base; lobes 4, ovate, *c.* 3 × 2 mm, acute at apex, entire, glabrous. Stamens 4; filaments *c.* 3 mm long, glabrous. Female flowers perianth as same as male flowers. Ovary adnate with perianth; style *c.* 3 mm long, glabrous; stigmas 3-fid. Achenes 1 mm across; fruiting p erianth scaly.



Distribution: The native range of this species is Indian Subcontinent to S. China and Indo-China, Taiwan, Jawa (POWO, 2023); *Habitat*: Evergreen and shola forests: *Fl. & Ft.*: August-December.

Specimens examined: Calvary mount, 06.09.2017, *Vishnu Mohan & Santhosh Nampy* 154369; Edathattu, 13.09.2018, *Vishnu Mohan & Santhosh Nampy* 159485, Pachakkanam, 15.08.1993, *Jomy Agustine* 12300 (CALI).

Pilea microphylla (L.) Liebm., Mexic. Neldeagt. Pl. 18. 1851; Gamble, Fl. Madras 1379. 1928.

Pilea muscosa (L.) Lindl *sensu* Hook.f., Fl. Brit. India 5: 551. 1888.

Slender succulent, creeping herbs. Stems terete, fleshy, glabrous. Leaves simple, opposite; lamina ovate, 2–4 × 1–2 mm, obtuse at apex, attenuate at base, entire, glabrous, fleshy, 1-nerved; petioles *c.* 1 mm long, filiform, glabrous. Flowers unisexual, non-fragrant, transparent, in small axillary umbellate clusters; peduncles and pedicels reduced. Male flowers tepals 4, free, ovate, *c.* 2 × 1 mm, acute at apex, entire, glabrous. Stamens 4; filaments erect, glabrous. Female flowers tepal connate at base; lobes 2–4, ovate, acute, glabrous. Ovary ovoid, 1-celled; style simple. Achenes ellipsoid; fruiting perianth scaly.



Distribution: The native range of this species is Mexico to N. South America and Peru, SE. U.S.A. to Caribbean (POWO, 2023); *Habitat*: Grown as garden plant, often found as an escape: *Fl. & Ft.*: August-May.

Specimens examined: Adimali, 07.08.2019, *Vishnu Mohan & Santhosh Nampy* 170216 (CALI); Thekkady, 19.05.1995, *N. Sasidharan* 15324 (KFRI).

Pilea wightii Wedd., Ann. Sci. Nat. Bot. ser. 4, 1: 186. 1854; Hook.f., Fl. Brit. India 5: 455. 1888; Gamble, Fl. Madras 3: 1379. 1928.

Erect herbs, up to 30 cm tall. Stems terete, grooved, glabrous. Leaves simple, alternate, broadly ovate, 1–3 × 1–2 cm, acute at apex, sub-cordate at base, crenate, glabrous;

petioless 2–4 cm long, slender, glabrous. Flowers unisexual, non-fragrant, green, in axillary cymes; peduncles 3–6 cm long, slender, glabrous; pedicels reduced. Male flowers perianth fused at base; lobes 4, obovate, *c.* 1 × 2 mm, acute at apex, entire, glabrous, spurred. Stamens 4; filaments *c.* 2 mm long, glabrous. Female perianth lobes curved, spathulate, *c.* 3 × 2 mm, smooth, spurred. Ovary ovate; style simple, *c.* 3 mm long, glabrous; stigma sticky. Achenes biconvex, smooth or tubercled; fruiting perianth scaly.

Distribution: The native range of this species is S. India, Sri Lanka and China (Guangxi, Guangdong) (POWO, 2023); *Habitat*: Evergreen forests: *Fl. & Ft.*: October-December.

Specimen examined: Mlappara, 20.11.1998, *Jomy Augustine* 17911 (CALI).

Pouzolzia Gaudich.

Voy. Uranie 12: 503. 1830.

Pouzolzia zeylanica (L.) Benn., Pl. Jav. Rar. 1: 67. 1838. *Pouzolzia indica* (L.) Gaudich., Voy. Uranie 12: 503. 1830; Hook.f., Fl. Brit. India 5: 581. 1888; Gamble, Fl. Madras 3: 1382. 1928. *Parietaria zeylanica* L. in Sp. Pl.: 1052 1753.



Erect herbs-shrubs, up to 60 cm tall. Stems terete, hispid, rough. Leaves simple, alternate; lamina ovate-elliptic, 1–8 × 1–4 cm, acute-acuminate at apex, rounded at base, entire, glabrous above, anastomosingly nerved, sparsely hairy below on nerves; petioless 1–3 cm long, slender, sparsely hairy. Stipules absent. Flowers non-fragrant, green, in axillary sub-sessile clusters. Bracts ovate, *c.* 3 × 2 mm, acute at apex, entire. Male flowers perianth fused at base; lobes 4, ovate-lanceolate, *c.* 3 × 1.4 mm, acute a t apex, entire, sparsely villous out, glabrous within. Stamens 4; filaments *c.* 3 mm long. Female flowers perianth 5-lobed; lobes orbicular *c.* 3

× 2 mm. Ovary adnate with perianth; style glabrous, linear, thinly pubescent; stigma sticky. Achenes 2-winged; fruiting perianth scaly.

Distribution: The native range of this species is Tropical & Subtropical Asia to N. Australia (POWO, 2023); *Habitat*: Wastelands; *Fl. & Ft.*: June-December.

Specimens examined: Eravikulam, 29.09.2017, *Vishnu Mohan & Santhosh Nampy* 156315; Kannadippara, 08.06.2018, *Vishnu Mohan & Santhosh Nampy* 159285; Munnar, 18.06.2019, *Vishnu Mohan & Santhosh Nampy* 176118; Vellappara, 05.08.2018, *Vishnu Mohan & Santhosh Nampy* 154146 (CALI); Vellimala, 18.08.1994, *Jomy Augustine* 13887 (KFRI).

Procris Comm. ex Juss.

Gen. Pl. 403. 1789.

Procris crenata Robins., Philipp. J. Sci. 5: 507. 1911.

Procris wightiana (Wedd.) Baill., Monogr. Pipérac. Urtic. 501. 1871; Gamble, Fl. Madras 3: 1378. 1928.



Epiphytic sacculent herbs. Stems terete, fleshy, scandent, glabrous. Leaves simple, alternate. Lamina linear lanceolate, *c.* 8 × 2.5 cm, sharply acuminate at apex, acuminate at base, crenate, glabrous, penninerved; petioless 2–3 mm long, grooved above, glabrous. Stipules absent. Flowers unisexual, non-fragrant, in the axils of leaf scars. Male flowers in small cymes, perianth lobes 5, obovate, *c.* 4 × 2 mm, rounded at apex, fleshy. Stamens 5. Female flowers on long peduncled receptacle, perianth lobes 4, ovate, *c.* 4 × 2 mm acute at apex, entire, glabrous, fleshy, cucullate. Ovary 1-celled, ovoid; stigma sessile, globose. Achenes ovoid, apiculate, rugose.

Distribution: The native range of this species is Tropical Africa, Madagascar, Tropical & Subtropical Asia (POWO, 2023); *Habitat*: Shola and evergreen forests: *Fl. & Ft.*: September-January.

Specimens examined: Anakkulam, 18.09.2018, *Vishnu Mohan & Santhosh Nampy* 161966; way to Karimutty, Mankulam, 20.12.2019, *Vishnu Mohan & Santhosh Nampy* 164597 (CALI).

Discussion

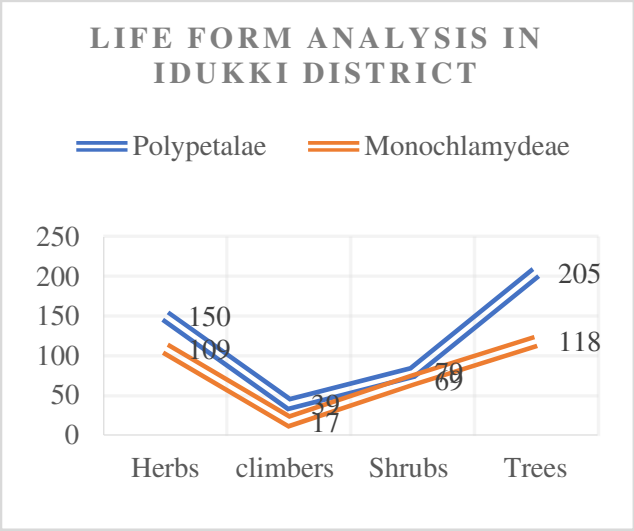


DISCUSSION

The Western Ghats holds a wealth of plant diversity, traced back to the supercontinent of Gondwanaland since peninsular India was part of Gondwanaland in the past. Due to its rich biodiversity, the Western Ghats hold importance in conservation. Numerous plant species in this area face threats and are on the verge of extinction, emphasizing the need for conservation measures to protect this distinctive plant life. Scientists are actively working on conservation efforts to safeguard and maintain this collection of flora representing our natural heritage. Of the 17,000 species of angiosperms in India, Western Ghats processes more than 4000 species (Nayar, 1982).

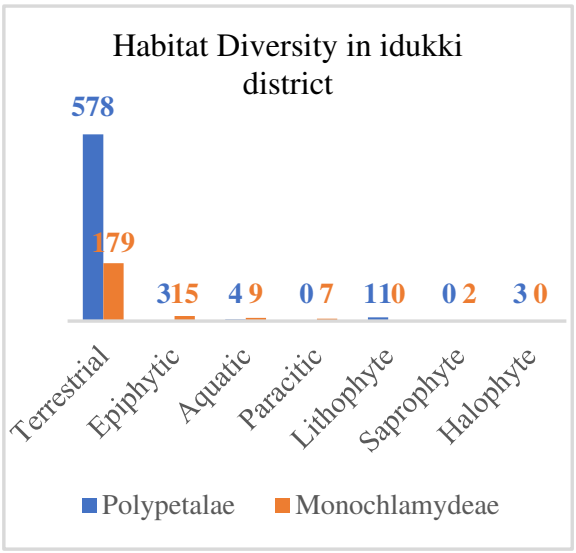
An expeditionary inventory of the Polypetalae and Monochlamydeae was completed between 2017 and 2023, spanning all seasons. This analysis may help estimate the district's vegetation for future worth. The present floristic study in Idukki resulted in the collection, identification and description of 811 taxa in a total area of 4612 sq. km. The specimens were classified following Bentham and Hooker system of classification. The analysis represents 371 genera and 84 families, of which Polypetalae represents 599 species in 271 genera belonging to 63 families and 212 species in 100 genera belonging to 21 families. 2193 specimens were prepared as herbarium sheets and deposited in the Calicut University Herbarium (CALI). An abundance of species was observed in the region of Eravikulam, Mankulam, Periyar Tiger Reserve, and the Chinnar area.

Considering various life forms in the study area, the results indicate that the herbaceous forms are the dominant group with 36% (259), followed by 250 trees (31%), 215 shrubs (26%), and 87 climbers (11%). Based on the data collected from the study area, it is evident that 93% of the



species areterrestrial, 2%, each are epiphytic and aquatic, 1% each are parasitic and lithophytic, 0.4% are saprophytes, and 0.5% are halophytes.

It has been found that, out of the 84 recorded families, Fabaceae (138), Euphorbiaceae (80), Geraniaceae (60), Melastomataceae (36), Lauraceae (31), Urticaceae (25), Malvaceae (32), Moraceae (24), Myrtaceae (25) and Meliaceae (18) are the families with highest number (Table 1).



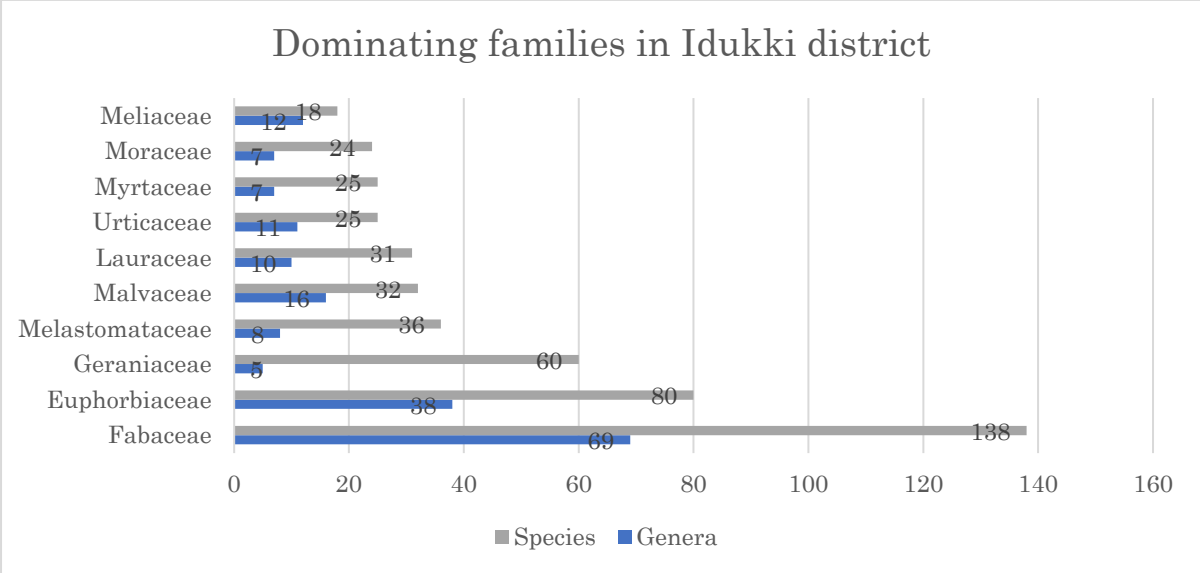
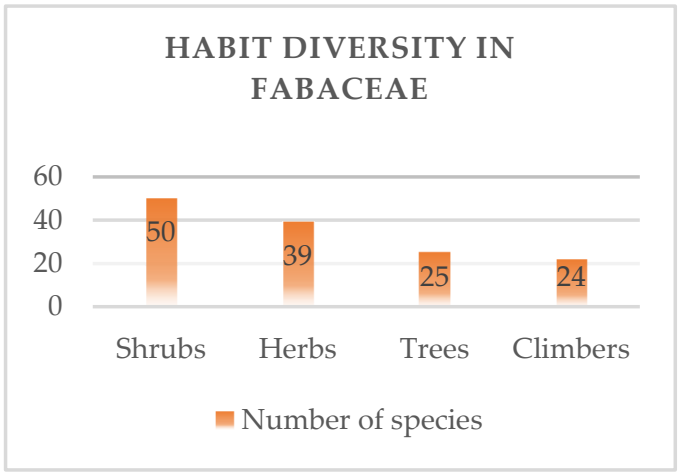


Table 1. Relative abundance of the top ten families (including cultivated) in Idukki district Wayanad district and Kerala state.

Sl. No.	Family	**Idukki**		Wayanad		Kerala	
		Genera	Species	Genera	Species	Genera	Species
1	Fabaceae	**69**	**138**	61	159	93	444
2	Euphorbiaceae	**38**	**80**	36	80	49	190
3	Geraniaceae	**5**	**60**	4	27	5	100
4	Melastomataceae	**8**	**36**	5	26	8	74
5	Malvaceae	**16**	**32**	11	26	15	73

6	Lauraceae	**10**	**31**	11	29	11	69
7	Urticaceae	**11**	**25**	11	15	13	42
8	Myrtaceae	**7**	**25**	3	23	10	63
9	Moraceae	**7**	**24**	5	23	8	48
10	Meliaceae	**12**	**18**	12	17	16	31

Idukki district, holds importance because of its abundant plant diversity, particularly within the Polypetalae and Monochlamydeae groups. Within the district there is an array of plant families, many of which boast a number of different species. This diverse range of plants makes contribution to the botanical richness found within the state. Idukki represented 45% of the total diversity of Polypetalae and Monochlamydeae in the Kerala state. All the top ten families of Western Ghats and Kerala are well represented in Idukki (Table 1). Regarding species diversity, Fabaceae with 138 species (wild and cultivated) contributes 40% of the total Fabaceae diversity in Kerala, followed by Euphorbiaceae contributing 45%. Geraniaceae, Meliaceae and Urticaceae contributing about 60% of the total plant wealth in the Kerala state in accordance with the respective families have become the prominent families. Fabaceae a predominantly tropical family with diverse group of plants is well represented in Kerala with 444 species and 93 genera. In the present study Fabaceae rank first in the order of dominance with 138 species (including cultivated 245) and 69 genera under three sub-families. Of this, Faboideae consist of 103 species, sub-family Caesalpinioideae having 12 species and sub-family Mimosoideae contains 17 species. This family represented with high degree of diversity in habit includes tree, shrubs, herbs and climbers. There are 39 herbs, 50 shrubs, 25 trees, and 24 climbers. Out of the total number (138) of



Fabaceae, 13 are endemic to South India, *Smithia venkobarowii* and *Crotalaria kurisumalayana* are strictly endemic to Kerala. As per the data analysis of IUCN red list of threatened plants (https://www.iucnredlist.org/) few plants were professionally assed. From which *Dalbergia latifolia* and *D. sissoides* falls under Vulnerable category, *Pterocarpus marsupium* is placed under Nearly Threatened and *Humboldtia vahliana* and *Prioria pinnata* under Endangered. *Lablab purpureus subsp. uncinatus* forms a new distributional record for Asia. *Crotalaria* became the most dominant genera in the family having 27 species followed by *Indigofera* and *Bauhinia.*

Genera with more species in the study area

Out of 371 wild genera recorded, there are nine genera that have ten or more species in each: *Impatiens* (47), *Crotalaria* (27), *Ficus* (15), *Syzygium* (13), *Osbeckia* (12), *Sonerila* (11), *Litsea* (11), *Polygala* (10) and *Grewia* (10).

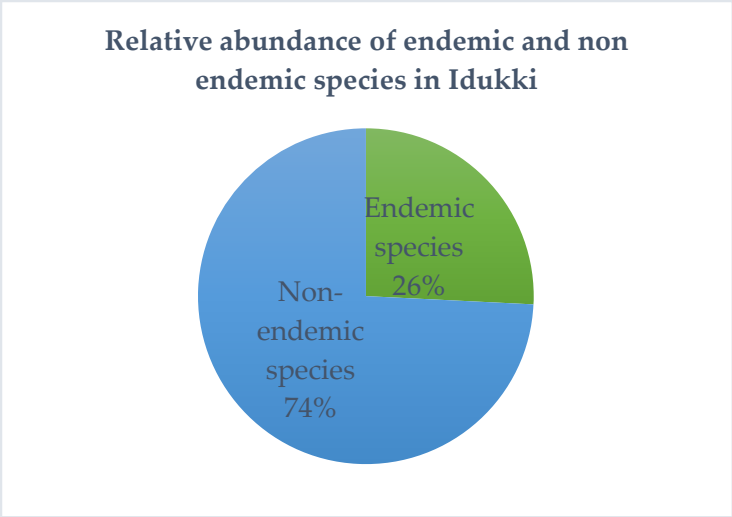
Impatience is the largest genus in Kerala with 80 species (1113 in world) and the present study also reveals a maximum diversity in the study area. Out of 47 species recorded, 41 are endemics of which eight are endemic to Kerala and seven are strictly endemic to Idukki district. *Impatiens coelotropis, I. grandispora, I. mankulamensis, I. modesta, I. nidholapathra, I. pandata, I. panduranganii* and *I. platyadena* are recognised as Critically Endangered (CR). As per IUCN Red List of threatened plants (https://www. iucnredlist. org/). *I. acaulis I. goughii, I. grandispora, I. mankulamensis, I. modesta, I. nidholapathra, I. panduranganii, I. raktakesara, I. scapiflora* and *I. viscosa* are lithophytes. *I. parasitica* is the only epiphytic species in the study area. The finding highlights the significance of *Impatiens* in Kerala, especially in Idukki district, as a hotspot for *Impatiens* diversity and endemism. It also underscores the importance of conservation efforts to protect them in their natural habitat.

Crotalaria the "Rattle box Plant" is the largest genus of the family Fabaceae and is the second largest genus in the study area with 27 species, which represents 42% of the total species diversity of this genus in Kerala. Majority of the species under this genus prefers to grow in the forest margins and road

cutting of highland areas in the study area. Hence the chances of extension of the population is very high, because of the anthropogenic activities (road widening, and other tourism development activities) and natural calamities like landsliding. *Crotalaria kurisumalayana* is endemic species to Kerala state. *C. beddomeana*, *C. candicans.*, *C. fysonii*, *C. grahamiana, C. heyneana, C. kurisumalayana*, *C. obtecta* var. *glabrescens*, *C. peduncularis* and *C. salicifolia* are endemic to southern western Ghats.

Endemic taxa

The World Conservation Monitoring Centre (WCMC) (https://www.unep-wcmc.org) estimates that 16,04,000 species have been recorded in the world. Nayar (1989) estimates that 4900 out of a total of 15000 flowering plant species, or 33%, are endemic to our country.



Being a tropical nation, India has a highly diverse population and a high level of endemism, making up 8% of the world's biodiversity (Ahemedullah & Nair, 1986). This is one of the 12 mega-biodiversity countries in the world. According to Botanical survey of India (https://knowindia.india.gov.in/profile/flora.php accessed on 13.11.2023), the nation is home to over 46,000 species of plants, and account for 8% of all flowering plant sp ecies known to exist in the globe. India is home to two of the 34 biodiversity hotspots recognised by CIF (2004). These are the hottest hotspots having both species and ecosystem diversity in India are the southern Western Ghats and western Himalayas harbouring around 1500 and 1808 endemic flowering plants respectively. The southern Western Ghats, which include southern Karnataka, Kerala, and a portion of Tamil Nadu, are thought to contain the most endemism-rich species. Kerala may only make up a relatively small portion of the southern Western Ghats' overall landmass, yet it is extremely diverse and has a high rate of endemism. According to

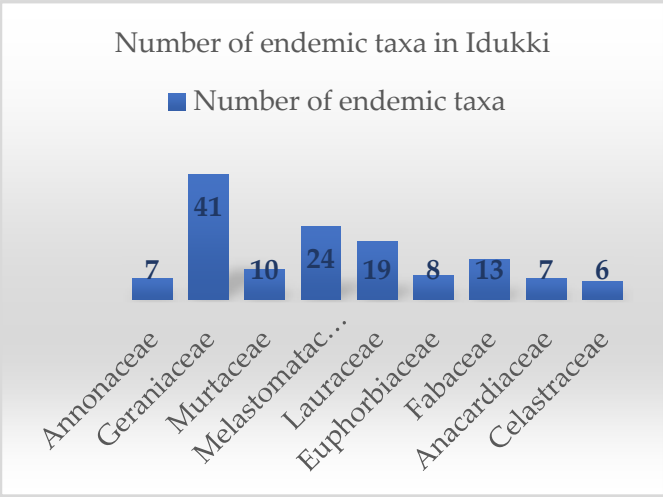
Sasidharan (2004), Kerala is home to 263 endemic species and 1637 endemic flowering plant species, totaling 4679 species.

Nayar (1997) recognized three hotspots of endemic centres in Kerala, *viz*., Agastyamala, Anamalai High Ranges and Silent Valley-Wayanad. Among these, Idukki comes under Anamalai High Range centre of endemism. The study reports a total of 209 endemic taxa (Table 2) forming 26% of the total species. Among these 29 are strictly endemic to Kerala state.

Table 2. Number of endemic taxa collected state wise.

States	Number of taxa
Kerala	29
Kerala, Tamil Nadu	76
Kerala, Karnataka	6
Kerala, Maharashtra	2
Kerala, Karnataka, Tamil Nadu	50
Kerala, Tamil Nadu, Maharashtra	1
Kerala, Karnataka, Maharashtra	4
Kerala, Tamil Nadu, Andhra Pradesh	1
Kerala, Karnataka, Goa	1
Kerala, Karnataka, Tamil Nadu, Maharashtra	20
Kerala, Karnataka, Tamil Nadu, Goa	7
Kerala, Karnataka, Maharashtra, Goa	3
Kerala, Karnataka, Tamil Nadu, Andra Pradesh	2
Kerala, Karnataka, Tamil Nadu, Maharashtra, Goa	3
Kerala, Karnataka, Tamil Nadu, Maharashtra, Andhra Pradesh	1
Kerala, Karnataka, Tamil Nadu, Goa, Andhra Pradesh	1
Kerala, Karnataka, Tamil Nadu, Maharashtra, Goa, Andhra Pradesh	1
Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Utter Pradesh	1

The highest number of endemic taxa are found in Geraniaceae (41), followed by Melastomataceae (24) and Lauraceae (19). *Impatiens* is the endemic genus to the study area with 41 endemics. All the five members from the family Dipterocarpaceae are endemics, i.e. endemic. Fifteen species are exclusively endemic to the Idukki district (*Callitriche idukkiana, Clematis pettimudiensis, Garcinia pushpangadaniana, Impatiens grandispora, I. mankulamensis, I. nidholapathra, I. pallidiflora, I. pandata, I. panduranganii, I. raktakesara, I. wightiana, Kalanchoe dineshi, Memecylon idukkianum, Peperomia ekakesara, Polygala idukkiana* and *Polypleurum munnarense*).



Exotic taxa

The global spread of non-native or alien species has been referred to as a major threat to ecosystems over the past few decades in a variety of research and practice fields (Heywood, 1989; Prieur-Richard & Lavorel, 2000; Dukes, 2002; Weber, 2003; Seabloom *et al.,* 2006). By abolishing native species, the proliferation of invasive alien species into forest habitats may disrupt the processes and functions of the forest ecosystem (Collier, 2002; Huebner, 2003). Furthermore, dominant alien species may also change the surrounding ecosystem. The table below reveals the study area's exotic flora (Table 3).

Table 3: List of exotic species in Idukki district, with family and nativity.

Sl. No.	Species	Family	Nativity
1.	*Acacia mangium* Willd.	Fabaceae	Maluku, New Guinea, Queensland
2.	*Acacia mearnsii* De Wild.	Fabaceae	New South Wales, South Australia,

			Tasmania, Victoria
3.	*Alternanthera bettzickiana* (Regel) G.Nicolson	Amaranthaceae	Bolivia, Brazil North, Brazil South, Ecuador, Peru
4.	*Alternanthera brasiliana* (L.) Kuntze	Amaranthaceae	Mexico to Tropical America
5.	*Alternanthera pungens* Kunth	Amaranthaceae	Mexico to Tropical America
6.	*Alternanthera sessilis* (L.) DC.	Amaranthaceae	Tropical & Subtropical Asia to N. & E. Australia, S. Mexico to Tropical America
7.	*Amaranthus spinosus* L.	Amaranthaceae	Mexico to Tropical America
8.	*Antigonon leptopus* Hook. & Arn.	Polygonaceae	Mexico to Central America
9.	*Bixa Orellana* L.	Bixaceae	Mexico to S. Tropical America
10.	*Boerhavia erecta* L.	Nyctaginaceae	Tropical & Subtropical America
11.	*Ceiba pentandra* (L.) Gaertn.	Malvaceae	Mexico to Tropical America
12.	*Centrosema molle* Mart. ex Benth.	Fabaceae	S. Mexico to Tropical America
13.	*Cereus pterogonus* Lem.	Cactaceae	S. America
14.	*Couroupita guianensis* Aubl.	Lecythidaceae	Panama to S. Tropical America
15.	*Crotalaria micans* Link	Fabaceae	Mexico to Tropical America
16.	*Cytisus scoparius* (L.) Link	Fabaceae	Europe
17.	*Dysphania ambrosioides* (L.) Mosyakin & Clemants	Chenopodiaceae	America, Subantarctic Islands
18.	*Eucalyptus grandis* W.Hill ex Maiden	Myrtaceae	E. Australia
19.	*Eucalyptus tereticornis* Sm.	Myrtaceae	New Guinea to E. & SE. Australia
20.	*Euphorbia heterophylla* L.	Euphorbiaceae	Central & S. U.S.A. to Tropical & Subtropical America

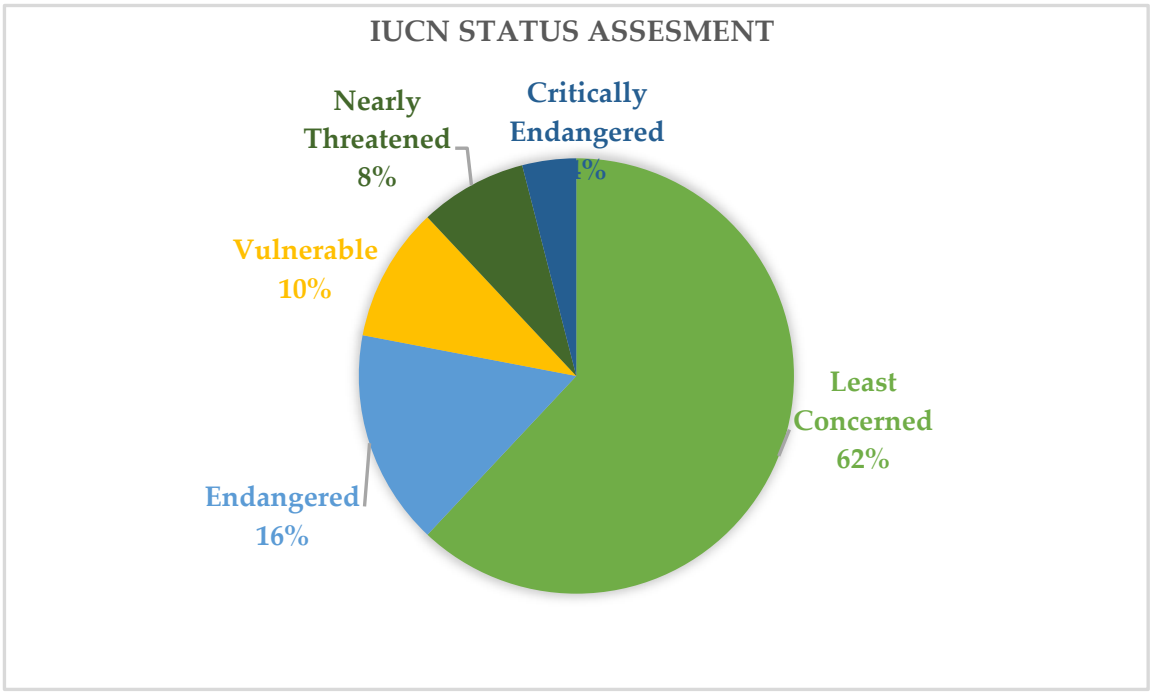
21.	*Euphorbia hirta* L.	Euphorbiaceae	Tropical & Subtropical America
22.	*Euphorbia thymifolia* L.	Euphorbiaceae	Tropical & Subtropical America
23.	*Gliricidia sepium* (Jacq.) Kunth	Fabaceae	Mexico to Colombia
24.	*Grevillea robusta* A.Cunn. ex R.Br.	Proteaceae	SE. Queensland to NE. New South Wales
25.	*Grona heterocarpos* (L.) H.Ohashi & K.Ohashi	Fabaceae	Tanzania (incl. Zanzibar), Tropical & Subtropical Asia to W. Pacific
26.	*Herissantia crispa* (L.) Brizicky	Malvaceae	Tropical & Subtropical America
27.	*Hibiscus sabdariffa* L.	Malvaceae	W. Tropical Africa to Sudan
28.	*Jatropha curcas* L.	Euphorbiaceae	Mexico to Tropical America
29.	*Kalanchoe delagoensis* Eckl. & Zeyh.	Crassulaceae	S. Central & S. Madagascar
30.	*Kalanchoe fedtschenkoi* Raym.-Hamet & H.Perrier	Crassulaceae	Central & S. Central Madagascar
31.	*Kalanchoe pinnata* (Lam.) Pers.	Crassulaceae	Madagascar
32.	*Lepidium didymum* L.	Brassicaceae	Peru to Brazil and S. South America
33.	*Ludwigia hyssopifolia* (G.Don) Exell	Onagraceae	S. Mexico to Tropical America, N. Australia
34.	*Ludwigia octovalvis* (Jacq.) P.H.Raven	Onagraceae	Tropics & Subtropics (except India)
35.	*Ludwigia peruviana* (L.) H.Hara	Onagraceae	S. Mexico to Tropical America
36.	*Miconia crenata* (Vahl) Michelang.	Melastomataceae	Mexico to Tropical America
37.	*Mimosa diplotricha* C.Wright	Fabaceae	Tropical & Subtropical America

38.	*Oenothera laciniata* Hill	Onagraceae	Central & E. U.S.A. to Guatemala
39.	*Opuntia monacanthos* (Willd.) Haw.	Cactaceae	E. & S. Brazil to Uruguay
40.	*Opuntia stricta* (Haw.) Haw.	Cactaceae	SE. U.S.A. to E. & S. Mexico
41.	*Oxalis latifolia* Kunth	Geraniaceae	Tropical & Subtropical America
42.	*Passiflora foetida* L.	Passifloraceae	Tropical & Subtropical America
43.	*Euphorbia tithymaloides* L.	Euphorbiaceae	Florida, Mexico to Tropical America
44.	*Peperomia pellucida* (L.) Kunth	Piperaceae	Tropical & Subtropical America, Tropical Africa, Madagascar
45.	*Peperomia tetraphylla* (G.Forst.) Hook. & Arn.	Piperaceae	Tropics & Subtropics (except India)
46.	*Persicaria glabra* (Willd.) M.Gómez	Polygonaceae	New World, Central African Republic to Arabian Peninsula, Tropical & Subtropical Asia
47.	*Persicaria hydropiper* (L.) Delarbre	Polygonaceae	NW. Africa, Temp. Eurasia to W. & Central Malesia, Australia
48.	*Phyllanthus amarus* Schumach. & Thonn.	Euphorbiaceae	S. Mexico to Tropical America
49.	*Phyllanthus tenellus* Roxb.	Euphorbiaceae	Tanzania to Mozambique, SW. Arabian Peninsula, W. Indian Ocean
50.	*Pilea microphylla* (L.) Liebm.	Urticaceae	Mexico to N. South America and Peru, SE.

			U.S.A. to Caribbean
51.	*Polygala paniculata* L.	Polygalaceae	Mexico to Tropical America
52.	*Senna alata* (L.) Roxb.	Fabaceae	SW. Mexico to Tropical America
53.	*Senna didymobotrya* (Fresen.) H.S.Irwin & Barneby	Fabaceae	Ethiopia to S. Tropical Africa
54.	*Senna hirsuta* (L.) H.S.Irwin & Barneby	Fabaceae	Tropical & Subtropical America
55.	*Senna occidentalis* (L.) Link.	Fabaceae	Tropical & Subtropical America
56.	*Syzygium jambos* (L.) Alston	Myrtaceae	China (S. Yunnan) and W. Malesia
57.	*Tetrapanax papyrifer* (Hook.) K.Koch	Araliaceae	Central & S. China, Taiwan
58.	*Tropaeolum majus* L.	Geraniaceae	Peru
59.	*Waltheria indica* L.	Sterculiaceae	Tropical & Subtropical America

Some of the fast-spreading aggressive exotics which negatively affect the native flora observed in the study area are *Acacia mangium, Acacia mearnsii, Alternanthera bettzickiana, Centrosema molle, Dysphania ambrosioides, Eucalyptus grandis, Eucalyptus tereticornis, Euphorbia heterophylla , Kalanchoe delagoensis*, *Lepidium didymum, Mimosa diplotricha, Persicaria glabra, Senna alata*, *Senna didymobotrya , Senna hirsuta* and *Senna occidentalis*.

In the present study, when the species were subjected to analysis for their threats based on the IUCN RED LIST OF THREATENED SPECIES



(https://www.iucnredlist.org/) out of 811 wild taxa collected from the study area, 306 were provisionally assed. It includes 49 Endangered (EN), 31 Vulnerable (VU), 24 nearly Threatened (NT), 13 Critically Endangered (CR) and 189 Least Concerned (LC).

Critically Endangered: *Dipterocarpus bourdillonii, Impatiens coelotropis, I. grandispora, I. levingei, I. mankulamensis, I. modesta, I. nidholapathra, I. pandata, I. panduranganii, I. platyadena, Ilex gardneriana, Eugenia argentea* and *Aporosa fusiformis*.

Endangered: *Clematis pettimudiensis, Goniothalamus wightii, Garcinia wightii, Dipterocarpus indicus, Impatiens aliciae, I. chinensis, I. latifolia, I. ligulata, I. omissa, I. pallidiflora, I. parasitica, I. phoenicea, I. tangachee, I. tenella, I. uncinata, I. viridiflora, I. wightiana, Dysoxylum beddomei, D. malabaricum, Anacolosa densiflora, Euonymus serratifolius, Humboldtia vahliana, Prioria pinnata, Syzygium caryophyllatum, S. parameswaranii, Memecylon flavescens, Sonerila brunonis, S. cannanorensis, S. devicolamensis, S. grandiflora, S. nemakadensis, S. ponmudiana, S. rheedei, S. rotundifolia, S. sreenarayaniana, S. tenella, S. wallichii, Rotala ritchiei, Hydrocotyle conferta, Polypleurum munnarense, Piper barberi, Actinodaphne*

salicina, Cinnamomum keralaense, C. perrottetii, C. wightii, Cryptocarya anamalayana, C. praetervisa, and *Litsea beddomei.*

Vulnerable: *Magnolia nilagirica*, *Goniothalamus rhynchantherus, Orophea erythrocarpa, Hopea ponga, Vateria indica, Pterospermum reticulatum, Elaeocarpus recurvatus, Erythroxylum obtusifolium, Impatiens elegans, I. grandis, I. herbicola, I. leptura, I. leschenaultii, I. maculata, I. verticillata, I. viscosa, Aglaia perviridis, Salacia oblonga, Cayratia pedata*, *Dalbergia latifolia*, *D. sissoides, Syzygium densiflorum, S. occidentale, Memecylon lawsonii, Aralia malabarica, Myristica malabarica, Cinnamomum sulphuratum*, *Cryptocarya wightiana, Litsea ghatica* and *Aporosa cardiosperma.*

Nearly Threatened: *Goniothalamus wynaadensis, Meiogyne pannosa, Orophea uniflora, Sageraea thwaitesii, Elaeocarpus munroi, Impatiens campanulata, I. cordata, I. cuspidata, I. goughii, I. henslowiana, I. inconspicua, I. oppositifolia, Aglaia edulis, A. simplicifolia, Nothopegia heyneana, Pterocarpus marsupium*, *Eucalyptus grandis, Actinodaphne bourdillonii, Litsea bourdillonii, L. coriacea, L. ligustrina, L. floribunda, L. stocksii* and *L. wightiana.*

Least Concerned

LC: Cocculus laurifolius, Capparis sepiaria, Bixa Orellana, Polygala arillate, Polycarpon prostratum, Portulaca oleracea, Garcinia cowa, G. morella, Hopea parviflora, Abelmoschus angulosus, Abelmoschus moschatus, Abelmoschus angulosus, A. moschatus, Bombax ceiba, Ceiba pentandra, Urena lobata, Firmiana colorata, Melochia corchorifolia, Pterospermum diversifolium, Sterculia villosa, Waltheria indica, Grewia abutilifolia, G. flavescens, G. hirsute, G. villosa, Hiptage benghalensis, Tribulus terrestris, Impatiens acaulis, I. dasysperma, I. diversifolia, I. flaccida, I. minor, I. scapiflora, I. tomentosa, Acronychia pedunculata, Atalantia monophyla, A. racemose, Clausena anisate, Glycosmis mauritiana, G. pentaphylla, Pleiospermium alatum, Zanthoxylum ovalifolium, Aglaia elaeagnoidea, A. lawii, A. tomentosa, Aphanamixis polystachya, Chukrasia tabularis, Cipadessa baccifera, Heynea trijuga, Melia azedarach, Toona ciliate, Dichapetalum gelonioides,

Erythropalum scandens, Olax imbricata, Gomphandra tetrandra, Euonymus indicus, E. laxiflorus, Lophopetalum wightianum, Pleurostylia opposite, Salacia fruticose, Ziziphus oenopolia, Leea indica, Cardiospermum halicacabum, Dodonaea viscosa, Lepisanthes tetraphylla, Sapindus emarginatus,Schleichera oleosa, Aeschynomene indica, Alysicarpus bupleurifolius, Butea monosperma, Cajanus scarabaeoides, Crotalaria albida, C. fysonii, C. micans, C. scabrella, Dumasia villosa, Gliricidia sepium, Mucuna bracteate, Phyllodium pulchellum, Sesbania javanica, Spatholobus parviflorus, Smithia blanda, Tephrosia vogelii, Tadehagi triquetrum, Biancaea decapetala, Cassia fistula, Senna alata, S. didymobotrya, S. occidentalis, Acacia mangium, Albizia amara, A. lebbeck, A. odoratissima, Archidendron clypearia, Dichrostachys cinerea, Senegalia torta, Xylia xylocarpa, Photinia integrifolia, Rubus ellipticus, Drosera burmanni, D. indica, Drosera peltate, Myriophyllum oliganthum, Terminalia bellirica, Eucalyptus tereticornis, Eugenia uniflora, Rhodomyrtus tomentosa, Syzygium jambos, Couroupita guianensis, Memecylon intermedium, Ammannia baccifera, A. multiflora, Rotala indica, R. rosea, R. rotundifolia, Ludwigia adscendens, L. hyssopifolia, L. octovalvis, L. perennis, Opuntia stricta, Glinus oppositifolius, Centella asiatica, Hydrocotyle sibthorpioides, Heptapleurum venulosum, Tetrapanax papyrifer, Alternanthera sessilis, Pupalia lappacea, Persicaria barbata, Persicaria glabra, Indotristicha ramosissima, Podostemum subulatum, Polypleurum dichotomum, Polypleurum stylosum, Polypleurum wallichii, Zeylanidium lichenoides, Zeylanidium olivaceum, Knema attenuate, Actinodaphne wightiana, Alseodaphne semecarpifolia, Beilschmiedia gemmiflora, Cinnamomum malabatrum, Litsea glabrata, Neolitsea foliosa var. scrobiculata, Phoebe lanceolata, Phoebe wightii, Grevillea robusta, Lasiosiphon glaucus, Elaeagnus conferta, Osyris lanceolata, Scleropyrum pentandrum, Acalypha fruticose, Actephila excelsa, Agrostistachys borneensis, A. indica, Antidesma acidum, A. bunius, A. montanum, Bischofia javanica, Breynia retusa, B. vitis-idaea, Bridelia retusa, B. stipularis, Cleidion javanicum, Croton tiglium, Euphorbia heterophylla, Flueggea virosa, Glochidion zeylanicum, Jatropha curcas, Macaranga indica,

Mallotus philippensis, M. resinosus, Phyllanthus reticulatus, Celtis philippensis, C. tetrandra, Trema orientale, Antiaris toxicaria, Ficus drupacea, F. exasperate, F. hispida, F. macrocarpa, F. nervosa, F. racemose, Streblus asper, Boehmeria depauperate, B. virgata var. macrostachya, Debregeasia longifolia.

New taxa described from the study area during the investigation

Impatiens nidholapathra M.Vishnu & Nampy, Taiwania 65: 187. 2020.

Impatiens nidholapathra M.Vishnu & Nampy is an integral component of evergreen forests, found on shaded rocks and is highly sensitive to external conditions. The plants might be ruined by a small lack of moisture. The leaves are drooping and the flowers are pinkish with 3-lobed lateral united petals. Tubers on the rocks are covered with mosses and are non-stoloniferous but give rise to one or two leaves and a scape.

Impatiens grandispora Nampy & M.Vishnu, Taiwania 65: 191. 2020

The plants grow abundantly but are extremely sensitive to rain. They start to flowers only after receiving ample rains. But any rain during their period of flowering causes the plants to decline, eventually destroying the entire population. This sudden appearance and vanishing caused the local people to call them "Wonder Plant". With the beginning of next rainy season, the tubers will continue to give rise to new plants.

Impatiens raktakesara M.Vishnu & Nampy, Brittonia 73: 319. 2021

Impatiens raktakesara is a lithophytic species with flowers in axillary umbels. The most striking feature of the species is its red anthers. Abundantly found in the high elevated areas like Anamudi peak and its adjoining peaks.

Polygala idukkiana M.Vishnu & Nampy, Anales del Jardín Botánico de Madrid 79 (2): e129. 2022

Polygala idukkiana is unmistakable in the field, due to its violet streaked lavender showy flowers, fimbriate-straight floral appendages (crest) and a well-developed keel pocket. The flower is white in bud stage, gradually turning lavender and finally turns white.

Callitriche idukkiana M.Vishnu & Nampy sp. nov.

It is a tiny helophytic plant which prefers to grow in the way sides of tea

plantations. The major features of this species include acute leaf apex, presence of bracts, bisexual flowers and erect fruits. All the floral parts were microscopic in nature.

Species named afterthe study area

Five species were named after the study area, which include *Callitriche idukkiana* (under publication), *Clematis pettimudiensis*, *Impatiens mankulamensis, Memecylon idukkianum, Sonerila devicolamensis*. Except *Sonerila devicolamensis*, others are reported only from the study area.

New distributional record

Lablab purpureus subsp. **uncinatus** Verdcourtia

This taxon is so far not reported from Asia and therefore it forms a new distributional record for the flora of Asia.

Callitriche wightiana Wall. in Wight & Arnott

Prostrate, decumbent terrestrial fleshy herbs grow in marshy woodlands in Anamudishola and Pambadumshola. The species is morphologically close to *C. fehmedianii* Majeed Kak & Javeid, but is a complete aquatic species. Spathulate leaf with notched apex, absence of bracts and inverted orientation of the fruits are the major distinguishing features of *C. wightiana*. A pursual of the literature (Lansdown, 2006) shows that the species is so far only collected from the Nilgiris and the adjoining areas in Tamil Nadu. So, present report of its occurrence in Idukki district forms a new distributional record for the flora of Kerala.

Summary & Conclusion



Summary

During this study specimens of 978 species were collected for scientific study. Out of 978 species recorded in the study 811 occur in the wild and belongs to 371 genera and 84 families. A total of 2153 herbarium sheets were prepared and deposited in CALI, and all the herbarium sheets were digitalized. 96 field trips were conducted and around 300 days were spent in the field. Species were arranged according to Bentham and Hooker's system of classification.

An abundance of species was observed in the region such as Eravikulam, Mankulam, Periyar Tiger Reserve, and the Chinnar area. It has been found that, out of the 84 recorded families, Fabaceae (138), Euphorbiaceae (80), Geraniaceae (60), Melastomataceae (36), Lauraceae (31), Urticaceae (25), Malvaceae (32), Moraceae (24), Myrtaceae (25) and Meliaceae

Out of 371 wild genera recorded, there are nine genera that have ten or more species in each: *Impatiens* (47), *Crotalaria* (27), *Ficus* (15), *Syzygium* (13), *Osbeckia* (12), *Sonerila* (11), *Litsea* (11), *Polygala* (10) and *Grewia* (10).

The study reports a total of 209 endemic taxa forming 26% of the total species. Among these 29 are strictly endemic to Kerala state. The highest number of endemic taxa are found in Geraniaceae (41), followed by Melastomataceae (24) and Lauraceae (19). *Impatiens* is the largest endemic genus to the study area with 41 endemics. All the five members from the family Dipterocarpaceae are endemics. Fifteen species are exclusively endemic to the Idukki district.

Out of the total taxa recorded 59 of them are exotics from which 16 are aggressive which have the potential to harm the native flora.

Out of 811 wild taxa collected from the study area, 306 were provisionally assed for the threat by IUCN. It includes 49 Endangered (EN), 31 Vulnerable (VU), 24 nearly Threatened (NT), 13 Critically Endangered (CR) and 189 Least Concerned (LC).

Impatiens nidholapathra M.Vishnu & Nampy, Taiwania 65: 187. 2020, *Impatiens grandispora* Nampy & M.Vishnu, Taiwania 65: 191. 2020, *Impatiens raktakesara* M.Vishnu & Nampy, Brittonia 73: 319. 2021, *Polygala idukkiana* M.Vishnu & Nampy, Anales del Jardín Botánico de Madrid 79 (2):

e129. 2022 and *Callitriche idukkiana* M.Vishnu & Nampy sp. nov. are the new species published during the study. *Lablab purpureus* subsp. *uncinatus* Verdcourtia forms the new distributional record to Asia, and *Callitriche wightiana* Wall. in Wight & Arnott forms the new distributional record to the Kerala state.

Conclusion

Present study reveals that 811 wild species and belongs to 371 genera and 84 families. 2153 herbarium sheets were prepared and deposited in CALI. Eravikulam, Mankulam, Periyar Tiger Reserve, and the Chinnar area are recognized as hotspots. An analysissw of endemism revealed 209 species endemic to India. According to the IUCN Red list of threatened species, there were 49 Endangered (EN), 31 Vulnerable (VU), 24 nearly Threatened (NT), 13 Critically Endangered (CR) and 189 Least Concerned (LC). 59 exotic taxa were recorded from the study area. During this period five new species were published. Two species were showing new distributional record.

Recommendations

The plant diversity of Idukki district has been seriously threatened in recent years by a number of factors, chief among them being the indiscriminate anthropogenic destruction of natural vegetation coupled with natural disasters. So, conservation of the greenery in Idukki is mandatory. It can be achieved by creating general awareness among all regarding the threats of native taxa, establish the germplasm of the threat species and prevent the spreading of weedy exotic taxa.

As a part of the study, it is evident that within a district itself the endemic genus *Impatiens* shows tremendous variations in its morphology. So, this study provides a foundation for investigating the morphologic plasticity of the entire genus *Impatiens* and it will helps to prevents the proliferation of unscientific species emergence.



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Ornamentals and cultivated plants in Idukki district

1. RANUNCULACEAE	1. Clematis recta L.
2. MAGNOLIACEAE	2. Magnolia champaca (L.) Figlar
3. ANNONACEAE	3. Annona cherimola Mill.
	4. Annona muricata L.
	5. Annona reticulata L.
	6. Annona squamosa L.
	7. Cananga odorata (Lam.) Hook.f. & Thomson
4. BRASSICACEAE	8. Brassica juncea (L.) Czern.
	9. Brassica oleracea var. botrytis L.
	10. Brassica oleracea var. capitata L.
	11. Raphanus sativus L.
5. PORTULACACEAE	12. Portulaca grandiflora Hook.
	13. Talinum portulacifolium Asch. ex Schweinf.
6. CLUSIACEAE	14. Garcinia gummi-gutta (L.) N.Robson
	15. Garcinia mangostana L.
7. THEACEAE	16. Camellia sinensis (L.) Kuntze
8. MALVACEAE	17. Abelmoschus esculentus (L.) Moench
	18. Abelmoschus rugosus Wight & Arn.
	19. Abutilon striatum G.F.Dicks. ex Lindl.
	20. Alcea rosea L.
	21. Hibiscus mutabilis L.
	22. Hibiscus radiatus Cav.
	23. Hibiscus rosa-sinensis L.
	24. Malvaviscus penduliflorus Sessé & Moc. ex DC.
9. STERCULIACEAE	25. Abroma augustum (L.) L.f.
	26. Dombeya burgessiae Gerrard ex Harv.
	27. Helicteres isora L.
	28. Theobroma cacao L.
10. TILIACEAE	29. Berrya cordifolia Burret
11. MALPIGHIACEAE	30. Galphimia gracilis Bartl.
	31. Malpighia coccigera L.
	32. Malpighia glabra L.
	33. Tristellateia australis A.Rich.
12. ZYGOPHYLLACEAE	34. Guaiacum officinale L.
13. GERANIACEAE	35. Impatiens balsamina L.
	36. Impatiens walleriana Hook.f.
	37. Averrhoa bilimbi L.
	38. Averrhoa carambola L.
	39. Oxalis triangularis A.St.-Hil.
14. RUTACEAE	40. Aegle marmelos (L.) Corrêa
	41. Citrus medica f. aurantifolia (Christm.) M.Hiroe
	42. Citrus limetta Risso
	43. Citrus limon (L.) Osbeck
	44. Citrus maxima (Burm.) Merr.

	45. Citrus medica f. aurantifolia (Christm.) M.Hiroe
	46. Citrus pennivesiculata (Lushington) Tanaka
	47. Citrus reticulata Blanco
	48. Melicope denhamii (Seem.) T.G.Hartley
	49. Murraya koenigii (L.) Spreng.
	50. Murraya paniculata (L.) Jack
	51. Ravenia spectabilis (Lindl.) Engl.
15. SIMAROUBACEAE	52. Quassia amara L.
	53. Simarouba glauca DC.
16. MELIACEAE	54. Azadirachta indica A.Juss.
17. VITACEAE	55. Vitis vinifera L.
18. SAPINDACEAE	56. Nephelium lappaceum L.
19. ANACARDIACEAE	57. Anacardium occidentale L.
	58. Mangifera indica L.
	59. Spondias pinnata (L.f.) Kurz
20. FABACEAE	60. Arachis glabrata Benth.
	61. Arachis hypogaea L.
	62. Cajanus cajan (L.) Huth
	63. Clitoria ternatea var. pleniflora Fantz
	64. Clitoria ternatea var. ternatea L.
	65. Cyamopsis tetragonoloba Taub.
	66. Phaseolus vulgaris L.
	67. Pisum sativum L.
	68. Psophocarpus tetragonolobus DC.
	69. Sesbania grandiflora (L.) Poir.
	70. Vigna mungo (L.) Hepper
	71. Vigna unguiculata (L.) Walp.
	72. Calliandra calothyrsus Meisn.
	73. Calliandra emarginata (Humb. & Bonpl. ex Willd.) Benth.
	74. Calliandra haematocephala Hassk.
	75. Bauhinia acuminata L.
	76. Bauhinia purpurea DC. ex Walp.
	77. Bauhinia tomentosa L.
	78. Bauhinia variegata L.
	79. Caesalpinia pulcherrima (L.) Sw.
	80. Cassia javanica var. indochinensis Gagnep.
	81. Delonix regia (Bojer) Raf.
	82. Saraca asoca (Roxb.) W.J.de Wilde
	83. Senna polyphylla (Jacq.) H.S.Irwin & Barneby
	84. Tamarindus indica L.
21. ROSACEAE	85. Fragaria ananassa (Weston) Duchesne ex Rozier
	86. Malus sylvestris (L.) Mill.
	87. Prunus cerasoides D.Don
	88. Pyrus communis L.
	89. Rosa multiflora Thunb.

22. CRASSULACEAE	90. Kalanchoe blossfeldiana Poelln.
23. COMBRETACEAE	91. Terminalia catappa L.
24. MYRTACEAE	92. Callistemon citrinus Skeels
	93. Melaleuca leucadendra (L.) L.
	94. Syzygium aqueum (Burm.f.) Alston
	95. Syzygium aromaticum (L.) Merr. & L.M.Perry
	96. Syzygium cumini (L.) Skeels
	97. Syzygium malaccense (L.) Merr. & L.M.Perry
	98. Psidium guajava L.
25. MELASTOMATACEAE	99. Heterotis rotundifolia (Sm.) Jacq.-Fél.
	100. Tibouchina urvilleana Cogn.
26. LYTHRACEAE	101. Cuphea hyssopifolia Kunth
	102. Cuphea llavea Lex.
	103. Cuphea melvilla Lindl.
	104. Lagerstroemia indica L.
	105. Lagerstroemia speciosa (L.) Pers.
	106. Woodfordia fruticosa Kurz
27. ONAGRACEAE	107. Fuchsia boliviana Carrière
	108. Fuchsia regia (Vand. ex Vell.) Munz
	109. Ludwigia sedioides (Humb. & Bonpl.) H.Hara
28. PASSIFLORACEAE	110. Passiflora coccinea Blanco
	111. Passiflora edulis Sims
	112. Passiflora quadrangularis L.
	113. Passiflora vitifolia Kunth
29. CUCURBITACEAE	114. Benincasa hispida (Thunb.) Cogn.
	115. Citrullus lanatus (Thunb.) Matsum. & Nakai
	116. Coccinia grandis (L.) Voigt
	117. Cucumis melo L.
	118. Cucumis sativus L.
	119. Cucurbita maxima Duchesne
	120. Cucurbita pepo L.
	121. Lagenaria siceraria (Molina) Standl.
	122. Luffa acutangula (L.) Roxb.
	123. Momordica charantia L.
	124. Trichosanthes anguina L.
30. APIACEAE	125. Coriandrum sativum L.
	126. Daucus carota L.
	127. Eryngium foetidum L.
	128. Foeniculum vulgare Mill.
31. NYCTAGINACEAE	129. Bougainvillea glabra Choisy
	130. Bougainvillea spectabilis Willd.
	131. Mirabilis jalapa L.
	132. Pisonia grandis R.Br.
32. AMARANTHACEAE	133. Amaranthus hybridus L.
	134. Amaranthus tricolor L.

	135. Celosia argentea L.
	136. Celosia argentea var. plumosa (Barr & Sugden) Bakh.f
	137. Gomphrena globosa L.
	138. Iresine herbstii Hook.
33. PIPERACEAE	139. Piper betle L.
	140. Piper chaba Blume
	141. Piper nigrum L.
34. MYRISTICACEAE	142. Myristica fragrans Houtt.
35. SANTALACEAE	143. Santalum album L.
36. EUPHORBIACEAE	144. Acalypha amentacea Roxb.
	145. Acalypha hispida Burm.f.
	146. Baccaurea courtallensis (Wight) Müll.Arg.
	147. Codiaeum variegatum (L.) A.Juss.
	148. Euphorbia cotinifolia L.
	149. Euphorbia lactea Haw.
	150. Euphorbia milii Des Moul.
	151. Excoecaria cochinchinensis Lour.
	152. Hevea brasiliensis (Willd. ex A.Juss.) Müll.Arg.
	153. Jatropha integerrima Jacq.
	154. Jatropha multifida L.
	155. Euphorbia pulcherrima Willd. ex Klotzsch
	156. Jatropha podagrica Hook.
	157. Manihot esculenta Crantz
	158. Phyllanthus acidus (L.) Skeels
	159. Phyllanthus emblica L.
	160. Phyllanthus myrtifolius (Wight) Müll.Arg.
	161. Ricinus communis L.
	162. Sauropus androgynus (L.) Merr.
37. MORACEAE	163. Artocarpus heterophyllus Lam.
	164. Artocarpus incisus (Thunb.) L.f.
	165. Ficus auriculata Lour.
	166. Ficus benjamina L.
	167. Morus alba L.

SL. NO	FAMILY	SPECIES	HERB	SHRUBS	TREES	CLIMBER	ERRESTRIAL	AQUATIC	HALOPHYTTIC	EPIPHYTTIC	PARASITIC	LITHOPHYTTE	SAPROPHYTTE	ENDEMISM	CONSERVATI ON STATUS
1	RANUNCULACEAE	*1. Clematis gouriana*				✓	✓								
		2. Clematis munroiana				✓	✓							KA, KL, TN	
		3. Clematis pettimudiensis				✓	✓							Kerala (IDK)	EN
		4. Clematis zeylanica				✓	✓								
		5. Eriocapitella rivularis	✓				✓								
		6. Ranunculus reniformis	✓				✓								
		7. Ranunculus wallichianus	✓				✓								
		8. Thalictrum javanicum	✓				✓								
2	DILLENIACEAE	*9. Dillenia pentagyna*			✓		✓								
3	MAGNOLIACEAE	*10. Magnolia nilagirica*			✓		✓								VU
4	ANNONACEAE	11. *Artabotrys zeylanicus*				✓	✓								
		12. Cyathocalyx zeylanicus			✓		✓								
		13. Desmos chinensis		✓			✓								
		14. Desmos ramarowii			✓		✓								
		15. Goniothalamus rhynchantherus			✓		✓							KL, TN	VU
		16. Goniothalamus wightii			✓		✓							KL, TN	EN
		17. Goniothalamus wynaadensis		✓			✓							KL	NT
		18. Meiogyne pannosa			✓		✓							KL, KA, TN, MAH	NT
		19. Miliusa indica			✓		✓								
		20. Miliusa tomentosa			✓		✓								
		21. Monoon coffeoides			✓		✓								
		22. Monoon fragrans			✓		✓							GO, KL, KA, TN	
		23. Orophea erythrocarpa			✓		✓							KL	VU
		24. Orophea uniflora			✓		✓							KA,KL,TN	NT
		25. Sageraea thwaitesii			✓		✓								NT
		26. Uvaria concava				✓	✓								
		27. Uvaria narum				✓	✓								
5	MENISPERMACEAE	*28. Anamirta cocculus*				✓	✓								
		29. Cissampelos pareira				✓	✓								
		30. Cocculus hirsutus				✓	✓								
		31. Cocculus laurifolius			✓		✓								LC
		32. Cyclea fissicalyx				✓	✓							KL	
		33. Cyclea peltata				✓	✓								

		34. Diploclisia glaucescens				✓	✓								
		35. Pachygone ovata				✓	✓								
		36. Stephania japonica var. discolor				✓	✓								
		37. Stephania wightii				✓	✓							KL, TN	
		38. Tinospora cordifolia				✓	✓								
		39. Tinospora sinensis				✓	✓								
6	BERBERIDACEAE	*40. Berberis tinctoria*		✓			✓							KL, TN	
		41. Berberis napaulensis		✓			✓								
7	BRASSICACEAE	*42. Capsella bursa-pastoris*	✓				✓								
		43. Cardamine africana	✓				✓								
		44. Cardamine hirsuta	✓				✓								
		45. Lepidium didymum	✓				✓								
		46. Rorippa indica	✓				✓								
8	CAPPARACEAE	*47. Cadaba fruticosa*		✓			✓								
		48. Capparis brevispina		✓			✓								
		49. Capparis cleghornii		✓			✓							KL, KA	
		50. Capparis diversifolia		✓			✓							KL, TN	
		51. Capparis fusifera		✓			✓							KL, TN	
		52. Capparis moonii		✓			✓								
		53. Capparis sepiaria		✓			✓								LC
		54. Capparis shevaroyensis		✓			✓							TN, KL	
		55. Capparis zeylanica		✓			✓								
		56. Cleome aspera	✓				✓								
		57. Cleome monophylla	✓				✓								
		58. Cleome rutidosperma var. burmanni	✓				✓								
		59. Cleome viscosa	✓				✓								
		60. Crateva magna			✓		✓								
9	VIOLACEAE	*61. Pigea enneasperma*	✓				✓								
		62. Viola pilosa	✓				✓								
		63. Viola hamiltoniana	✓				✓								
		64. Viola patrinii	✓				✓								
10	BIXACEAE	*65. Bixa orellana*		✓			✓								LC
11	PITTOSPORACEAE	*66. Pittosporum napaulense*			✓		✓								
		67. Pittosporum neelgherrense			✓		✓							KA, KL, TN	
		68. Pittosporum tetraspermum			✓		✓								
12	POLYGALACEAE	*69. Polygala arillata*			✓		✓								LC
		70. Polygala bolbothrix	✓				✓							AP, KA, KL, TN	
		71. Polygala chinensis	✓				✓								
		72. Polygala elongata	✓				✓								
		73. Polygala jacobii	✓				✓								

		74. Polygala idukkiana		✓			✓							KL (IDK)	DD
		75. Polygala persicariifolia	✓				✓								
		76. Polygala rosmarinifolia	✓				✓								
		77. Polygala sibirica	✓				✓								
		78. Polygala paniculata	✓				✓								
		79. Xanthophyllum flavescens			✓		✓							KA, KL, TN	
13	CARYOPHYLLACEAE	*80. Cerastium glomeratum*	✓				✓								
		81. Drymaria diandra	✓				✓								
		82. Polycarpaea corymbosa	✓				✓								
		83. Polycarpon prostratum	✓				✓								LC
		84. Polycarpon tetraphyllum	✓				✓								
		85. Spergula arvensis	✓				✓								
		86. Stellaria media	✓				✓								
		87. Stellaria vestita	✓				✓								
14	PORTULACACEAE	*88. Portulaca oleracea*	✓				✓								LC
		89. Portulaca quadrifida	✓				✓								
15	HYPERICACEAE	*90. Hypericum japonicum*	✓				✓								
		91. Hypericum mysurense		✓			✓								
		92. Hypericum wightianum	✓				✓								
16	CLUSIACEAE	*93. Calophyllum austroindicum*			✓		✓								
		94. Calophyllum calaba			✓		✓								
		95. Calophyllum polyanthum			✓		✓								
		96. Garcinia cowa			✓		✓								LC
		97. Garcinia morella			✓		✓								LC
		98. Garcinia pushpangadaniana			✓		✓							KL (IDK)	
		99. Garcinia spicata			✓		✓								
		100. Garcinia wightii			✓		✓							KL, TN	EN
		101. Mesua thwaitesii			✓		✓								
		102. Poeciloneuron indicum			✓		✓							KL, KA, TN	
17	THEACEAE	*103. Eurya japonica*		✓			✓								
		104. Eurya nitida		✓			✓								
		105. Polyspora obtusa			✓		✓							MAH, KA, KL, TN	
		106. Ternstroemia gymnanthera			✓		✓								
18	DIPTEROCARPACEAE	*107. Dipterocarpus bourdillonii*			✓		✓							KA, KL	CR
		108. Dipterocarpus indicus			✓		✓							KA, KL, TN	EN
		109. Hopea parviflora			✓		✓							KA, KL, TN	LC
		110. Hopea ponga			✓		✓							GO, KA, KL, TN	VU
		111. Vateria indica			✓		✓							KA, KL, TN	VU
19	MALVACEAE	*112. Abelmoschus angulosus*		✓			✓								LC
		113. Abelmoschus moschatus	✓				✓								LC

		114.	*Abutilon indicum*		✓			✓									
		115.	*Abutilon persicum*		✓			✓									
		116.	*Azanza lampas*		✓			✓									
		117.	*Bombax ceiba*			✓		✓									LC
		118.	*Bombax insigne*			✓		✓									
		119.	*Ceiba pentandra*			✓		✓									LC
		120.	*Cullenia exarillata*			✓		✓								KL, KA, TN	
		121.	*Herissantia crispa*	✓				✓									
		122.	*Hibiscus hispidissimus*				✓	✓									
		123.	*Hibiscus lobatus*	✓				✓									
		124.	*Hibiscus lunariifolius*		✓			✓									
		125.	*Hibiscus micranthus*		✓			✓									
		126.	*Hibiscus sabdariffa*		✓			✓									
		127.	*Pavonia burchellii*	✓				✓									
		128.	*Pavonia zeylanica*		✓			✓									
		129.	*Sida acuta*		✓			✓									
		130.	*Sida cordata*	✓				✓									
		131.	*Sida cordifolia*		✓			✓									
		132.	*Sida mysorensis*		✓			✓									
		133.	*Sida rhombifolia*		✓			✓									
		134.	*Sida scabrida*		✓			✓									
		135.	*Urena lobata*		✓			✓									LC
20	STERCULIACEAE	*136.*	*Eriolaena quinqueolocularis*			✓		✓									
		137.	*Firmiana colorata*			✓		✓									LC
		138.	*Helicteres isora*		✓			✓									
		139.	*Heritiera papilio*			✓		✓									
		140.	*Leptonychia caudata*			✓		✓									
		141.	*Melhania incana*	✓				✓									
		142.	*Melochia corchorifolia*		✓			✓									LC
		143.	*Pterospermum diversifolium*			✓		✓									LC
		144.	*Pterospermum reticulatum*			✓		✓									VU
		145.	*Pterospermum rubiginosum*			✓		✓									
		146.	*Sterculia foetida*			✓		✓									
		147.	*Sterculia guttata*			✓		✓									
		148.	*Sterculia urens*			✓		✓									
		149.	*Sterculia villosa*			✓		✓									LC
		150.	*Waltheria indica*		✓			✓									LC
21	TILIACEAE	*151.*	*Corchorus aestuans*	✓				✓									
		152.	*Grewia abutilifolia*		✓			✓									LC
		153.	*Grewia bracteata*		✓			✓									

		154.	*Grewia flavescens*			✓		✓										LC
		155.	*Grewia hirsuta*			✓		✓										LC
		156.	*Grewia lanceifolia*			✓		✓										DD
		157.	*Grewia oppositifolia*			✓		✓										
		158.	*Grewia serrulata*			✓		✓										
		159.	*Grewia tiliifolia*			✓		✓										
		160.	*Grewia umbellifera*		✓			✓									MAH, KA, KL, TN	
		161.	*Grewia villosa*		✓			✓										LC
		162.	*Triumfetta annua*	✓				✓										
		163.	*Triumfetta pilosa*		✓			✓										
		164.	*Triumfetta rhomboidea*	✓				✓										
22	ELAEOCARPACEAE	*165.*	*Elaeocarpus munroi*			✓		✓									MAH, KL, KA, TN	NT
		166.	*Elaeocarpus recurvatus*			✓		✓									KL, TN	VU
		167.	*Elaeocarpus serratus*			✓		✓										
		168.	*Elaeocarpus tuberculatus*			✓		✓										
		169.	*Elaeocarpus glandulosus*			✓		✓										
		170.	*Muntingia calabura*			✓		✓										
23	LINACEAE	*171.*	*Linum mysorense*	✓				✓										
		172.	*Erythroxylum monogynum*		✓			✓										
		173.	*Erythroxylum obtusifolium*		✓			✓										VU
24	MALPIGHIACEAE	*174.*	*Aspidopterys canarensis*				✓	✓									GO, MAH, KA, KL, TN	
		175.	*Hiptage benghalensis*				✓	✓										LC
25	ZYGOPHYLLACEAE	*176.*	*Tribulus terrestris*	✓				✓										LC
26	GERANIACEAE	*177.*	*Biophytum intermedium*	✓				✓										
		178.	*Biophytum reinwardtii*	✓				✓										
		179.	*Biophytum sensitivum*	✓				✓										
		180.	*Biophytum veldkampii*	✓				✓									KL	
		181.	*Geranium nepalense*	✓				✓										
		182.	*Impatiens acaulis*	✓									✓					LC
		183.	*Impatiens aliciae*	✓				✓									KL, KA	EN
		184.	*Impatiens campanulata*	✓				✓									KL, TN	NT
		185.	*Impatiens chinensis*	✓				✓									KL, KA	EN
		186.	*Impatiens coelotropis*		✓			✓									KL	CR
		187.	*Impatiens cordata*	✓				✓									KL, TN	NT
		188.	*Impatiens cuspidata*		✓			✓									KA,KL, TN	NT
		189.	*Impatiens dasysperma*	✓				✓									KL, KA, TN	LC
		190.	*Impatiens diversifolia*	✓				✓									KA,KL, TN	LC
		191.	*Impatiens elegans*	✓				✓									KL, TN	VU
		192.	*Impatiens flaccida*	✓				✓										LC
		193.	*Impatiens goughii*	✓									✓				KA,KL, TN	NT

		194.	*Impatiens grandis*		✓			✓									VU
		195.	*Impatiens grandispora*	✓									✓			KL (IDK)	CR
		196.	*Impatiens henslowiana*		✓			✓									NT
		197.	*Impatiens herbicola*	✓				✓								KL, TN	VU
		198.	*Impatiens inconspicua*	✓				✓								GO, KA,KL, MH	NT
		199.	*Impatiens latifolia*	✓				✓									EN
		200.	*Impatiens leptura*	✓				✓								KA, KL, MAH, TN	VU
		201.	*Impatiens leschenaultii*		✓			✓								KL, MAH, TN	VU
		202.	*Impatiens levingei*	✓				✓								KL, TN	CR
		203.	*Impatiens ligulata*	✓				✓								KL, TN	EN
		204.	*Impatiens maculata*	✓				✓								KL, TN	VU
		205.	*Impatiens mankulamensis*	✓									✓			KL (IDK)	CR
		206.	*Impatiens minor*	✓				✓								KL, KA, TN	LC
		207.	*Impatiens modesta*	✓									✓			KL, TN	CR
		208.	*Impatiens nidholapathra*	✓									✓			KL (IDK)	CR
		209.	*Impatiens omissa*	✓				✓									EN
		210.	*Impatiens oppositifolia*	✓				✓									NT
		211.	*Impatiens pallidiflora*	✓				✓								KL (IDK)	EN
		212.	*Impatiens pandata*	✓				✓								KL (IDK)	CR
		213.	*Impatiens pandurangani*	✓									✓			KL (IDK)	CR
		214.	*Impatiens parasitica*	✓							✓					KL, TN	EN
		215.	*Impatiens phoenicea*	✓				✓								KL, TN	EN
		216.	*Impatiens platyadena*		✓			✓								KL, TN	CR
		217.	*Impatiens raktakesara*	✓									✓			KL (IDK)	EN
		218.	*Impatiens rupicola var. nataliae*	✓				✓								MAH, KA, KL	EX
		219.	*Impatiens scapiflora*	✓									✓			KL, KA, TN	LC
		220.	*Impatiens tangachee*		✓			✓								KL, TN	EN
		221.	*Impatiens tenella*	✓				✓								KL, KA, MAH, TN	EN
		222.	*Impatiens tomentosa*	✓				✓								KA, KL, TN	LC
		223.	*Impatiens trichocarpa*	✓				✓								KA, KL, TN	DD
		224.	*Impatiens uncinata*	✓				✓								KL, TN	EN
		225.	*Impatiens verticillata*		✓			✓								(KL, TN)	VU
		226.	*Impatiens viridiflora*	✓				✓								TN	EN
		227.	*Impatiens viscosa*	✓									✓			KL, TN	VU
		228.	*Impatiens wightiana*	✓	✓			✓								KL (IDK)	EN
		229.	*Oxalis corniculata*	✓				✓									
		230.	*Oxalis latifolia.*	✓				✓									
		231.	*Tropaeolum majus*	✓				✓									
27	RUTACEAE	*232.*	*Acronychia pedunculata*			✓		✓									LC
		233.	*Atalantia monophylla*			✓		✓									LC

		234.	*Atalantia racemosa*			✓		✓								LC
		235.	*Atalantia wightii*		✓			✓							MAH, KA, KL, TN	
		236.	*Clausena anisata*		✓			✓								LC
		237.	*Clausena austroindica*		✓			✓							AP, KA, KL, TN	
		238.	*Clausena indica*		✓			✓								
		239.	*Glycosmis angustifolia*		✓			✓								
		240.	*Glycosmis macrocarpa*		✓			✓							KL, TN	
		241.	*Glycosmis mauritiana*		✓			✓								LC
		242.	*Glycosmis pentaphylla*		✓			✓								LC
		243.	*Pleiospermium alatum*			✓		✓								LC
		244.	*Ruta chalepensis*	✓				✓								
		245.	*Vepris bilocularis*			✓		✓							KA, KL. TN	
		246.	*Zanthoxylum asiaticum*		✓			✓								
		247.	*Zanthoxylum ovalifolium*		✓			✓								LC
		248.	*Zanthoxylum tetraspermum*				✓	✓								
28	SIMAROUBACEAE	*249.*	*Ailanthus triphysa*					✓								
29	OCHNACEAE	*250.*	*Ochna obtusata*			✓		✓								
30	BURSERACEAE	*251.*	*Canarium strictum*					✓								
31	MELIACEAE	*252.*	*Aglaia edulis*			✓		✓								NT
		253.	*Aglaia elaeagnoidea*			✓		✓								LC
		254.	*Aglaia lawii*			✓		✓								LC
		255.	*Aglaia perviridis*			✓		✓								VU
		256.	*Aglaia simplicifolia*			✓		✓								NT
		257.	*Aglaia tomentosa*			✓		✓								LC
		258.	*Aphanamixis polystachya*			✓		✓								LC
		259.	*Chukrasia tabularis*			✓		✓								LC
		260.	*Cipadessa baccifera*		✓			✓								LC
		261.	*Dysoxylum beddomei*			✓		✓							KL	EN
		262.	*Dysoxylum gotadhora*			✓		✓								
		263.	*Dysoxylum malabaricum*			✓		✓							KL, KA, TN	EN
		264.	*Heynea trijuga*			✓		✓								LC
		265.	*Melia azedarach*			✓		✓								LC
		266.	*Munronia pinnata*		✓			✓								
		267.	*Naregamia alata*	✓				✓							AP, MAH, GO, KA, KL, TN	
		268.	*Toona ciliata*			✓		✓								LC
		269.	*Walsura trifoliolata*			✓		✓								
32	DICHAPETALACEAE	*270.*	*Dichapetalum gelonioides*			✓		✓								LC
33	OLACACEAE	*271.*	*Anacolosa densiflora*			✓		✓							KL, TN	EN
		272.	*Erythropalum scandens*				✓	✓								LC
		273.	*Olax imbricata*			✓		✓								LC

		274.	*Strombosia ceylanica*			✓		✓									
34	OPILIACEAE	275.	*Cansjera rheedei*				✓	✓									
35	ICACINACEAE	276.	*Gomphandra tetrandra*			✓		✓									LC
		277.	*Mappia nimmoniana*			✓		✓									
		278.	*Miquelia dentata*				✓	✓								KA, KL, TN	
36	AQUIFOLIACEAE	279.	*Ilex denticulata*			✓		✓									
		280.	*Ilex gardneriana*			✓		✓								TN	CR
		281.	*Ilex malabarica*			✓		✓								MAH, KA, TN	
		282.	*Ilex walkeri*			✓		✓									
37	CELASTRACEAE	*283.*	*Celastrus paniculatus*				✓	✓								KL-(Malabar), TN	
		284.	*Elaeodendron paniculatum*			✓		✓									
		285.	*Euonymus crenulatus*		✓			✓								KL, KA, TN	
		286.	*Euonymus dichotomus*			✓		✓									
		287.	*Euonymus indicus*		✓			✓									LC
		288.	*Euonymus laxiflorus*		✓			✓									LC
		289.	*Euonymus serratifolius*		✓			✓								KL, TN	EN
		290.	*Lophopetalum wightianum*			✓		✓									LC
		291.	*Microtropis microcarpa var. densiflora*		✓			✓								TN	
		292.	*Microtropis ramiflora*			✓		✓									
		293.	*Microtropis stocksii*			✓		✓								MH, KA, KL, TN	
		294.	*Microtropis wallichiana*			✓		✓									
		295.	*Pleurostylia opposita*			✓		✓									LC
		296.	*Parnassia mysorensis*	✓				✓									
		298.	*Salacia fruticosa*				✓	✓								KL, KA, TN	LC
		299.	*Salacia malabarica*				✓	✓									
		300.	*Salacia oblonga*				✓	✓									VU
38	HIPPOCRATEACEAE	*301.*	*Pristimera arnottiana*				✓	✓									
39	RHAMNACEAE	*302.*	*Gouania microcarpa*				✓	✓									
		303.	*Sageretia hamosa*				✓	✓									
		304.	*Smythea bombaiensis*				✓	✓									
		305.	*Ziziphus glabrata*			✓		✓									
		306.	*Ziziphus horrida*		✓			✓								MAH	
		307.	*Ziziphus oenopolia*		✓			✓									LC
		308.	*Ziziphus rugosa*				✓	✓									
40	VITACEAE	*309.*	*Ampelocissus tomentosa*				✓	✓									
		310.	*Cayratia pedata*				✓	✓									VU
		311.	*Cissus arnottiana*		✓			✓									
		312.	*Cissus heyneana*				✓	✓									
		313.	*Cissus discolor*				✓	✓									
		314.	*Cissus latifolia*				✓	✓									

		315.	*Cissus quadrangularis*		✓			✓									
		316.	*Leea asiatica*		✓			✓									
		317.	*Leea guineensis*		✓			✓									
		318.	*Leea indica*					✓									LC
		319.	*Parthenocissus semicordata*				✓	✓									
		320.	*Tetrastigma leucostaphylum*		✓			✓									
		321.	*Tetrastigma nilagiricum*		✓			✓									
		322.	*Tetrastigma sulcatum*				✓	✓								AP, GO, KA, KL, TN	
41	STAPHYLEACEAE	*323.*	*Staphylea cochinchinensis*			✓		✓									
		324.	*Turpinia malabarica*			✓		✓									
42	SAPINDACEAE	*325.*	*Allophylus cobbe*		✓			✓									
		326.	*Allophylus concanicus*		✓			✓								KA, KL	
		327.	*Allophylus serratus*		✓			✓									
		328.	*Cardiospermum corindum*				✓	✓									
		329.	*Cardiospermum halicacabum*				✓	✓									LC
		330.	*Dimocarpus longan*			✓		✓									DD
		331.	*Dodonaea viscosa*		✓			✓									LC
		332.	*Harpullia arborea*			✓		✓									
		333.	*Lepisanthes tetraphylla*					✓									LC
		334.	*Otonephelium stipulaceum*			✓		✓								KL,TN,KA	
		335.	*Sapindus emarginatus*			✓		✓									LC
		336.	*Schleichera oleosa*			✓		✓									LC
43	SABIACEAE	337.	*Meliosma simplicifolia*			✓		✓									
44	ANACARDIACEAE	*338.*	*Buchanania lanzan*			✓		✓									
		339.	*Holigarna ferruginea*			✓		✓								GO, KA, KL, TN	
		340.	*Holigarna grahamii*			✓		✓								GO, MAH, KA, KL, TN	
		341.	*Nothopegia beddomei*			✓		✓								KL, KA	
		342.	*Nothopegia heyneana*		✓			✓								AP, KL, TN	NT
		343.	*Semecarpus auriculatus*			✓		✓								KL, TN, KA	
		344.	*Semecarpus travancoricus*			✓		✓								KL, TN	
		345.	*Solenocarpus indicus*			✓		✓								KL, KA, TN	
		346.	*Spondias pinnata*			✓		✓									
45	CONNARACEAE	347.	*Connarus sclerocarpus*				✓	✓									
46	FABACEAE	*348.*	*Abrus melanospermus*				✓	✓									
		349.	*Aeschynomene indica*	✓				✓									LC
		350.	*Aganope thyrsiflora*				✓	✓									
		351.	*Alysicarpus bupleurifolius*	✓				✓									LC
		352.	*Alysicarpus heterophyllus*	✓				✓									
		353.	*Butea monosperma*			✓		✓									LC
		354.	*Cajanus lineatus*		✓			✓									

		355.	*Cajanus rugosus*		✓			✓									
		356.	*Cajanus scarabaeoides*				✓	✓									LC
		357.	*Centrosema molle*				✓	✓									
		358.	*Crotalaria albida*	✓				✓									LC
		359.	*Crotalaria beddomeana*		✓			✓								KL, TN	
		360.	*Crotalaria calycina*	✓				✓									
		361.	*Crotalaria candicans*		✓			✓								AP, TN	
		362.	*Crotalaria evolvuloides*	✓				✓									
		363.	*Crotalaria fysonii*	✓				✓								KL, TN	LC
		364.	*Crotalaria grahamiana*		✓			✓								KL, TN	
		365.	*Crotalaria heyneana*		✓			✓								KA, KL, TN	
		366.	*Crotalaria humifusa*	✓				✓									
		367.	*Crotalaria juncea*	✓				✓									
		368.	*Crotalaria multiflora Benth. var. kurisumalayana*	✓				✓								KL	
		369.	*Crotalaria medicaginea*		✓			✓									
		370.	*Crotalaria micans*		✓			✓									LC
		371.	*Crotalaria mysorensis*	✓				✓									
		372.	*Crotalaria nana*	✓				✓									
		373.	*Crotalaria obtecta Graham ex Wight & Arn. var.*		✓			✓								KA, KL, TN	
		374.	*Crotalaria pallida*		✓			✓									
		375.	*Crotalaria peduncularis*		✓			✓								TN	
		376.	*Crotalaria retusa*	✓				✓									
		377.	*Crotalaria salicifolia*		✓			✓								KA, KL, TN	
		378.	*Crotalaria scabrella*	✓				✓									LC
		379.	*Crotalaria semperflorens*		✓			✓									
		380.	*Crotalaria spectabilis*	✓				✓									
		381.	*Crotalaria triquetra*	✓				✓									
		382.	*Crotalaria verrucosa*	✓				✓									
		383.	*Crotalaria walkeri*		✓			✓									
		384.	*Crotalaria wightiana*		✓			✓									
		385.	*Cytisus scoparius*		✓			✓									
		386.	*Dalbergia latifolia*			✓		✓									VU
		387.	*Dalbergia sissoides*			✓		✓									VU
		388.	*Dalbergia ovalis*		✓			✓									
		389.	*Derris brevipes*				✓	✓								KL, KA, MAH, TN	
		390.	*Desmodium heterocarpon*		✓			✓									
		391.	*Desmodium heterophyllum*	✓				✓									
		392.	*Desmodiastrum parviflorum*	✓				✓									
		393.	*Dolichos trilobus*				✓	✓									
		394.	*Dumasia villosa*				✓	✓									LC

		395.	*Erythrina stricta*			✓		✓									
		396.	*Flemingia macrophylla*		✓			✓									
		397.	*Flemingia strobilifera*		✓			✓									
		398.	*Grona styracifolia*	✓				✓									
		399.	*Gliricidia sepium*			✓		✓									LC
		400.	*Indigofera articulata*		✓			✓									
		401.	*Indigofera cassioides*		✓			✓									
		402.	*Indigofera colutea*	✓				✓									
		403.	*Indigofera hendecaphylla var. siamensis*		✓			✓									
		404.	*Indigofera hirsuta*	✓				✓									
		405.	*Indigofera pedicellata*	✓				✓									
		406.	*Indigofera psoraloides*	✓				✓									
		407.	*Indigofera tsiangiana*	✓				✓									
		408.	*Indigofera wightii*		✓			✓									
		409.	*Lablab purpureus* subsp.*uncinatus*				✓	✓									
		410.	*Leptodesmia microphylla*	✓				✓									
		411.	*Mucuna bracteata*				✓	✓									LC
		412.	*Phyllodium pulchellum*		✓			✓									LC
		413.	*Pleurolobus pryonii*		✓			✓									
		414.	*Pseudarthria viscida*	✓				✓									
		415.	*Pterocarpus marsupium*			✓		✓									NT
		416.	*Neustanthus phaseoloides*				✓	✓									
		417.	*Pueraria tuberosa*				✓	✓									
		418.	*Rhynchosia hirta*				✓	✓									
		419.	*Rhynchosia rufescens*	✓				✓									
		420.	*Rothia indica*	✓				✓									
		421.	*Sesbania javanica*		✓			✓									LC
		422.	*Shuteria involucrata*				✓	✓									
		423.	*Spatholobus parviflorus*				✓	✓									LC
		424.	*Sohmaea laxiflora*		✓			✓									
		425.	*Sohmaea zonata*	✓				✓									
		426.	*Smithia blanda*		✓			✓									LC
		427.	*Smithia conferta*	✓				✓									
		428.	*Smithia venkobarowii*		✓			✓								KL	
		429.	*Tephrosia maxima*		✓			✓									
		430.	*Tephrosia senticosa*		✓			✓									
		431.	*Tephrosia purpurea*	✓				✓									
		432.	*Tephrosia vogelii*		✓			✓									LC
		433.	*Tadehagi triquetrum*		✓			✓									LC
		434.	*Teramnus labialis*				✓	✓									

		435.	*Uraria rufescens*		✓			✓									
		436.	*Vigna vexillata*	✓				✓									
		437.	*Zornia diphylla*	✓				✓									
		438.	*Zornia gibbosa*	✓				✓									
		439.	*Bauhinia phoenicea*				Clim	✓								KL, KA, TN	
		440.	*Biancaea decapetala*		✓			✓									LC
		441.	*Cassia fistula*			✓		✓									LC
		442.	*Humboldtia vahliana*			✓		✓								KL, TN	EN
		443.	*Prioria pinnata*			✓		✓									EN
		444.	*Senna alata*		✓			✓									LC
		445.	*Senna didymobotrya*		✓			✓									LC
		446.	*Senna hirsuta*		✓			✓									
		447.	*Senna occidentalis*		✓			✓									LC
		448.	*Acacia mangium*			✓		✓									LC
		449.	*Acacia mearnsii*			✓		✓									
		450.	*Albizia amara*			✓		✓									LC
		451.	*Albizia chinensis*			✓		✓									
		452.	*Albizia lebbeck*			✓		✓									LC
		453.	*Albizia odoratissima*			✓		✓									LC
		454.	*Archidendron clypearia*			✓		✓									LC
		455.	*Dichrostachys cinerea*			✓		✓									LC
		456.	*Mimosa diplotricha*		✓			✓									
		457.	*Senegalia torta*		✓			✓									LC
		458.	*Xylia xylocarpa*			✓		✓									LC
47	ROSACEAE	*459.*	*Photinia integrifolia*			✓		✓									LC
		460.	*Potentilla leschenaultiana*	✓				✓									
		461.	*Prunus ceylanica*			✓		✓									EN
		462.	*Rubus ellipticus*		✓			✓									LC
		463.	*Rubus glomeratus*		✓			✓									
		464.	*Rubus indicus*		✓			✓									
		465.	*Rubus niveus*		✓			✓									
48	CRASSULACEAE	*467.*	*Kalanchoe bhidei*	✓				✓								KL, KA, MAH	
		468.	*Kalanchoe delagoensis*	✓				✓									
		469.	*Kalanchoe dineshii*	✓				✓								LK (IDK)	
		470.	*Kalanchoe fedtschenkoi*	✓				✓									
		471.	*Kalanchoe grandiflora*	✓				✓								KL, TN	
		472.	*Kalanchoe pinnata*	✓				✓									
		473.	*Kalanchoe laciniata*	✓				✓									
		474.	*Kalanchoe olivacea*	✓				✓								KA, KL, MAH, TN	
49	DROSERACEAE	475.	*Drosera burmanni*	✓				✓									LC

		476.	*Drosera indica*	✓				✓									LC
		477.	*Drosera peltata*	✓				✓									LC
50	HALORAGACEAE	478.	Callitriche idukkiana	✓						✓						KL (IDK)	
		479.	Callitriche wightiana	✓						✓						TN	
		480.	*Laurembergia coccinea*	✓				✓									
		481.	*Myriophyllum oliganthum*	✓				✓								KL, TN	LC
51	COMBRETACEAE	482.	Combretum albidum				✓	✓									
		483.	Combretum latifolium				✓	✓									
		484.	*Getonia floribunda*				✓	✓									
		485.	Terminalia arjuna			✓		✓									
		486.	*Terminalia bellirica*			✓		✓									LC
		487.	*Terminalia elliptica*			✓		✓									
		488.	*Terminalia paniculata*			✓		✓								KA, KL, MAH, TN	
		489.	*Terminalia travancorensis*			✓		✓								KA, KL, TN	
52	MYRTACEAE	*490.*	*Eucalyptus grandis*			✓		✓									NT
		491.	*Eucalyptus tereticornis*			✓		✓									LC
		492.	*Eugenia argentea*		✓			✓								KL (WYD), TN	CR
		493.	*Eugenia uniflora*		✓			✓									LC
		494.	*Rhodomyrtus tomentosa*		✓			✓									LC
		495.	*Syzygium caryophyllatum*			✓		✓									EN
		496.	*Syzygium densiflorum*			✓		✓								KA, KL, TN	VU
		497.	*Syzygium gardneri*			✓		✓									
		498.	*Syzygium hemisphericum*			✓		✓									
		499.	*Syzygium jambos*			✓		✓									LC
		500.	*Syzygium laetum*			✓		✓								GOA, KA, KL, MAH, TN	
		501.	*Syzygium lanceolatum*			✓		✓									
		502.	*Syzygium malabaricum*			✓		✓								KA, KL, TN	
		503.	*Syzygium mundagam*			✓		✓								KA, KL, TN	
		504.	*Syzygium munroi*			✓		✓								KA, KL, TN	
		505.	*Syzygium occidentale*			✓		✓								KA, KL, TN	VU
		506.	*Syzygium parameswaranii*			✓		✓								KL, TN	EN
		507.	*Syzygium rama-varmae*			✓		✓								TN	
53	LECYTHIDACEAE	*508.*	*Careya arborea*			✓		✓									
		509.	*Couroupita guianensis*			✓		✓									LC
54	MELASTOMACEAE	*510.*	*Medinilla beddomei*		✓						✓					KA, KL, TN	
		511.	*Medinilla malabarica*		✓						✓					KL, TN	
		512.	*Melastoma malabathricum*		✓			✓									
		513.	*Memecylon flavescens*		✓			✓								TN	EN
		514.	*Memecylon idukkianum*		✓			✓								KL (IDK)	------
		515.	*Memecylon intermedium*		✓			✓									LC

		516.	*Memecylon lawsonii*		✓			✓							KL (WYD), TN	VU
		517.	*Memecylon randerianum*		✓			✓							KL, TN	
		518.	*Memecylon talbotianum*		✓			✓							GO, KA, TN	
		519.	*Memecylon wightii*		✓			✓								
		520.	*Miconia crenata*		✓			✓								
		521.	*Osbeckia abrahamii*		✓			✓								
		522.	*Osbeckia brachystemon*	✓				✓							KA, KL, MAH, TN	
		523.	*Osbeckia gracilis*		✓			✓							KA, KL, TN	
		524.	*Osbeckia leschenaultiana*		✓			✓							KL, TN	
		525.	*Osbeckia mehrana*		✓			✓							TN	
		526.	*Osbeckia muralis*	✓				✓								
		527.	*Osbeckia parvifolia*		✓			✓								
		528.	*Osbeckia reticulata*			✓		✓							KL, TN	
		529.	*Osbeckia travancorica*		✓			✓								
		530.	*Osbeckia virgata*		✓			✓							KL, KA, TN	
		531.	*Osbeckia wightiana*		✓			✓								
		532.	*Osbeckia wynaadensis*		✓			✓							KL, TN	
		533.	*Sonerila brunonis*	✓				✓							KL, TN	EN
		534.	*Sonerila cannanorensis*	✓				✓							KL, TN	EN
		535.	*Sonerila devicolamensis*	✓				✓							KL, TN	EN
		536.	*Sonerila grandiflora*		✓			✓							KL, TN	EN
		537.	*Sonerila nemakadensis*	✓				✓							KL, TN	EN
		538.	*Sonerila ponmudiana*	✓				✓							KL	EN
		539.	*Sonerila rheedei*	✓				✓							GO, AP, KA, KL, TN	EN
		540.	*Sonerila rotundifolia*	✓									✓		KA, KL, TN	EN
		541.	*Sonerila sreenarayaniana*	✓				✓								EN
		542.	*Sonerila tenella*	✓				✓							KL	EN
		543.	*Sonerila wallichii*	✓				✓							KA, KL, MAH, TN	EN
55	LYTHRACEAE	544.	*Ammannia baccifera*	✓					✓							LC
		545.	*Ammannia cordata*	✓				✓								
		546.	*Ammannia multiflora*	✓				✓								LC
		547.	*Rotala indica*	✓				✓								LC
		548.	*Rotala ritchiei*	✓					✓						KA, KL, MAH, TN	EN
		549.	*Rotala rosea*	✓						✓						LC
		550.	*Rotala rotundifolia*	✓					✓							LC
56	ONAGRACEAE	*551.*	*Ludwigia adscendens*	✓					✓							LC
		552.	*Ludwigia hyssopifolia*	✓				✓								LC
		553.	*Ludwigia octovalvis*	✓				✓								LC
		554.	*Ludwigia perennis*	✓				✓								LC
		555.	*Ludwigia peruviana*		✓			✓								

		556.	*Oenothera laciniata*	✓				✓									
57	PASSIFLORACEAE	557.	*Adenia hondala*				✓	✓									
		558.	*Passiflora leschenaultii*				✓	✓									
		559.	*Passiflora foetida*	✓				✓									
58	CUCURBITACEAE	*560.*	*Cucumis leiospermus*				✓	✓									
		561.	*Cucumis maderaspatanus*				✓	✓									
		562.	*Cucumis silentvalleyi*	✓				✓								KL	
		563.	*Diplocyclos palmatus*				✓	✓									
		564.	*Momordica dioica*				✓	✓									
		565.	*Trichosanthes lobata*				✓	✓									
		566.	*Trichosanthes nervifolia*	✓				✓									
		567.	*Trichosanthes tubiflora*				✓	✓									
		568.	*Zehneria thwaitesii*				✓	✓									
59	BEGONIACEAE	569.	Begonia albococcinea	✓				✓								KA, KL, TN	
		570.	Begonia crenata	✓				✓								GO, KL, KA, MAH	
		571.	Begonia cordifolia	✓				✓									
		572.	Begonia fallax		✓			✓									
		573.	Begonia floccifera	✓				✓									
		574.	Begonia dipetala		✓			✓									
		575.	Begonia trichocarpa	✓				✓								GO, KA, KL, MAH	
60	CACTACEAE	576.	*Cereus pterogonus*		✓			✓									
		577.	*Opuntia stricta*		✓			✓									LC
		578.	*Opuntia monacanthos*		✓			✓									
61	AIZOACEAE	*579.*	*Gisekia pharnaceoides*	✓				✓									
		580.	*Glinus oppositifolius*	✓				✓									LC
		581.	*Paramollugo nudicaulis*	✓				✓									
		582.	*Trigastrotheca pentaphylla*	✓				✓									
		583.	*Trianthema portulacastrum*	✓				✓									
62	APIACEAE	*584.*	*Bupleurum ramosissimum*	✓				✓									
		585.	*Centella asiatica*	✓				✓									LC
		586.	*Tetrataenium ceylanicum*	✓				✓									
		587.	*Tetrataenium rigens*	✓				✓								KL, KA, TN, MAH	
		588.	*Tetrataenium sprengelianum*	✓				✓								KA	
		589.	*Hydrocotyle conferta*	✓				✓								KL, TN	EN
		590.	*Hydrocotyle sibthorpioides*	✓				✓									LC
		591.	*Peucedanum anamallayense*	✓				✓								KL, TN	
		592.	*Pimpinella candolleana*	✓				✓								KL,KA, TN	
		593.	*Sanicula elata anacard*	✓				✓									
63	ARALIACEAE	594.	*Aralia malabarica*			✓		✓								KL, TN	VU
		595.	*Polyscias acuminata*		✓			✓									

		596.	*Heptapleurum racemosum*			✓		✓									
		597.	*Heptapleurum venulosum*			✓		✓									LC
		598.	*Heptapleurum wallichianum*			✓		✓									
		599.	*Tetrapanax papyrifer*		✓			✓									LC
		597.	*Heptapleurum venulosum*			✓		✓									LC
		598.	*Heptapleurum wallichianum*			✓		✓									
		599.	*Tetrapanax papyrifer*		✓			✓									LC
64	NYCTAGINACEAE	*600.*	*Boerhavia chinensis*	✓				✓									
		601.	*Boerhavia diffusa*	✓				✓									
		602.	*Boerhavia erecta*	✓				✓									
65	AMARANTHACEAE	*603.*	*Achyranthes aspera*	✓				✓									
		604.	*Achyranthes bidentata*	✓				✓									
		605.	*Aerva lanata*	✓				✓									
		606.	*Allmania nodiflora*	✓				✓									
		607.	*Alternanthera bettzickiana*	✓				✓									
		608.	*Alternanthera brasiliana*		✓			✓									
		609.	*Alternanthera pungens*	✓				✓									
		610.	*Alternanthera sessilis*	✓				✓									LC
		611.	*Amaranthus spinosus*	✓				✓									
		612.	*Cyathula prostrata*	✓				✓									
		613.	*Psilotrichum patulum*	✓				✓									
		614.	*Pupalia lappacea*	✓				✓									LC
66	CHENOPODIACEAE	*615.*	*Chenopodium album*	✓				✓									
		616.	*Dysphania ambrosioides*	✓				✓									
		617.	*Dysphania ambrosioides*	✓				✓									
67	POLYGONACEAE	*618.*	*Antigonon leptopus*		✓			✓									
		619.	*Persicaria barbata*	✓				✓									LC
		620.	*Persicaria chinensis*		✓			✓									
		621.	*Persicaria glabra*	✓				✓									LC
		622.	*Persicaria hydropiper*	✓				✓									
		623.	*Rumex nepalensis*	✓				✓									
68	PODOSTEMACEAE	*624.*	*Indotristicha ramosissima*	✓					✓						KL, TN		LC
		625.	*Polypleurum munnarense*	✓					✓						KL (IDK)		EN
		626.	*Podostemum subulatum*	✓					✓								LC
		627.	*Polypleurum dichotomum*	✓					✓						KL, MAH, TN		LC
		628.	*Polypleurum stylosum*	✓					✓								LC
		629.	*Polypleurum wallichii*	✓					✓								LC
		630.	*Zeylanidium lichenoides*	✓					✓								LC
		631.	*Zeylanidium olivaceum*	✓					✓								LC
		632.	*Zeylanidium sessile*	✓					✓						AP, GO, MAH, KL, TN		

69	ARISTOLOCHIACEAE	*633.*	*Aristolochia acuminata*				✓	✓									
		634.	*Aristolochia indica*				✓	✓									
		635.	*Thottea dinghoui*	✓				✓								KL	
		636.	*Thottea duchartrei*		✓			✓									
		637.	*Thottea siliquosa*		✓			✓									
70	PIPERACEAE	*638.*	*Peperomia ekakesara*	✓							✓					KL (IDK)	
		639.	*Peperomia heyneana*	✓							✓						
		640.	*Peperomia leptostachya*	✓							✓						
		641.	*Peperomia pellucida*	✓							✓						
		642.	*Peperomia portulacoides*	✓							✓						
		643.	*Peperomia tetraphylla*	✓							✓						
		644.	*Piper argyrophyllum*				✓				✓						
		645.	*Piper barberi*				✓				✓					TN	EN
		646.	*Piper peepuloides*				✓				✓						
		647.	*Piper schmidtii*				✓				✓					KA, KL, TN	
		648.	*Piper trichostachyon*				✓				✓					KA, MAH	
		649.	*Piper umbellatum*		✓						✓						
		650.	*Piper velayudhanii*				✓				✓					KA, KL, TN	
		651.	*Piper wightii*				✓				✓					GO, KL, TN	
71	CHLORANTHACEAE	*652.*	*Sarcandra glabra subsp. Brachystachys*		✓			✓									
72	MYRISTICACEAE	*653.*	*Gymnacranthera farquhariana*			✓		✓									
		654.	*Knema attenuata*			✓		✓								GO, KA, KL, TN	LC
		655.	*Myristica malabarica*			✓		✓									VU
73	LAURACEAE	*656.*	*Actinodaphne bourdillonii*			✓		✓								KA, KL, TN	NT
		657.	*Actinodaphne campanulata*			✓		✓								TN	
		658.	*Actinodaphne salicina*			✓		✓								TN	EN
		659.	*Actinodaphne wightiana*			✓		✓								KL, KA, TN	LC
		660.	*Alseodaphne semecarpifolia*			✓		✓									LC
		661.	*Apollonias arnottii*			✓		✓									
		662.	*Beilschmiedia gemmiflora*			✓		✓									LC
		663.	*Cinnamomum keralaense*			✓		✓								KL, TN	EN
		664.	*Cinnamomum malabatrum*			✓		✓								KA, KL, TN	LC
		665.	*Cinnamomum perrottetii*			✓		✓								KL, TN	EN
		666.	*Cinnamomum sulphuratum*			✓		✓									VU
		667.	*Cinnamomum wightii*			✓		✓								KL, KA, TN	EN
		668.	*Cryptocarya anamalayana*			✓		✓								TN	EN
		669.	*Cryptocarya praetervisa*			✓		✓								TN	EN
		670.	*Cryptocarya wightiana*			✓		✓									VU
		671.	*Litsea beddomei*			✓		✓									EN
		672.	*Litsea bourdillonii*			✓		✓								AP, KL, TN	NT

		673.	*Litsea coriacea*			✓		✓							GO, MAH, KA, KL, TN	NT
		674.	*Litsea ligustrina*			✓		✓								NT
		675.	*Litsea floribunda*			✓		✓							KA, KL, MAH, TN	NT
		676.	*Litsea ghatica*			✓		✓							KA, KL, MAH	VU
		677.	*Litsea glabrata*			✓		✓							KA, KL, TN	LC
		678.	*Litsea mysorensis*			✓		✓							KA, KL, TN	VU
		679.	*Litsea oleoides*			✓		✓							KL, TN	
		680.	*Litsea stocksii*			✓		✓							KA, KL, MAH, TN	NT
		681.	*Litsea wightiana*			✓		✓							KL, TN	NT
		682.	*Machilus glaucescens*			✓		✓								
		683.	*Neolitsea cassia*			✓		✓								
		684.	*Neolitsea foliosa var. scrobiculata*			✓		✓								LC
		685.	*Phoebe lanceolata*			✓		✓								LC
		686.	*Phoebe wightii*			✓		✓								LC
74	PROTEACEAE	*687.*	*Grevillea robusta*			✓		✓								LC
75	THYMELAEACEAE	*688.*	*Lasiosiphon glaucus*			✓		✓								LC
76	ELAEGNACEAE	*689.*	*Elaeagnus conferta*				✓	✓								LC
		690.	*Elaeagnus indica*				✓	✓								
77	LORANTHACEAE	*691.*	*Dendrophthoe falcata*		✓							✓				
		692.	*Dendrophthoe trigona*		✓							✓				
		693.	*Helixanthera obtusata*		✓							✓			KA, KL, MAH, TN	
		694.	*Macrosolen capitellatus*		✓							✓				
		695.	*Macrosolen parasiticus*		✓							✓				
		696.	*Scurrula parasitica*		✓							✓				
		697.	*Taxillus recurvus*		✓							✓			KA, KL, TN	
78	SANTALACEAE	*698.*	*Osyris lanceolata*		✓			✓								LC
		699.	*Scleropyrum pentandrum*			✓		✓								LC
79	BALANOPHORACEAE	*700.*	*Balanophora abbreviata*	✓										✓		
		701.	*Balanophora fungosa subsp. indica*	✓										✓		
80	BUXACEAE	*702.*	*Sarcococca coriacea*		✓			✓								
81	EUPHORBIACEAE	*703.*	*Acalypha fruticosa*		✓			✓								LC
		704.	*Acalypha paniculata*	✓				✓								
		705.	*Actephila excelsa*			✓		✓								LC
		706.	*Agrostistachys borneensis*			✓		✓								LC
		707.	*Agrostistachys indica*			✓		✓								LC
		708.	*Antidesma acidum*		✓			✓								LC
		709.	*Antidesma bunius*			✓		✓								LC
		710.	*Antidesma montanum*			✓		✓								LC
		711.	*Aporosa acuminata*			✓		✓								
		712.	*Aporosa cardiosperma*			✓		✓								VU

		713.	*Aporosa fusiformis*			✓		✓									CR
		714.	*Bischofia javanica*			✓		✓									LC
		715.	*Blachia umbellata*		✓			✓									
		716.	*Breynia retusa*		✓			✓									LC
		717.	*Breynia vitis-idaea*		✓			✓									LC
		718.	*Bridelia retusa*			✓		✓									LC
		719.	*Bridelia stipularis*				✓	✓									LC
		720.	*Cleidion javanicum*			✓		✓									LC
		721.	*Croton caudatus*		✓			✓									
		722.	*Croton malabaricus*			✓		✓								KL, KA, TN	
		723.	*Croton tiglium*		✓			✓									LC
		724.	*Croton zeylanicus*		✓			✓									
		725.	*Dimorphocalyx glabellus var. lawianus*			✓		✓								GO, KA, KL, TN	LC
		726.	*Drypetes malabarica*			✓		✓								TN	
		727.	*Drypetes oblongifolia*			✓		✓									
		728.	*Epiprinus mallotiformis*			✓		✓								AP, KA, KL, TN	
		729.	*Euphorbia heterophylla*	✓				✓									LC
		730.	*Euphorbia hirta*	✓				✓									
		731.	*Euphorbia indica*	✓				✓									
		732.	*Euphorbia rothiana*		✓			✓									
		733.	*Euphorbia thymifolia*	✓				✓									
		734.	*Euphorbia tortilis*		✓			✓									
		735.	*Excoecaria oppositifolia var. crenulata*			✓		✓									
		736.	*Flueggea virosa*		✓			✓									LC
		737.	*Givotia moluccana*			✓		✓									
		738.	*Glochidion candolleanum*			✓		✓									
		739.	*Glochidion ellipticum*			✓		✓									
		740.	*Glochidion heyneanum*			✓		✓									
		741.	*Glochidion zeylanicum*		✓			✓									LC
		742.	*Homonoia riparia*		✓			✓									
		743.	*Jatropha curcas*		✓			✓									LC
		744.	*Macaranga indica*			✓		✓									LC
		745.	*Mallotus beddomei*		✓			✓									
		746.	*Mallotus philippensis*			✓		✓									LC
		747.	*Mallotus resinosus*		✓			✓									LC
		748.	*Mallotus tetracoccus*			✓		✓									
		749.	*Margaritaria indica*			✓		✓									
		750.	*Meineckia longipes*		✓			✓								KL, TN	
		751.	*Micrococca beddomei*	✓				✓								KL, TN	
		752.	*Microstachys chamaelea*	✓				✓									

		753.	*Pedilanthus tithymaloides*		✓			✓								
		754.	*Phyllanthus amarus*	✓				✓								
		755.	*Phyllanthus beddomei*		✓			✓							(KL, TN	
		756.	*Phyllanthus reticulatus*		✓			✓								LC
		757.	*Phyllanthus rheedei*	✓				✓								
		758.	*Phyllanthus tenellus*	✓				✓								
		759.	*Phyllanthus urinaria*	✓				✓								
		760.	*Phyllanthus virgatus*	✓				✓								
		761.	*Tragia bicolor*				✓	✓							KA, TN	
		762.	*Tragia montana*				✓	✓								
		763.	*Trevia nudiflora*			✓		✓								
82	ULMACEAE	*764.*	*Celtis philippensis*			✓		✓								LC
		765.	*Celtis tetrandra*			✓		✓								LC
		766.	*Holoptelea integrifolia*			✓		✓								
		767.	*Trema orientale*			✓		✓								LC
83	MORACEAE	*768.*	*Antiaris toxicaria*			✓		✓								LC
		769.	*Artocarpus zeylanicus*			✓		✓								
		770.	*Dorstenia indica*	✓				✓								
		771.	*Ficus amplissima*			✓		✓								
		772.	*Ficus beddomei*			✓		✓							MP, UP, AP, KA, KL, TN	
		773.	*Ficus callosa*			✓		✓								
		774.	*Ficus costata*			✓		✓								
		775.	*Ficus drupacea*			✓		✓								LC
		776.	*Ficus exasperata*			✓		✓								LC
		777.	*Ficus hispida*			✓		✓								LC
		778.	*Ficus laevis*				✓	✓							KL, TN	
		779.	*Ficus microcarpa*			✓		✓								LC
		780.	*Ficus mollis*			✓		✓								
		781.	*Ficus nervosa*			✓		✓								LC
		782.	*Ficus racemosa*			✓		✓								LC
		783.	*Ficus talbotii*			✓		✓								
		784.	*Ficus tinctoria subsp. gibbosa*			✓		✓								
		785.	*Ficus tsjakela*			✓		✓								
		786.	*Streblus asper*		✓			✓								LC
84	URTICACEAE	*787.*	*Boehmeria depauperata*		✓			✓								LC
		788.	*Boehmeria virgata var. macrostachya*		✓			✓								LC
		789.	*Debregeasia longifolia*		✓			✓								LC
		790.	*Debregeasia wallichiana*		✓			✓								
		791.	*Dendrocnide sinuata*		✓			✓								
		792.	*Droguetia iners*	✓				✓								

		793.	*Elatostema acuminatum*		✓			✓									
		794.	*Elatostema lineolatum*	✓				✓									
		795.	*Elatostema ranongense*	✓				✓									
		796.	*Elatostema sessile*		✓			✓									
		797.	*Elatostema wightii*		✓			✓								KL, TN	
		798.	*Girardinia diversifolia*		✓			✓									
		799.	*Laportea interrupta*	✓				✓									
		800.	*Lecanthus peduncularis*	✓				✓									
		801.	*Oreocnide integrifolia*			✓		✓									
		802.	*Elatostema heyneanum*		✓			✓									
		803.	*Pilea kingii*	✓				✓									
		804.	*Pilea melastomoides*		✓			✓									
		805.	*Pilea microphylla*	✓				✓									
		806.	*Pilea wightii*	✓				✓									
		807.	*Pouzolzia hirta*		✓			✓									
		808.	*Pouzolzia meeboldii*		✓			✓									
		809.	*Pouzolzia wightii*		✓			✓									
		810.	*Pouzolzia zeylanica*	✓				✓									
		811.	*Procris crenata*	✓							✓						

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Publications



List of publications

VISHNU MOHAN & SANTHOSH NAMPY 2022. *Polygala idukkiana* (Polygalaceae), a new species from the southern Western Ghats, India. *Anales del Jardín Botánico de Madrid* 79 (2): e129.

VISHNU MOHAN, DANI FRANCIS, SANTHOSH NAMPY & DIVYA K. VENUGOPAL2021. *Impatiens raktakesara* (Balsaminaceae), a new species from the southern Western Ghats, India. *Brittonia*, 73(3):316–322.

VISHNU MOHAN, DIVYA K. VENUGOPAL, DANI FRANCIS, & SANTHOSH NAMPY 2020. Two new scapigerous species of *Impatiens* (Balsaminaceae) from southern Western Ghats, India. *Taiwania* 65(2): 187–194.

DANI FRANCIS, **VISHNU MOHAN**, DIVYA K. VENUGOPAL. & SANTHOSH NAMPY 2021. *Burmannia munnarensis* (Burmanniaceae) a new species and rediscovery of *B. indica* after 110 years from southern Western Ghats, Kerala, India. Phytotaxa 507 (1): 105–112.

DANI FRANCIS, **VISHNU MOHAN**, DIVYA K. VENUGOPAL & SANTHOSH NAMPY 2020. A New Species of Eriocaulon *Edinburgh Journal of Botany* 77(2): 281–290.

HARISHMA K.H., **VISHNU MOHAN** & SANTHOSH NAMPY 2022. *Eriocaulon pandeyana* (Eriocaulaceae), a new species from southern Western Ghats, India. *Phytotaxa* 539(3): 273–279.

DIVYA K. VENUGOPAL, SANTHOSH NAMPY, PRADEEP A.K., DANI FRANCIS, **VISHNU MOHAN** & SYAM. RADH S. 2021. A new species of *Parasopubia* (Orobanchaceae) from the southern Western Ghats, India. *Anales del Jardín Botánico de Madrid* 78 (1): e106.

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DIVYA K. VENUGOPAL, DANI FRANCIS, **VISHNU MOHAN** & SANTHOSH NAMPY, 2018. Notes on taxonomic identity and typification of *Fagraea coromandelina* (Gentianaceae) *Phytotaxa* 360 (3): 292–295.

SANTHOSH NAMPY, DIVYA K. VENUGOPAL, DANI FRANCIS & **VISHNU MOHAN**. 2019. New record of *Iochroma arborescens* (Solanaceae) for India, a potential invasive plant from America with notes on its typification Rheedea Vol. 29(3): 222–226

Anales del Jardín Botánico de Madrid 79 (2): e129
https://doi.org/10.3989/ajbm.2641
ISSN-L: 0211-1322

Polygala idukkiana (Polygalaceae), a new species from the southern Western Ghats, India

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Abstract. *Polygala idukkiana* (Polygalaceae) is described as a new species from the Idukki district of Kerala in the southern Western Ghats. Detailed description along with colour photographs, distribution map, and key to the identification of *Polygala* species occurring in Kerala are provided. The new species is compared with the morphologically allied *P. sibirica, P. rosmarinifolia,* and *P. chinensis*. The conservation status of the new species is assessed provisionally as Data Deficient (DD) according to IUCN Red List Categories and Criteria.

Keywords. Biodiversity, conservation, flora, Kattadikkadavu, Kottappara, taxonomy.

Resumen. Se describe *Polygala idukkiana* (Polygalaceae) como una nueva especie del distrito de Idukki de Kerala en el sur de los Ghats occidentales. Se proporciona una descripción detallada junto con fotografías en color, un mapa de distribución y una clave para la identificación de las especies de *Polygala* presentes en Kerala. La nueva especie se compara con las especies morfológicamente afines *P. sibirica*, *P. rosmarinifolia* y *P. chinensis*. El estado de conservación de la nueva especie se evalúa provisionalmente como Datos Insuficientes (DD) de acuerdo con las Categorías y Criterios de la Lista Roja de la UICN.

Palabras clave. Biodiversidad, conservación, flora, Kattadikkadavu, Kottappara, taxonomía.

How to cite this article: Vishnu M., Nampy S. 2022. *Polygala idukkiana* (Polygalaceae), a new species from the southern Western Ghats, India. *Anales del Jardín Botánico de Madrid* 79: e129. https://doi.org/10.3989/ajbm.2641

Title in Spanish: *Polygala idukkiana* (Polygalaceae), una especie nueva del sur de los Ghats Occidentales, India.

Associate Editor: Mauricio Velayos. Received:16 June 2022; accepted: 10 October 2022; published online: 14 December 2022.

INTRODUCTION

Polygala L. is the largest genus in the family Polygalaceae, but the estimates of the number of species vary widely. Paiva (1998) recognized 725 species while Eriksen & Persson (2007) included 300–350 species and Pastore (2018a) about 580 species. The genus is widely distributed throughout the world except in the Arctic, Antarctic, and New Zealand (Paiva 1998). The main centres of diversity are known from South Africa and the Americas (Kerrigan 2012). Pastore & al. (2017) and Mota & al. (2019) considered *Polygala* as a non-monophyletic genus. Based on Abbott (2009), Pastore & al. (2019) recognized two clades in *Polygala s.str*., namely, New World clade comprising 213 species under three sections and the Old World clade with 349 species in 11 sections. *Polygala* is characterized by the presence of 8 (rarely 6) monadelphous stamens (in a single semi-circular ring), two petaloid inner and three smaller outer sepals, and the dehiscent capsules containing two pubescent caruncular seeds (Chodat 1891; Eriksen 1993; Paiva 1998; Uðurlu 2020). Chandrabose & Nair (1981) reported 15 species from South India while 27 species were reported in India by Banerjee (1993). Kerrigan (2008, 2012) in a treatment of *Polygala* from northern Australia, recognized 45 species, of which 26 species and four varieties were newly described. A key for the identification of all the 50 species found in Australia were also provided in this work. Recently several new taxa of *Polygala* have been described: *P. azizsancarii* Dönmez from Turkey (Dönmez & Aydin 2018); *P. mazandaranica* Sarvi & Faghir and *P. guilanica* Sarvi & Faghir from North Iran (Sarvi & al. 2020, 2021); *P. bringelii* J.F.B.Pastore & Antar, *P. capitolensis* J.F.B.Pastore, *P. herbiola* var. *minensis* J.F.B.Pastore, *P. jardimii* J.F.B.Pastore, *P. kalunga* J.F.B.Pastore, *P. michelliana* J.F.B.Pastore, *P. paganuccii* J.F.B.Pastore, *P. petricola* J.F.B.Pastore, *P. tocantinensis* J.F.B.Pastore & Antar and *P. veadeiroensis* J.F.B.Pastore from Brazil (Pastore 2018a, 2018b; Pastore & al. 2021a, 2021b; Pastore & Antar 2021; Pastore 2022) and *P. sandiaochiaoensis* S.S.Ying from Taiwan (Ying 2020).

During field work in the floristically rich Idukki district of Kerala in the southern Western Ghats, we found an unrecognized species of *Polygala* resembling *P. sibirica* L.

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and *P. rosmarinifolia* Wight & Arn. After careful comparison of morphological characters in living and herbarium specimens (CALI), and after consulting relevant literature (Adema 1966; Chandrabose & Nair 1981; Banerjee 1993; Banerjee & Balakrishnan 2005; Chen & al. 2008; Ranjan 2009; Kerrigan 2008, 2012; Yang & Chen 2013; Dönmez & Aydin 2018; Pastore 2018a, 2018b; Pastore & al. 2019; Sarvi & al. 2020; Ying 2020; Pastore & al. 2021a, 2021b; Pastore & Antar 2021; Sarvi & al. 2021; Pastore 2022) we found that the entity in question is consistently distinct from all other species of the genus and is described here as new. The new species falls under *Polygala* subgenus *Polygala*.

MATERIALS AND METHODS

Specimens collected were preserved in 4% formalin and 70% ethanol for detailed study. Photographs of habitat and habit were taken with a 77D DSLR camera (Canon, Japan). Floral details were studied using stemi 508 stereo microscope equipped with axiocam 105 color camera (Zeiss, Germany). The description was prepared by examining all available specimens and the terminologies followed Simpson (2006), Kerrigan (2008, 2012), and Pastore (2018a, 2018b). Herbarium sheets were prepared by conventional methods (Bridson & Forman 1991). The identity of the species was confirmed by comparing the types and protologues of the related species. For scanning electron microscopy (SEM), the seed samples were fixed in FAA and dehydrated by passing through an ethanol series. They were then critical point dried and mounted on to stubs using double-side adhesive tape, sputter coated with gold using SPI module sputter coater and examined under Gemini SEM 300 (Zeiss, Germany).

RESULTS AND DISCUSSION

Taxonomic treatment

Polygala idukkiana Vishnu & Nampy, **sp. nov.** Type: India, Kerala, Idukki district, Kottppara-Mullaringad, 10°00’02”N, 76°47’52”E, ± 318 m, 2 Oct. 2021, Vishnu Mohan & Santhosh Nampy 176330 (holotype: CALI!; isotype: K!). Figs. 1–3.

Diagnosis.—*Polygala idukkiana* resembles *P. rosmarinifolia* by its inflorescence pattern and hairy seeds and to *P. sibirica* by its 3-lobed aril, but differs from the former, by its lavender flowers and hispid inner sepals (vs. yellow flowers and glabrous inner sepals) and from the latter by its lanceolate leaves, ciliate capsules, and non-hooded, equal sized arils (vs. elliptic leaves, glabrous capsules and hooded unequal sized arils).



Fig. 1. *Polygala idukkiana* Vishnu & Nampy sp. nov. in its natural habitat.

Description.—Erect subshrubs, 20–50 cm tall. Roots not tuberous. Stem branched from base, cylindrical, striated, tomentulose, green. Leaves alternate; lamina lanceolate, 1.5–5.5 × 0.5–2.2 cm, acute at apex and base, entire and revolute along margins, sparsely tomentose on both surfaces; petioles 1.5–2 mm long, tomentulose. Racemes axillary, erect, 3–5 mm long, 3–5-flowered. Flowers 6–9 mm diameter; pedicels 3–5 mm long, puberulous; bracts 3, elliptic, 0.9–1.4 × 0.4–0.5 mm, rounded at apex and base, ciliate at margins. Sepals 5, persistent in fruit, green; upper outer sepals 2, free, lanceolate, 2–3 × 1 mm, narrowly acute at apex, ciliate; lower outer sepals 1, lanceolate, 4 × 1.4 mm, acuminate at apex, entire; inner sepals (wings) 2, petaloid, elliptic-lanceolate, 5–6 × 2–3 mm, mucronate at apex, wider at middle, ciliate, slightly coriaceous, hispid, reddish white. Petals 3, upper petals obliquely obcordate, 7–8 × 4–5 mm, lavender with violet streaks, retuse at apex, clawed, entire; lower petal, clawed, boat shaped, 6–7 × 2.5–3 mm; crest (dorsal appendages) 10–12-lobed in 2 bundles, violet; lateral lobe obliquely ovate. Stamens 8, monadelphous; fused at the base; staminal sheath 4.5–6 mm long, surrounding the style, adherent to upper petals; anthers obconical, 0.5–0.6

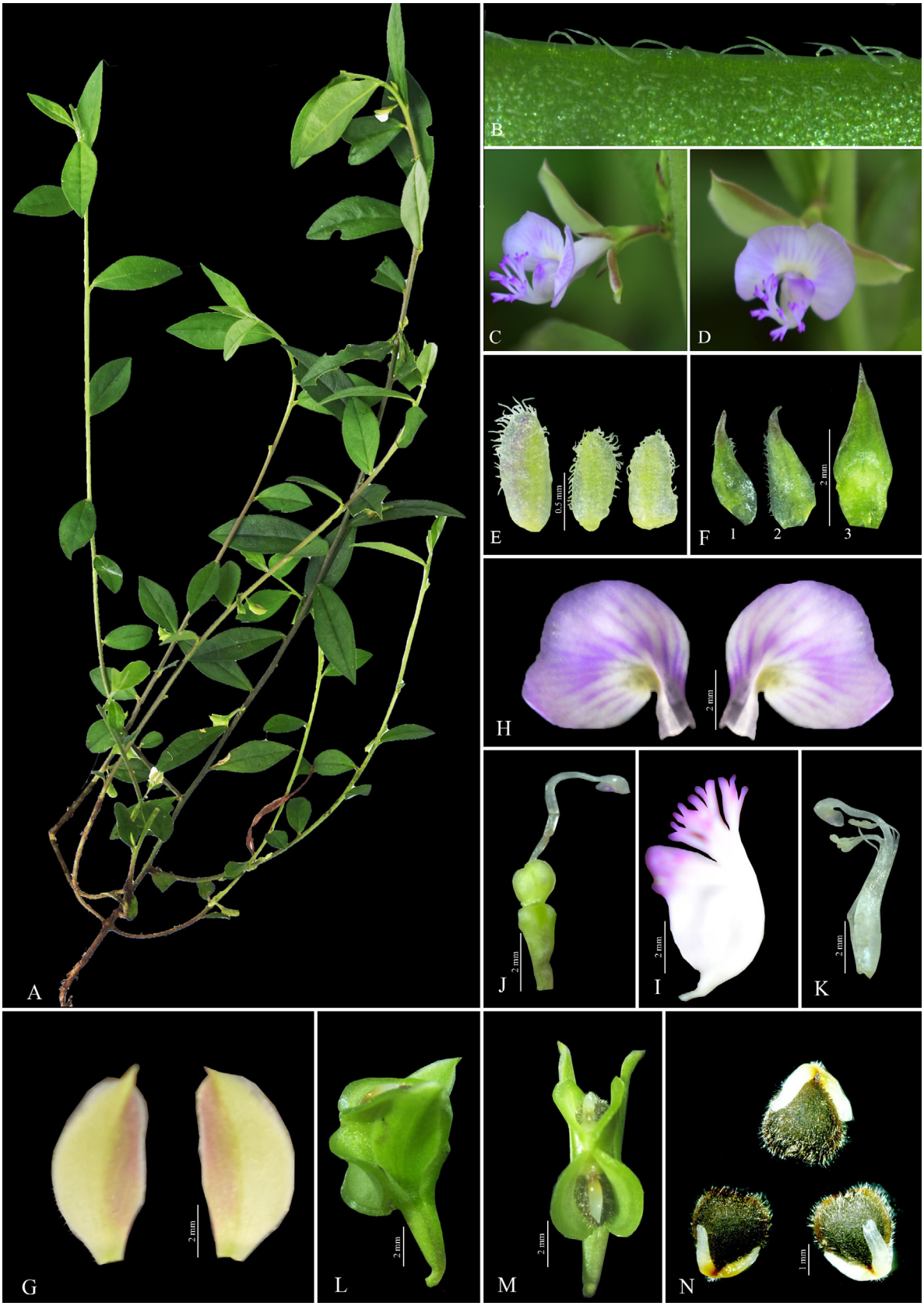

Fig. 2. *Polygala idukkiana* Vishnu & Nampy sp. nov.: **a**, habit; **b,** leaf margin; **c**, flower lateral view; **d**, flower front view; **e**, bracts; **f**, outer sepals (1 and 2: upper, 3: lower); **g**, inner sepals; **h**, upper petals; **i**, lower petal; **j**, gynoecium; **k**, androecium; **l-m**, fruits; **n**, seeds.

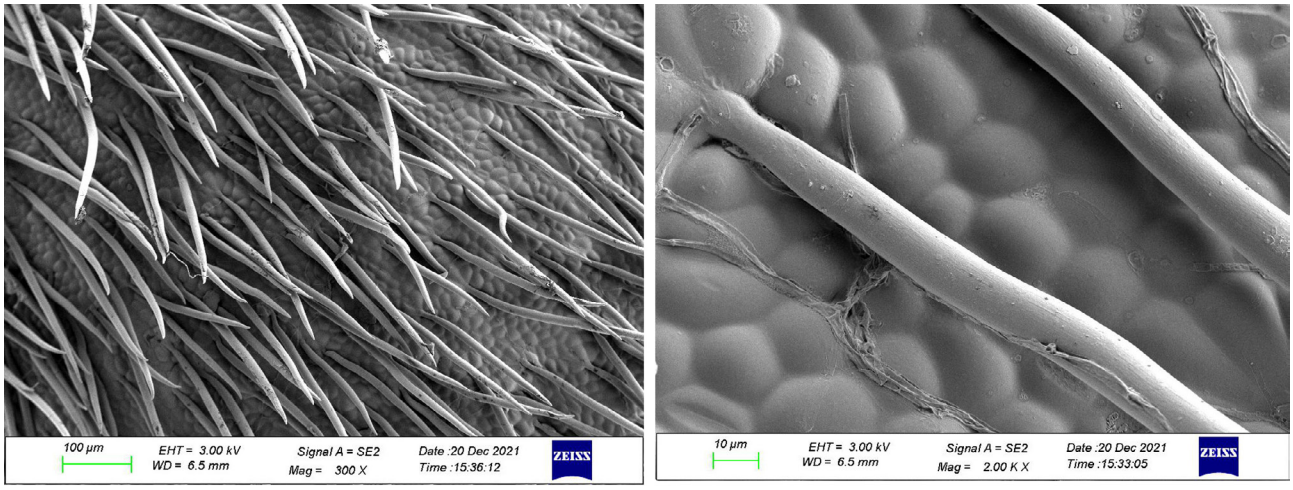

Fig. 3. Seed surfaceof *Polygala idukkiana* Vishnu & Nampy sp. nov. under SEM.

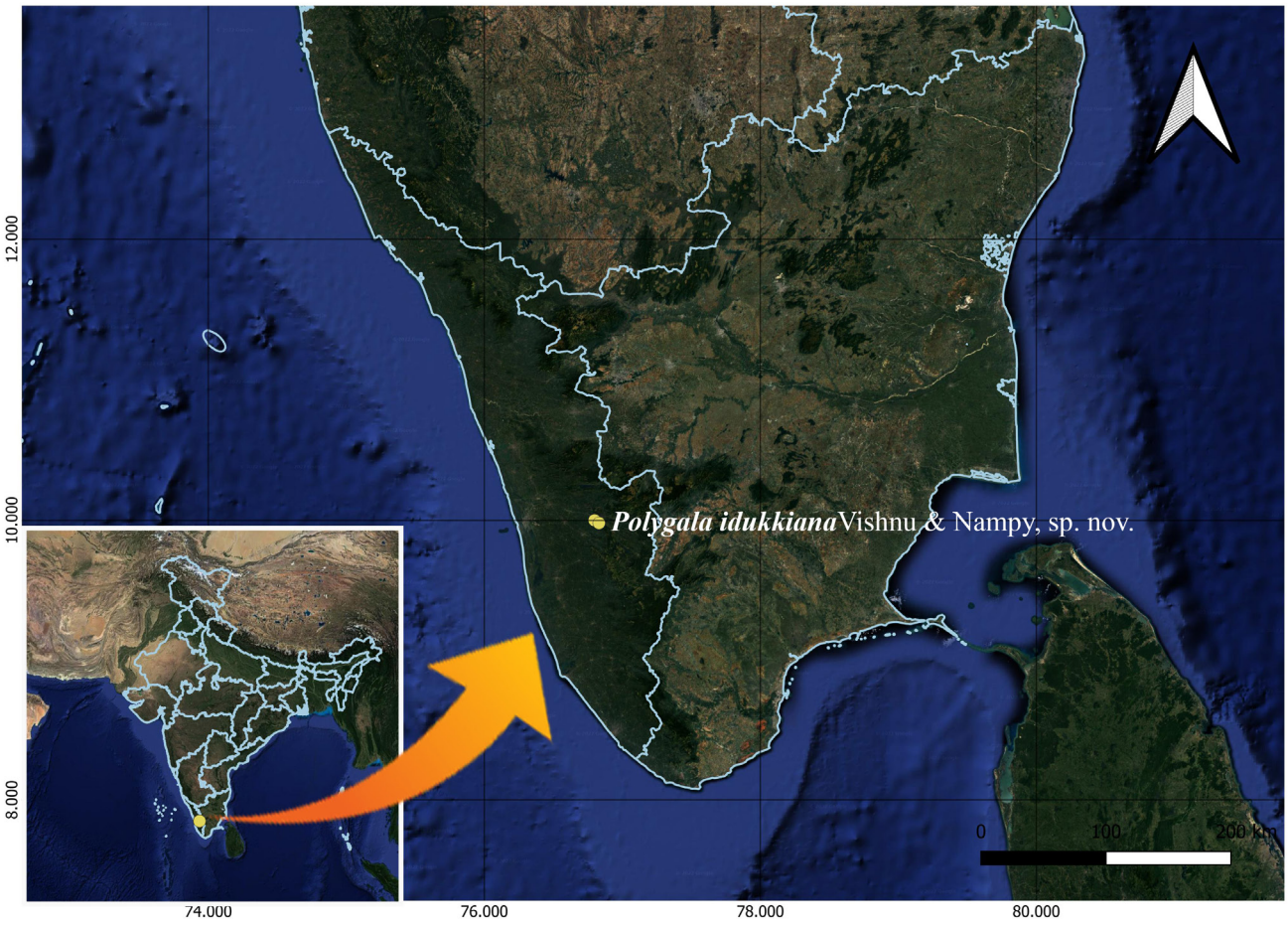

Fig. 4. Map showing the distribution of *Polygala idukkiana* Vishnu & Nampy sp. nov.

mm long. Ovary orbicular, 1.8 mm diameter, slightly oblique at apex; style strongly hooked, 6 mm long, inclined, terminated by an oblique cymbiform pre-stigmatic cavity. Capsules winged, orbicular, 6–7 × 4–5 mm, emarginated at apex, compressed, ciliate, 2-seeded; wings 2–3 mm wide. Seeds widely ovate, 3–3.7 × 2.8–3 mm, arillate, brown-black, strongly hirsute with dense silky white hairs; hairs 0.3 mm long, of equal length throughout; testa colliculate. Aril head reduced; lobes 3, equal, 2–2.2 mm long, non hooded.

Table 1. Morphological comparison of *Polygala idukkiana* Vishnu & Nampy sp. nov. and related species.

Characters	*P. idukkiana*	*P. sibirica*	*P. rosmarinifolia*	*P. chinensis*
Leaf blades	Lanceolate	Elliptic	Linear, elliptic or very rarely oblong	Oblong-elliptic
Bracts	Elliptic, persistent	Linear-lanceolate, persistent	Lanceolate, caducous	Lanceolate caducous
Racemes	Axillary, 0.3–0.5 cm long	Leaf opposed or terminal, 2–10 cm long	Axillary-lateral, 0.5–1.5 cm long	Super-axillary, rarely axillary, 1 cm long
Inner sepals	Slightly coriaceous, hispid, mucronate at apex	Membranaceous, glabrous, obtuse or rounded at apex,	Membranaceous, glabrous, attenuate at apex	Petaloid, acuminate at apex
Upper petals	Lavender with violet streaks	Bluish pink-lavender with brownish red streaks	Yellow with red markings	Yellow or white with violet tips
Capsules	Ciliate	Glabrous	Ciliate	Ciliate
Seeds	Widely ovate, strongly hirsute with dense silky white hairs	Ovate, sparsely minutely white pilose	Elliptic, white pubescent	Ovoid, densely white pubescent
Aril	3-lobed	3-lobed	2-lobed	2-lobed

Etymology.—The epithet 'idukkiana' refers to the floristically rich Idukki district, where the type locality belongs.

Distribution and habitat.—Known from Kattadikkadavu and Kottppara in Idukki district of Kerala state (Fig. 4), in the southern Western Ghats, at 318 m elevation, where it occurs in shady areas, as undergrowth of *Gliricidia sepium* (Jacq.) Kunth, *Anacardium occidentale* L.**,** *Artocarpus heterophyllus* Lam., *Macaranga peltata* Boiv. ex Baill., etc., and also in open lands. The associated plants include *Selaginella* sp. (Selaginellaceae), *Hyptis suaveolens* (L.) Poit. (Lamiaceae), *Microstachys chamaelea* (L.) Muell. (Euphorbiaceae), *Justicia* sp. (Acanthaceae), *Osbeckia aspera* (L.) Blume (Melastomataceae), *Chromolaena odorata* (L.) King & Robins. (Asteraceae), *Mimosa pudica* L. (Fabaceae), and *Spermacoce ocymoides* Burm.f. (Rubiaceae).

Phenology.—*Polygala idukkiana* was collected with flowers and fruits in October. Flowering may start in September and extend up to November.

Provisional conservation status.—*Polygala idukkiana* is known only from two localities with less than 25 mature individuals. The localities are separated by a distance of around 2 km and the Area of Occupancy (AOO) falls below 0.2 km^2. Since the localities are tourist destinations, there are chances of reduction in the number of plants in the near future. More field work is needed in similar habitats to assess the population size and full geographical extent. Hence the species is provisionally categorized here as Data Deficient (DD) as per IUCN Red List Categories and Criteria (IUCN 2022).

Notes.—The presence of crested keel places *Polygala idukkiana* in *Polygala* subgenus *Polygala*. The new species is unmistakable in the field, due to its violet streaked lavender showy flowers, fimbriate-straight floral appendages (crest) and a well developed keel pocket. The flower is white in bud stage, gradually turning lavender and finally turns white. A morphological comparison of *P. idukkiana*, *P. sibirica, P. rosmarinifolia* and *P. chinensis* are provided in Table 1.

Additional specimen examined.—India. Kerala: Idukki district: Kattadikkadavu, 9°58'51.6"N 76°49'49.9"E, c. 400 m, 1 Oct. 2021, Vishnu Mohan & Santhosh Nampy 176389 (CALI).

Key to the Polygala *species in Kerala (modified after Banerjee & Balakrishnan 2005)*

1. Sepals caducous ..... *P. arillata*
– Sepals (at least wing sepals) persistent in fruit 2
2. Flowers lavender; wing sepals broader at middle .. .. *P. idukkiana*
– Flowers other than lavender; wing sepals broader above or below the middle 3
3. Wing sepals broader above middle, rounded-obtuse or subacute at apex 4
– Wing sepals broader below middle, acute-acuminate at apex 7
4. Wing sepals falcate, acute; petals lavender-bluish pink, lateral lobes linear-oblong, midlobe rounded ....*P. sibirica*
– Wing sepals not falcate, or if falcate, obtuse; petals purple or yellow, lateral lobes obovate, midlobe acute 5
5. Stems and racemes dichotomously branched above; wing sepals symmetric, suborbicular, rounded, not mucronate at apex ..... *P. persicariifolia*
– Stems and racemes not dichotomously branched; wing sepals asymmetric, elliptic-oblong, obtuse, mucronate at apex 6
6. Leaves revolute at margins; crest with 2 bundles of appendages ..... *P. erioptera*
– Leaves flat at margins; crest with 1 or 3 bundles of appendages ..... *P. telephioides*

7. Racemes longer than leaves 8
– Racemes shorter than leaves 11
8. Ovary hairy or ciliate at apex 9
– Ovary neither hairy nor ciliate at apex ..... *P. javana*
9. Middle of petals distinctly auricled at base .... *P. wightiana*
– Middle of petals not auricled at base 10
10. Racemes 10–20 cm long; capsules asymmetric, unequally lobed at apex ..... *P. elongata*
– Racemes less than 10 cm long; capsules symmetric, equally lobed at apex ..... *P. bulbothrix*
11. Free portions of filaments on staminal tube differing much in length ..... *P. buxiformis*
– Free portions of filaments on staminal tube almost of same length 12
12. Racemes and flowers erect; outer sepals obovate-oblong, mucronate at apex ..... *P. rosmarinifolia*
– Racemes and flowers drooping; outer sepals ovate-falcate, acuminate at apex 13
13. Caruncle with broad membranous winged appendages, covering 2/3 of seed ..... *P. jacobii*
– Caruncle with short toothed or linear or narrowly oblong appendages covering less than 1/3 of seed 14
14. Leaves to 4 cm long; caruncle appendages subequal . ..... *P. arvensis*
– Leaves more than 4 cm long; caruncle appendages unequal, 2 large and 1 very short 15
15. Leaves linear or linear-lanceolate, to 10 mm broad; petals yellowish or dull orange; stigma hooded ....*P. linarifolia*
– Leaves oblong-elliptic, 10–25 mm broad; petals white with purple or violet tips; stigma 2-lobed ....*P. chinensis*

ACKNOWLEDGMENTS

The authors are thankful to the Head, Department of Botany, University of Calicut for facilities; Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden (Kerala) and officers and watchers in Kothamangalam Forest Division for their continuous assistance in field explorations; Kerala State Council for Science, Technology and Environment, Thiruvananthapuram for financial assistance (126/2016/KSCSTE dated 26 May 2016). VM is thankful to Government of Kerala for Centralized Grants Disbursal System for the financial assistance.

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Impatiens raktakesara (Balsaminaceae), a new species from the southern Western Ghats, India

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Abstract: A new species, ***Impatiens raktakesara***, belonging to section *Scorpioidae* is described and illustrated from Idukki district of Kerala in the southern Western Ghats. It is morphologically similar to *Impatiens goughii*, but can easily be distinguished in having uniseriate moniliform trichomes on leaf upper surface, unlobed lower petals and 1–3(-5)-seeded capsules. *Impatiens raktakesara* is assessed here as Endangered based on the categories and criteria of the IUCN Red List.

Keywords: Anamudi hills, Eravikulam National Park, *Impatiens*, taxonomy.

The genus *Impatiens* L. (Balsaminaceae) comprises more than 1000 species distributed primarily in the mountainous areas of the Old World tropics and subtropics (Grey-Wilson, 1980; Fischer, 2004; Janssens et al., 2006). Southeast Asia, southern India and Sri Lanka, the eastern Himalayas, tropical Africa, and Madagascar are the hotspots for *Impatiens* species diversity, with numerous endemics in each area (Yuan et al., 2004; Janssens et al., 2006). More than 210 species of *Impatiens* are known from India, the majority of which are restricted to Himalayas or Western Ghats. Over half of the species in India occur in the Western Ghats, and nearly 103 species are endemic to the Western Ghats (Bhaskar, 2012). Based on morphological and molecular data, Yu et al. (2016) classified the genus into two subgenera: subgen. *Clavicarpa* Warb. and subgen. *Impatiens*. The subgen. *Impatiens* was further divided into seven sections: sect. *Semeiocardium* (Zoll.) S.X. Yu & Wei Wang, sect. *Impatiens*, sect. *Tuberosae* S.X. Yu & Wei Wang, sect. *Racemosae* Hook.f. & Thomson, sect. *Uniflorae* Hook.f. & Thomson, sect. *Scorpioidae* S.X. Yu & Wei Wang and sect. *Fasciculatae* X.S Yu & Wei Wang.

During fieldwork in the floristically rich Idukki district of Kerala in the southern Western Ghats, which was undertaken to better document the angiosperm diversity of the district, we found an unrecognized species of *Impatiens* resembling *I. goughii* Wight. After careful comparison of morphological characters in living and herbarium specimens, and after consulting the relevant literature, we found that the entity in question is consistently distinct from *I. goughii* and all other species of *Impatiens*. Hence, it is described herein as a new species belonging to sect. *Scorpioidae*.

Materials and methods

Specimens of the new taxon were collected during field work in Idukki district. Collected materials were dried or preserved in 4% formalin and 70% ethanol. Photographs of habitat and habit were taken with a 77D DSLR Camera (Canon, Japan). Photographic images of floral parts were taken with a Stemi 508 stereomicroscope (Zeiss, Germany) attached with an Axiocam 105 color camera. The terminology of morphological characters follows Grey-Wilson (1980), and the taxonomic description was prepared after examining all available specimens. Voucher specimens were deposited at CALI (acronyms after Thiers 2020). Conservation assessment was done using the IUCN Red List categories and criteria (IUCN, 2012; IUCN Standards and Petitions Committee, 2019). To assess the distinctiveness of the new species, the relevant literature was consulted (Grey-Wilson, 1980; Sasidharan, 2011; Bhaskar, 2012; Shajitha et al., 2016; Yu et al., 2016) and

Brittonia, 73(3):316–322 (2021),
https://doi.org/10.1007/s12228-021-09676-7
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Published Online: 25 June 2021

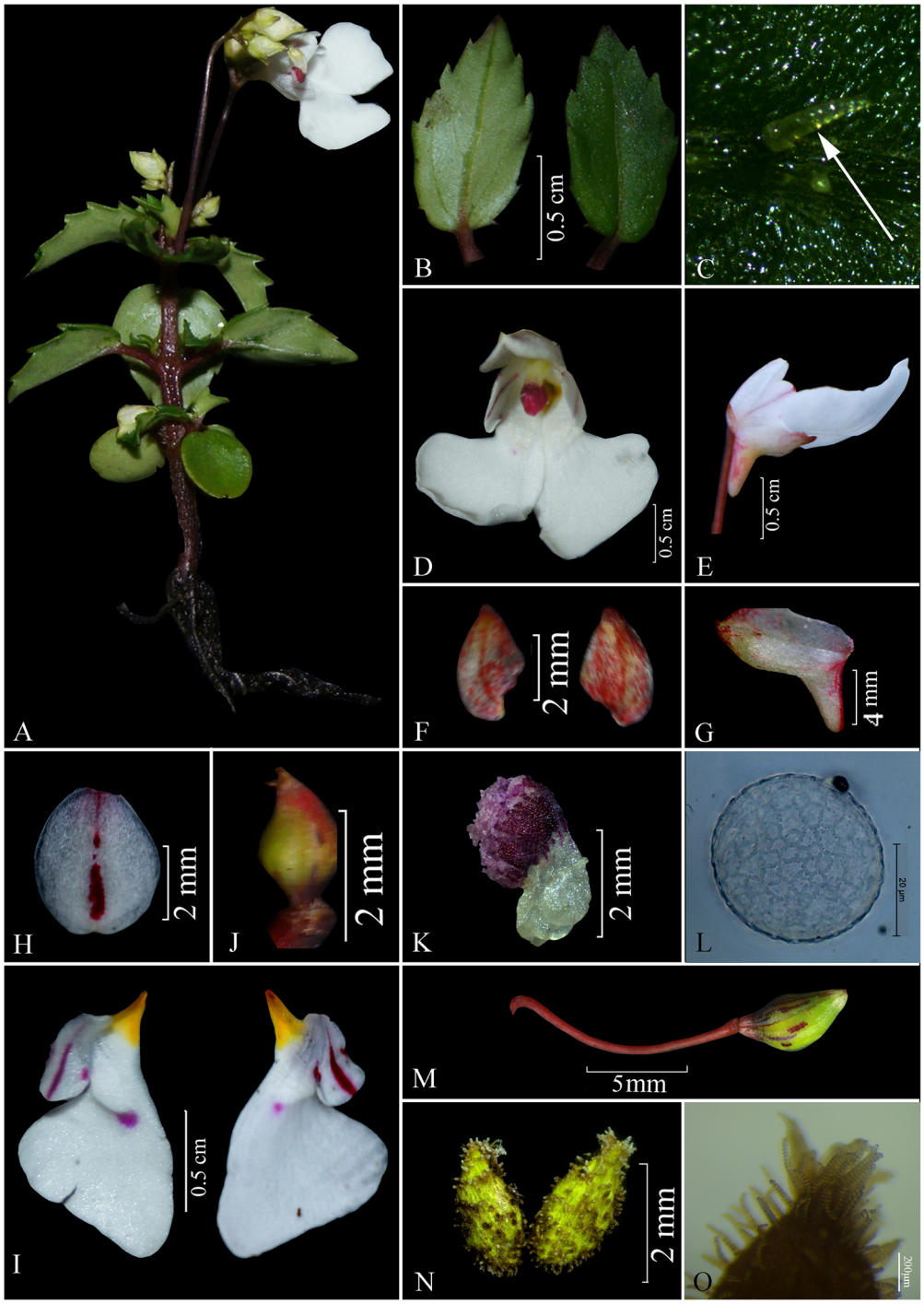

Fig. 1. *Impatiens raktakesara*. **A.** Habit. **B.** Leaf abaxial (left) and adaxial (right) surfaces. **C.** Detail of leaf adaxial surface showing trichome. **D.** Flower, frontal view. **E.** Flower, lateral view. **F.** Lateral sepals. **G.** Dorsal sepal with spur. **H.** Dorsal petal. **I.** Lateral united petals. **J.** Ovary. **K.** Connate stamens. **L.** Pollen grain. **M.** Mature fruit. **N.** Seeds. **O.** Detail of seed showing trichomes. (A–O from the holotype; photographed by Vishnu Mohan.)

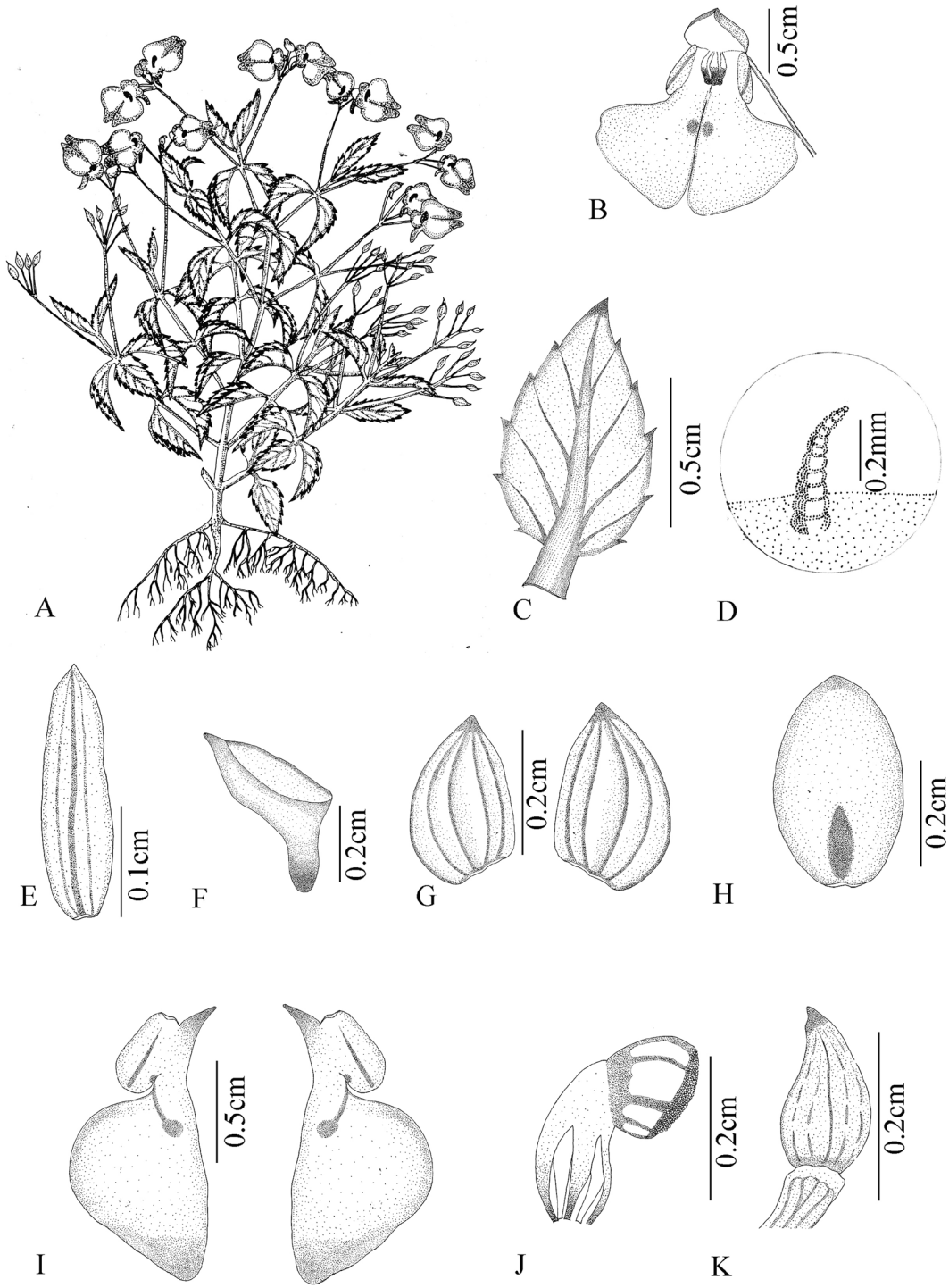

Fig. 2. *Impatiens raktakesara*. **A.** Habit. **B.** Flower, frontal view. **C.** Leaf, abaxial view. **D.** Leaf trichome. **E**. Bract. **F**. Dorsal sepal with spur. **G.** Lateral sepals. **H.** Dorsal petal. **I.** Lateral united petals. **J.** Connate stamens. **K.** Ovary. (A–K from the holotype; illustrated by Vishnu Mohan.)



FIG. 3. Habitat of *Impatiens raktakesara*. (Photographed by Vishnu Mohan.)

morphological comparisons were made with specimens of *I. goughii* and other similar species housed in the CALI herbarium and available as online images on GBIF (gbif.org) (Appendix 1).

Taxonomic treatment

Impatiens raktakesara Vishnu & Nampy., **sp. nov.**—Type: India, Kerala, Idukki District: Umiyamala peak, 10°10.3770"N,77°4.9870"E, ±2419 m, 30 Aug 2019, *Vishnu Mohan & Santhosh Nampy170254* (holotype: CALI; isotype: CAL). (Figs. 1 & 2.)

Diagnosis: *Impatiens raktakesara* is most similar to *I. goughii* (Fig. 5) but differs in having uniseriate moniliform trichomes on the upper leaf surface, unlobed lower petals, and 7–9 mm long, 1–3(-5)-seeded capsules.

Caulescent, lithophytic herbs, 4–40 cm tall. Stems simple or branched, purple, non-sticky, terete at base, grooved above, with scattered moniliform trichomes. Leaves simple, decussate; lamina 5–15 × 3–7 mm, ovate, serrate at margins, rounded at base, attenuate at apex, dark green above, pale green below, with scattered uniseriate moniliform trichomes on upper surface, glabrous below; petioles 1.5–2 mm long, grooved, glabrous. Inflorescences 4–6-flowered umbels, axillary from distal leaves; peduncles 2–5 cm long, sticky, dark brown; pedicels 0.4–0.6 cm long, erect, smooth, dark brown; bracts 2.2–2.4 mm long, linear, brown, persistent. Flowers 1.3–1.6 × 0.8–1.2 cm; sepals 3, free; lower sepal cymbiform, entire at margins, conical at apex, white with reddish patches; spur 4–5 mm long, straight, white with reddish patch on adaxial side; lateral sepals 3–3.3 × 2–2.2 mm, elliptic, entire at margins, acute at apex, oblique basally, glabrous, pale green to brownish red; petals white, delicate; dorsal petal 3.8–4.2 × 2.8–3.1 mm, widely elliptic to obovate, entire at margins, rounded at base and apex, white with a pink line at middle; lateral united petals 1.4–1.6 × 0.8–0.9 cm, entire at margins, with a pink spot between the upper and lower petals; upper petal white with 2 or 3 pink patches; auricle 2–2.5 mm long, yellow, extending into the spur; lower petal white, unlobed; stamens 5; filaments 1.8–2 mm long, united, white, papery; anthers 5–6 × 1.3–1.4 mm, united, oval, extrose, pink, longitudinally dehiscing; pollen 27–29 × 26–28 μm, white, spheroidal, with the exine reticulate; ovary 1.8–2 × 1 mm, elliptic, pale green to reddish; style 0; stigma sticky, crested. Capsules 7–9 × 2–4 mm, short-fusiform, subacute at apex, green with reddish patches, 1–3(-5) seeded. Seeds 2–3 × 1–2 mm, ovate, with the surface hairy throughout, the hairs spirally banded.

Distribution and habitat.—Known only from Idukki district in Kerala, where it grows on steep,

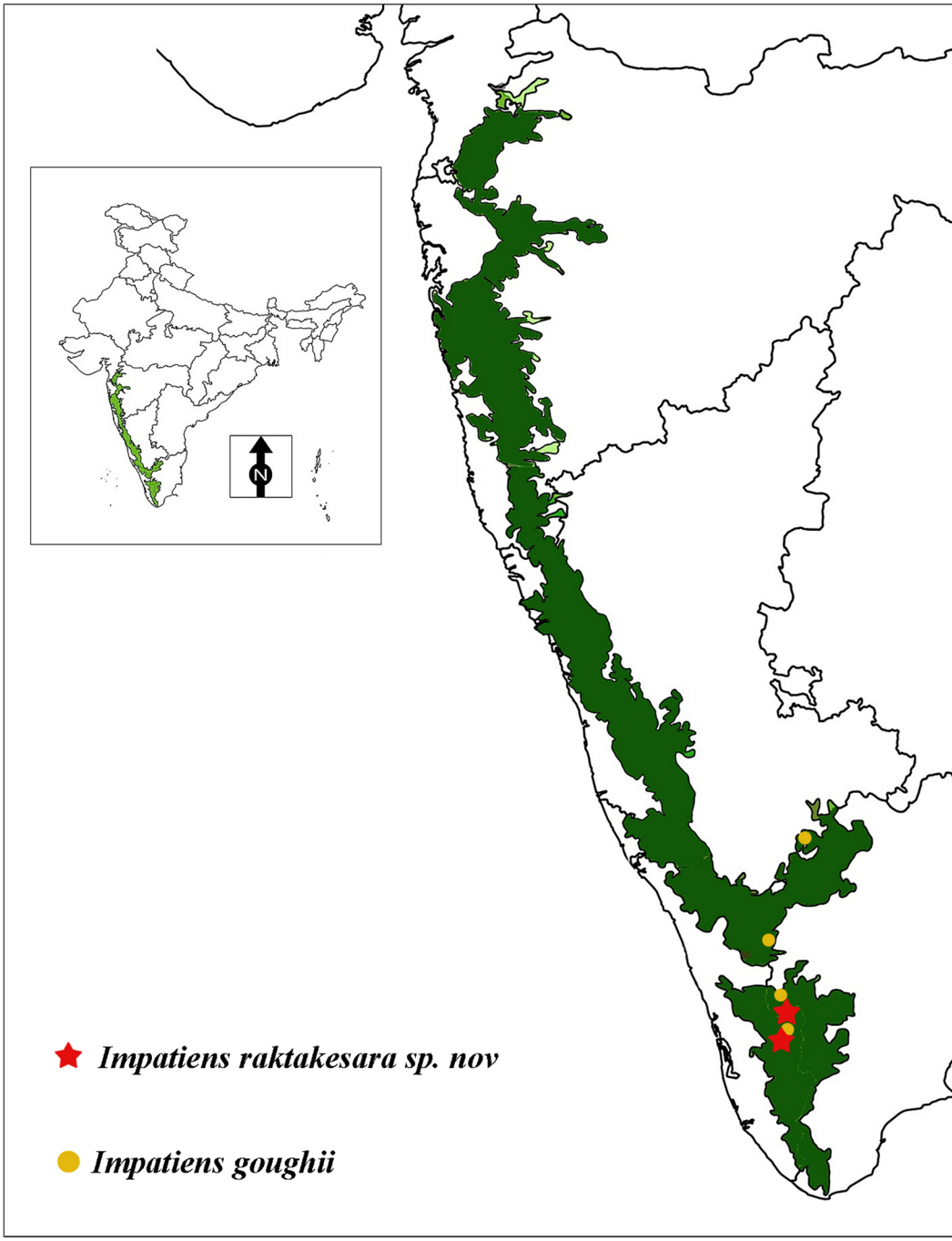

Fig. 4. Geographical distribution of *Impatiens raktakesara* and *I goughii*.

exposed, water dripping rocks, in association with *Utricularia nayarii* Janarth. & A.N. Henry (Lentibulariaceae), species of *Tripogon* Roth, *Isachne* R.Br. (both Poaceae) and *Funaria* Hedwig (moss), at elevations above 2000 msl. (Figs. 3 & 4).



Fig. 5. *Impatiens goughii*. (Photographed by Vishnu Mohan.)

Phenology.—Flowering and fruiting from August to December.

Etymology.—The specific epithet is derived from the Sanskrit words 'rakta', meaning red, and 'kesara', the word for stamens, the whole referring to the red colored stamens.

Conservation status.—The new species is known from four subpopulations in a protected area, each separated by a distance of 5 km. The estimated Extent of Occurrence (EOO) is 25 km^2 and the Area of Occupancy (AOO) is less than 10 km^2. The number of mature individuals is estimated to 120–180, when considering all the localities. Since these locations are inside a protected area, the likelihood of a decline due to anthropogenic activity is small. Nevertheless, we recommend that the species be categorized as Endangered [EN] based on criterion D: population size estimated to number less than 250 mature individuals (IUCN, 2012; IUCN Standards and Petitions Committee, 2019).

Additional specimens examined. INDIA. Kerala: Idukki district: Aanamudi, 10°10.0490"N, 77°3.5840"E, ±2658 m , 11 Dec 2019 *Vishnu Mohan & Santhosh Nampy 164675* (CALI); Subran shed, 30 Dec 2019, *Vishnu Mohan & Santhosh Nampy 164898* (CALI).

Notes.—*Impatiens raktakesara* is assigned to section *Scorpioidae* due to its decussate leaves, 2–4-flowered inflorescence, and short fusiform capsules. This lithophytic *Impatiens* grows up to 40 cm tall with flowers in axillary umbels. The stems are simple or branched and purple, but the most striking feature of the species is its red anthers. Within the

Table 1. Morphological comparison between *Impatiens raktakesara* and *I. goughii*.

Characters	*I. raktakesara*	*I. goughii*
Plants	4–40 cm tall	15–25 cm tall
Leaves	5–15 × 3–7 mm; with uniseriate moniliform trichomes above, glabrous below	8–16 × 6–10 mm; glabrous above and below
Flowers	4–6 per umbel, 8–12 mm wide	4–8 per umbel, 4–6 mm wide
Lateral sepals	Elliptic	Subulate
Lateral united petals	White with a pink spot between the upper and lower petals, upper petal white with 2 or 3 pink patches; lower petals unlobed	Pink or rarely white with a pair of dark crimson eyes followed by white blotches at the mouth; lower petals lobed
Peduncle	2–5 cm long	2–8 cm long
Capsule	7–9 mm long	3–5 mm long
Seeds	1–3(-5) per capsule, 1.8–3 mm long, with spirally banded trichomes	12–15 per capsule, 1–1.5 mm long, with moniliform trichomes

section, the new species is most similar to *I. goughii* (Fig. 5), in having an umbellate inflorescence, a pink spot between the upper and lower petal, a boat-shaped lower sepal, and overlapping geographical distributions (Fig. 4). A morphological comparison between the two species expanding on the differences listed in the diagnosis is given in Table 1. The new species is also similar to *I. omissa* Hook.f. and *I. parvifolia* Bedd., in having umbellate inflorescence, a boat-shaped lower sepal, the spur of lip shorter than wings, and reticulate pollen, but it can be easily distinguished from both by the lower petals unlobed (vs. deeply lobed in *I. omissa* and *I. parvifolia*), seeds up to five in the capsule (vs. numerous in *I. omissa* and *I. parvifolia*) and the spur sparsely hairy (vs. glabrous).

Acknowledgements

The authors are thankful to the Head of the Department of Botany at the University of Calicut for facilities; the Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden (Kerala), Smt. Lekshmi R (Wild Life Warden, Munnar Wild Life Division), Mr. Sandeep S (Assistant Wild Life Warden Munnar Wild Life Division) and all other forest officers and watchers for their continuous assistance in frequent field explorations; and the Kerala State Council for Science, Technology and Environment, Thiruvananthapuram for financial assistance (126/2016/KSCSTE dated 26 May 2016).

Appendix

Appendix 1. **Selected specimens examined of *Impatiens goughii*. INDIA. Kerala:** Idukki district: Devikolam, 8 Jul 1944, *James Sinclair 3670* (E digital image); Idukki, 29 Dec 1977, *K. U. Karmer & G. B. Nair 6531* (U digital image); Mathikettan shola National Park, 4 Jan 2017, *Vishnu Mohan & Santhosh Nampy 151490* (CALI); Neymakkad, 24 Jan 2018, *Vishnu Mohan & Santhosh Nampy 158187* (CALI); *Ibid*., 8th mile, 25 Jan 2018, *Vishnu Mohan & Santhosh Nampy 158220* (CALI); Meesapulimala, 8th plot, 15 Oct 2019, *Vishnu Mohan & Santhosh Nampy 170392* (CALI); Thrissur district: Sholayar, 18 Aug 1989, *N. Sasidharan 5461* (CALI); 19 Apr 2008, *K. H. Amithabachan 99056* (CALI); 30 June 2007, *K. H. Amithabachan 99091*(CALI). **Tamil Nadu:** Dindigul district: Shembaganur, 7 Feb 1986, *K. M. Matthew 44066* (L digital image).

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Taiwania 65(2): 187–194, **2020**
DOI: 10.6165/tai.2020.65.187

Two new scapigerous species of *Impatiens* (Balsaminaceae) from southern Western Ghats, India

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(Manuscript received 7 August 2019; Accepted 10 March 2020; Online published 18 March 2020)

ABSTRACT: Two scapigerous species of *Impatiens* (Balsaminaceae): *I. nidholapathra* and *I. grandispora* from Idukki district in Kerala, India are here described. *Impatiens nidholapathra* is most similar to *I. tirunelvelica* from which it differs by its membranous and silky lanuginose leaves. *Impatiens grandispora* is related to *I. stolonifera* morphologically but differs mostly by the purplish white flowers with red patches of papillae near the centre and considerably larger pollen grains. They are known from a small, fragmented population from a low range of hills. Therefore, under the IUCN Red List Categories & Criteria, they are assessed as Critically Endangered. We provide here morphological descriptions, illustrations, colour photoplates, notes on their habitats, distribution, phenology and conservation status.

KEY WORDS: Idukki district, *Impatiens grandispora, I. nidholapathra, I. stolonifera, I. tirunelvelica*, India, new species.

INTRODUCTION

Impatiens L., a genus of the Balsaminaceae family, has over 1000 species in the world (Grey-Wilson, 1980). They are terrestrial or occasionally epiphytic, more or less succulent annual or perennial herbs with attractive and morphologically complex flowers and dehiscent fruits. The majority of *Impatiens* species are distributed in five hotspots: Southeast Asia and Southwestern China, eastern to central Himalayas, southern India, tropical Africa and Madagascar (Grey-Wilson, 1980). The Western Ghats is one of the centers of diversity for this genus (Bhaskar, 2012). There are currently 210 accepted species of *Impatiens* known from India, of which 110 species are reported from Western Ghats, including 30 scapigerous species with greater percentage of endemism. Based on morphological and molecular data Yu *et al.* (2016) divided the genus into two subgenera: subgen. *Clavicarpa* and subgen. *Impatiens*. The subgen. *Impatiens* is further divided into seven sections: Sect. *Semeiocardium*, Sect. *Impatiens*, Sect. *Tuberosae*, Sect. *Racemosae*, Sect. *Uniflorae*, Sect. *Scorpioidae* and Sect. *Fasciculatae*.

During field trips to the floristically rich Idukki district in Kerala (southern Western Ghats), as a part of documenting the angiosperm diversity, specimens of remarkable, apparently undescribed *Impatiens* taxa were collected and are described here as *I. nidholapathra* and *I. grandispora.* These novelties belong to the section *Uniflorae* in having 5-carpellate ovary, fusiform capsules conspicuously turgid at middle and flowers produced in racemes.

MATERIALS AND METHODS

Specimens of the new taxa were collected during field work in Idukki district. Collected materials were pressed and dried or preserved in 4% formalin and 70% ethanol. Photographs of habitat and habit were taken with a Canon 77D DSLR Camera. Colour plates were prepared using Zeiss Stemi 508 stereomicroscope attached with an Axiocam 105 color Camera. The description was prepared after examining all available specimens. Voucher specimens were deposited at CALI and K. The conservation status of these taxa were assessed using the standard IUCN Categories and Criteria (IUCN, 2012, 2017).

TAXONOMIC TREATMENT

Impatiens nidholapathra Vishnu & Nampy, ***sp. nov.***
Figs. 1A, 2 & 3

Type: INDIA, Kerala, Idukki district, 50th mile-Mankulam, 10°06′96.7″N; 076°58′80.7″E, ±1023 m, 14 Sep. 2018, *Vishnu Mohan & Santhosh Nampy 161903* (holotype, CALI; isotype, K).

Diagnosis*: I. nidholapathra* resembles *I. tirunelvelica*, but differs in its membranous silky lanuginose leaves, pale green veins, and pink corolla with a yellow centre surrounded by white papillae against fleshy glabrous leaves, brown veins, pink corolla uniformly white at centre in *I. tirunelveica*.

Tuberous acaulescent, lithophytic herbs, densely pubescent, 10–25 cm tall. Tubers oblate, 2–5 × 2–4 mm. Leaves radical, pendulous, membranous, elliptic to narrowly deltoid, 5–11 × 2–5.5 cm, serrate and spinose at margins, cordate but rarely cuneate or obliquely cordate at base, acute or rarely obtuse at apex, with a tuft of uniseriate trichomes on upper surface and silky lanuginose hairs on lower surface, nerves pale green below; petioles 1.5–6 cm long, glabrous. Flowers in



Fig. 1. A: Habitat of ***Impatiens nidholapathra*** Vishnu & Nampy. **B:** Habitat of ***Impatiens grandispora*** Nampy & Vishnu.



Fig. 2. ***Impatiens nidholapathra*** Vishnu & Nampy. **A:** Habit. **B:** Leaf abaxial side showing hairs. **C & D:** Inflorescence. **E:** Lower sepal with spur. **F:** Lateral sepals. **G:** Dorsal petal. **H:** Lateral united petals. **I:** Androecium. **J:** Ovary. **K:** Pollen grains showing reticulate exine. **L:** Pollengrain, a portion enlarged. **M**: Seed. **N**: Seed, part enlarged showing spirally coiled hairs.

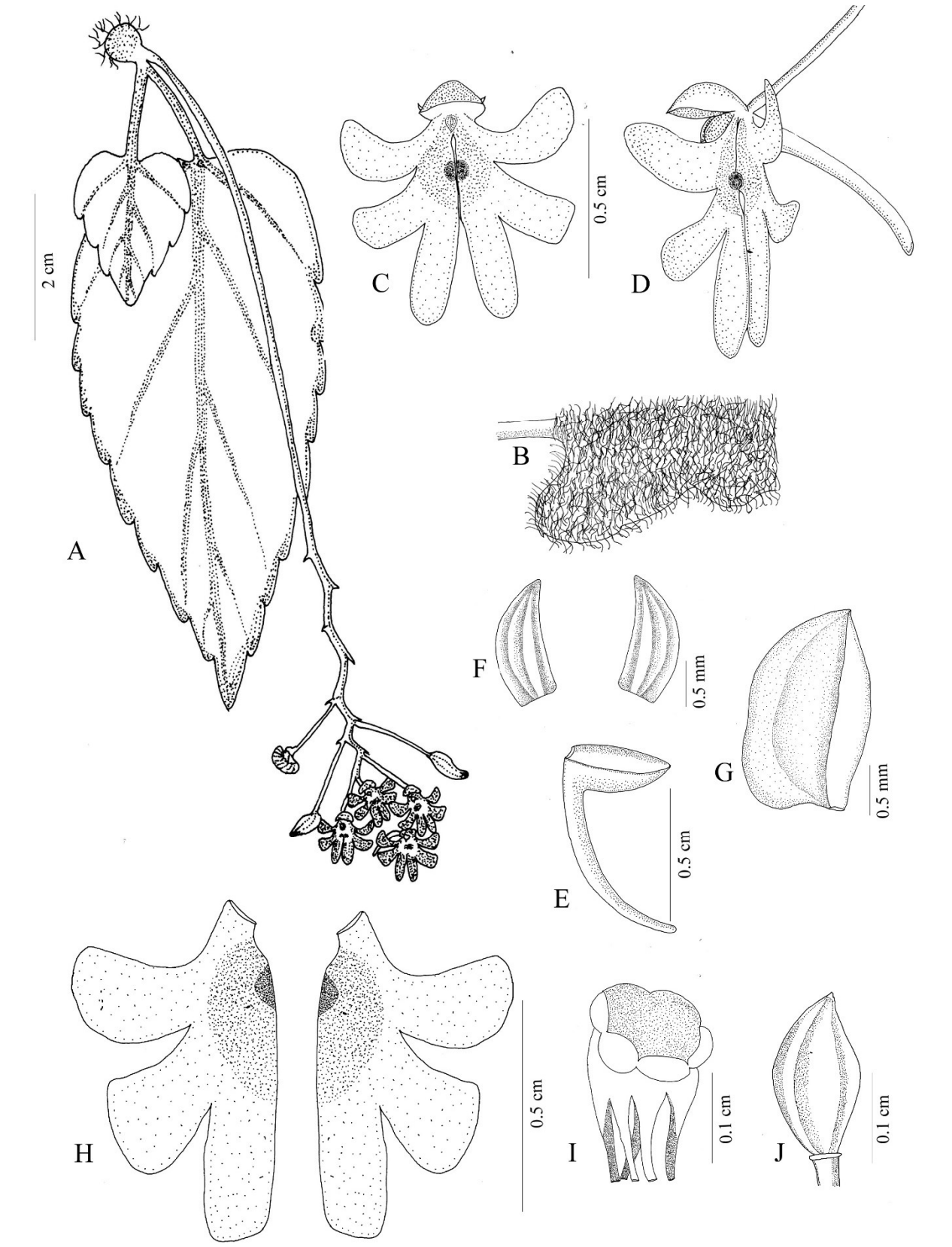

Fig. 3. **Impatiens *nidholapathra*** Vishnu & Nampy. **A:** Habit. **B:** Leaf abaxial side (a portion enlarged showing hairs). **C & D:** Flower (front and lateral views). **E:** Lower sepal with spur. **F:** Lateral sepals. **G:** Dorsal petal. **H:** Lateral united petals. **I:** Androecium. **J:** Ovary.

racemose scapes, scapes straight, 10–25 cm long; 4–12 flowered, pink. Pedicels glabrous, 0.8–1.5 cm long, erect, pale green. Bracts persistent, linear-lanceolate, 1–1.5 × 1 mm, pale green. Flowers 0.6–1 × 0.8–1.1 cm. Sepals free, pale green; lower sepal cymbiform, conical at apex, smooth at margins, white; spur 8–10 mm long, slightly incurved at base; lateral sepals elliptic, 1.7 × 0.7 mm, smooth at margins, rounded at base, acute at apex, glabrous. Petals pinkish, delicate; dorsal petal cordate, 2.7 × 3.3 cm, smooth at margins, rounded at base, acute at apex; lateral united petals 3-lobed, white papillae surrounds the yellow patch at base, 7 × 4.5 mm, smooth at margins, auricle absent. Stamens 5; filaments 2 × 3 mm; anthers united, ovate, 2 × 1 mm, extrose, longitudinally dehiscing; staminodes absent; pollen spheroidal, porate, golden yellow, *c.* 38±4 × 38±4 µm; exine reticulate. Ovary elliptic, 1 mm long, strigose; style 0; stigma sticky, capitate. Capsules 4 mm long, glabrous. Seeds numerous, golden brown, oval; testa reticulate with spirally coiled hairs.

Phenology: *Impatiens nidholapathra* produces flowers and fruits from August-October.

Distribution: Hitherto known only from the type locality.

Habitat: Grows on shady moist rocks in evergreen forests, in association with mosses (*Porella* L. and *Funaria* Hedw.), *Pilea microphylla* (L.) Liebm. (Urticaceae) and *Murdannia fadeniana* Nampy & Joby (Commelinaceae), at an elevation of 1023 msl.

Etymology: The epithet '*nidholapathra*' is derived from Sanskrit: 'nidholam' means pendulum and 'pathra' leaves, the whole referring to the pendulous nature of the leaves.

Notes: *Impatiens nidholapathra* is an integral component of evergreen forest found on shaded rocks and is highly sensitive to external conditions. They might be ruined by a small lack of moisture. The leaves are drooping and the flowers are pinkish with a 3-lobed lateral united petals. Even though it resembles *I. tirunelvelica* and *I. veerapazhasii,* it can be easily distinguished by its membranous and silky lanuginose leaves. Tubers on the rocks are covered with mosses and are non-stoloniferous but give rise to one or two leaves and a scape.

Specimen examined: India, Kerala, Idukki district, Kozhiyilakudi-Anakulam, 18 Sep. 2018, *Vishnu Mohan & Santhosh Nampy 161987* (CALI).

Conservation status: The authors came across three small populations from the Mankulam and Anakulam forests with no more than 30 individuals. The area of occupancy of each population is reduced to 3 m^2 with a distance of 14 km between two populations. Because of tourism and other anthropogenic activities, the type population may become extinct. The conservation status of the species is assessed as Endangered Category (IUCN, 2017).

Impatiens grandispora Nampy & Vishnu, ***sp. nov.***

Figs. 1B, 4 & 5

Diagnosis*: Impatiens grandispora* is close to *I. stolonifera* but differs by its pollen size (50 µm vs 25 µm), colour of papillae (red vs white), colour of bract (reddish brown vs pale green).

Type**:** INDIA, Kerala, Idukki district, Edathattu-Mankulam, 10°05′27.5″N; 076°57′29.0″E ±1395 m, 13 Sep. 2018, *Vishnu Mohan & Santhosh Nampy 159468* (holotype, CALI; isotype K).

Tuberous acaulescent, lithophytic, glabrous, herbs, 20–30 cm tall. Tubers oblate-prolate, 2–8 × 2–7 mm. Leaves radical, cordate to rounded, 6–8 × 4–6.5 cm, fleshy but leathery, serrate at margins, cordate at base, rounded or rarely mucronate at apex, with trichomes adaxially, glabrous abaxially, nerves pale green below; petioles 6–9 cm long, glabrous. Flowers in racemose scapes; scapes 20–30 cm long, reddish-brown; 4–16 flowered. Pedicels smooth, thin, erect, reddish-brown, 4–6 cm long; bract 1, persistent, ovate, 5–7 × 2 mm, acute at apex, smooth at margins, pale green-reddish brown. Flowers 2.5–3 × 1.8–2 cm. Sepals free, reddish-brown; lower sepal cymbiform, apex falcoid, 5–7 × 3–4 mm, smooth at margins, white, spurred; spur 3.8–4.3 cm long, base slightly incurved, white; lateral sepals obliquely triangular, 5–6 × 3.5–4 cm, smooth at margins, cordate at base, acute at apex, glabrous, reddish-brown. Petals purplish-white; dorsal petal cordate, 0.7–1 × 1.1–1.3 cm, smooth at margins, cordate at base, acute at apex; lateral united petals 3-lobed, 2.7 × 2 cm, smooth at margins, with a reddish patch of papillae at centre, auricle absent. Stamens 5; filaments papery, 5 × 8 mm; anthers oval, united, 5 × 2 mm, extrose, longitudinally dehiscing; pollen spheroidal, 50±8 µm diam., pantoporate with 2–4 pores, golden yellow; exine reticulate. Ovary elliptic, 4 × 1.5 mm; style 0; stigma sticky, capitate. Capsules 1.5 × 0.5 cm. Seeds numerous, golden brown, oval to elliptic with spirally coiled hairs.

Phenology: Flowering and fruiting occurs from August-October.

Distribution: Hitherto known only from the type locality.

Habitat: Grows on steep, exposed dripping rocks, in association with several grass species, at an elevation of 1425 msl.

Etymology: The epithet '*grandispora*' refers to the large pollen grains of the species.

Notes: The plants grow abundantly but are extremely sensitive to rain. They start to flowers only after receiving ample rains. But any rain during their period of flowering causes the plants to decline, eventually destroying the entire population. This sudden appearance and vanishing caused the tribal people to call them "Wonder Plant". With the beginning of next rainy season, the tubers will continue to give rise to new plants.



Fig. 4. ***Impatiens grandispora*** Nampy & Vishnu. **A:** Habit. **B:** Stolon. **C & D:** Flowers **E:** Lower sepal with spur. **F:** Lateral sepals. **G:** Dorsal petal. **H:** Lateral united petals. **I:** Androecium. **J:** Ovary. **K:** Pollen grains. **L**: Pollen grain, a portion enlarged showing reticulate exine. **M:** Seed. **N**: Seed, part enlarged showing spirally coiled hairs.

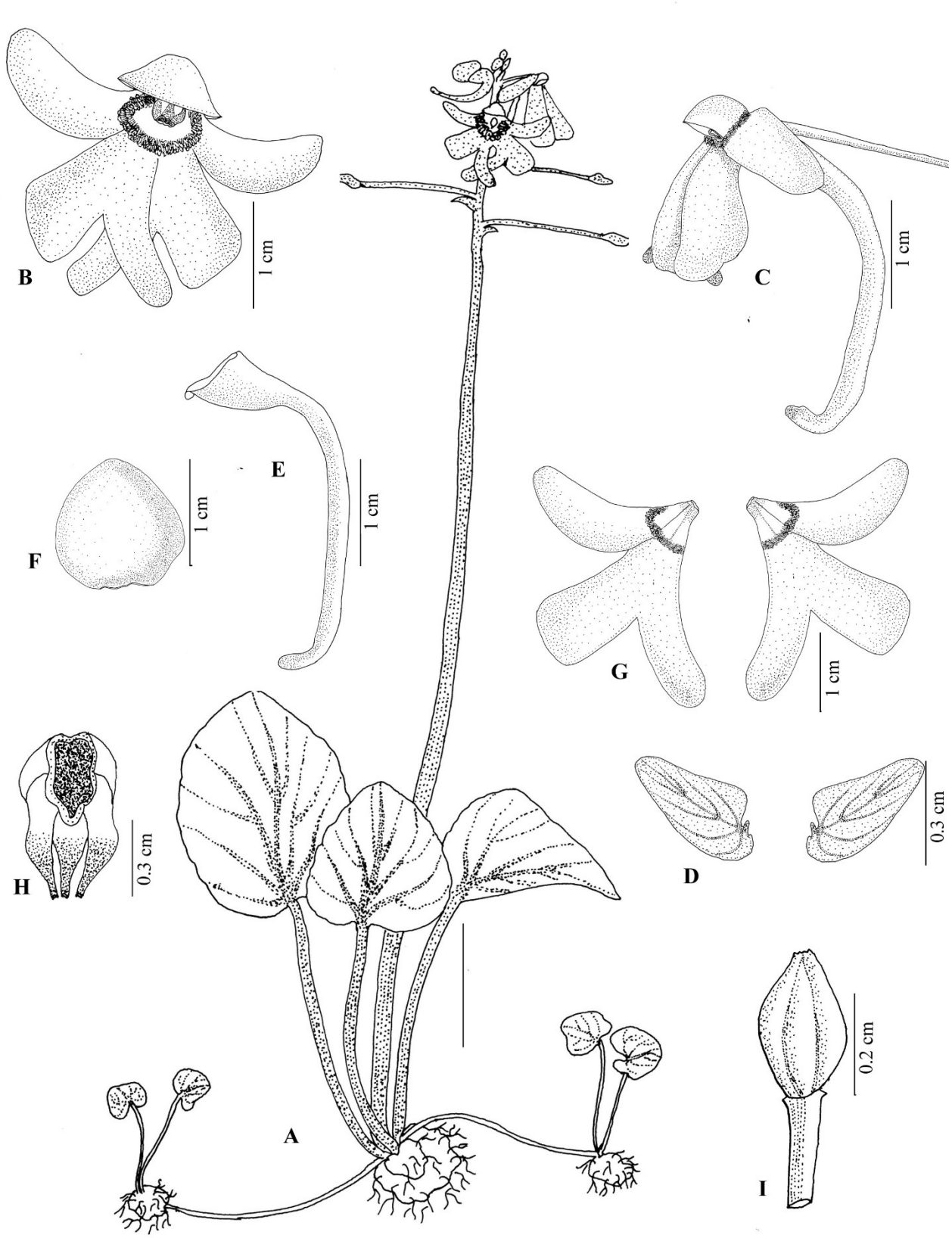

Fig. 5. **Impatiens *grandispora*** Nampy & Vishnu. **A:** Habit. **B & C:** Flower (front and lateral views). **D:** Lateral sepals. **E:** Lower sepal with spur. **F:** Dorsal petal. **G:** Lateral united petals. **H:** Androecium. **I:** Ovary.

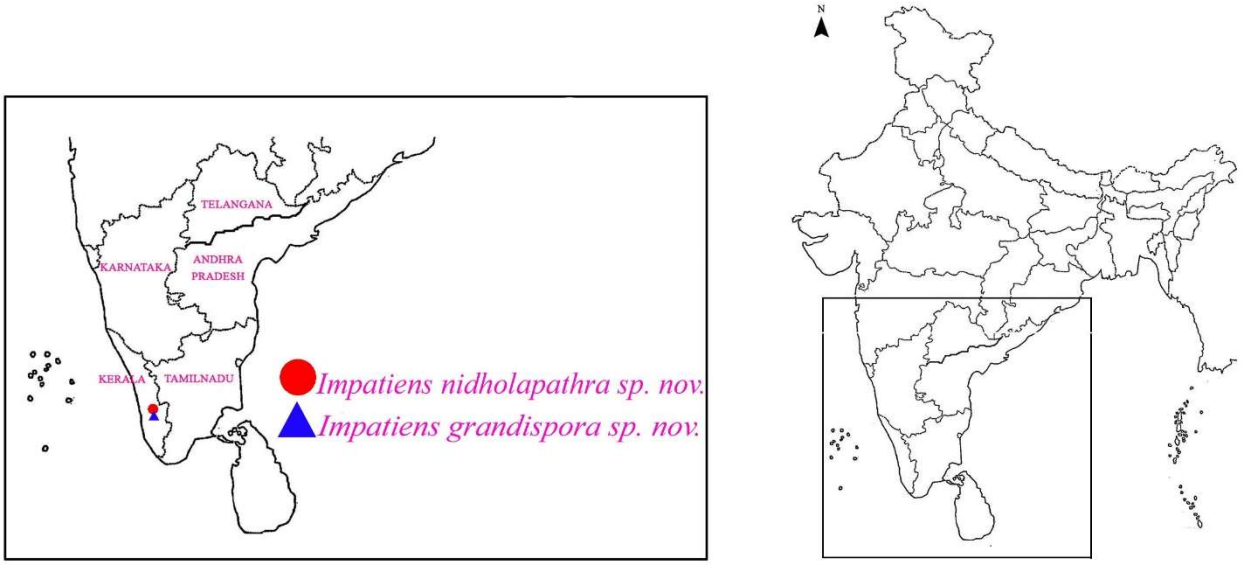

Fig. 6. Map showing distribution of ***Impatiens nidholapathra*** and ***I. grandispora***.

Although *I. grandispora* has similarities with *I. stolonifera*, there are many striking differences as well. While the latter's stolon is stout and exposed, that of the former is weak and unexposed. The former has purple white flowers with red patches of papillae near the centre, reddish brown pedicels, lateral united petals with inwardly bending basal lobes and larger pollen (50 µm) while the latter has white flowers with white papillae near the centre, pedicels pale green, lateral united petals with straight basal lobes and smaller pollen (25 µm).

Specimen examined: India, Kerala, Idukki district, Edathattu-Mankulam, 15 Oct. 2018, *Vishnu Mohan & Santhosh Nampy 167830* (CALI).

Conservation status: The current novelty is reported only from one location with 25–30 subpopulations. The extend of occurrence is 5 m^2. There are no perceived threats either to the populations or its habitat as it is reported from a protected area. Based on extend of occurrence, area of occupancy and number of individuals the species falls within the Critically Endangered Category (IUCN, 2017).

ACKNOWLEDGMENTS

The authors are thankful to the Head, Department of Botany, University of Calicut for facilities; Dr. K.N. Gandhi (Harward University) for confirming the gender of the specific epithet; Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden (Kerala), Divisional Forest Officer, Mankulam (Mr. Suhaib P.J.), Range Forest Officers of Mankulam Division (Mr. Anand R., Mr. Roy K.T.) and all other forest officers and watchers for their continuous assistance in frequent field explorations; Kerala State Council for Science, Technology and Environment, Thiruvananthapuram for financial assistance (126/2016/KSCSTE dated 26 May 2016).

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Phytotaxa 507 (1): 105–112
https://www.mapress.com/j/pt/
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Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

https://doi.org/10.11646/phytotaxa.507.1.6

Burmannia munnarensis (Burmanniaceae) a new species and rediscovery of *B. indica* after 110 years from southern Western Ghats, Kerala, India

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Abstract

A new species of *Burmannia* (Burmanniaceae), endemic to the southern Western Ghats of Kerala, India is described as *Burmannia munnarensis* and illustrations are provided. The new species is morphologically most similar to *B. indica* but can be easily distinguished by its narrow flower wings, involute margin of the perianth lobes, shorter perianth tube and shape of inflorescence. *Burmannia indica*, known only from the type locality Peermade in Idukki district, Kerala, is rediscovered after a lapse of 110 years on another locality, Meenuliyanpara in the same district. Key to the Indian species of *Burmannia* is included and status of both taxa is provisionally assessed as per IUCN Red List Categories and Criteria.

Keywords: *Burmannia wallichii*, Critically Endangered, Meebold, Meenuliyanpara, Munnar

Introduction

The Burmanniaceae Blume (1827:1) are a fascinating family of achlorophyllous mycoheterotrophic and autotrophic green plants that occur predominantly in tropical and subtropical regions of the world and comprise eight genera (Merckx *et al.* 2006, 2009). All autotrophic members of the family are all part of the largest genus, *Burmannia* Linnaeus (1753: 1) (Merckx *et al.* 2006). Although they have retained functional photosynthesis, most of green-leaved members have a certain degree of vegetative reduction, suggesting a partial dependence on mycorrhizal fungi. All achlorophyllous Burmanniaceae share strong modifications that are related to their mycoheterotrophic lifestyle: reduction of stomata, reduction of root hairs, reduction of leaves, and relatively well-developed underground parts (Jonker 1938, Maas *et al.* 1986, Leake 1994, Maas-Van de Kamer 1998).

Burmannia consists of about 46 species worldwide (POWO 2020), of which eight occur in India (Jonker 1938). The genus is mainly distributed in the tropics and subtropics of the world, but some species extending into warm temperate regions (Ma *et al.* 2018). Jonker in his revision recognised 57 species in two sections: sect. *Foliosa* Jonker, with five species of comparatively large, robust autotrophs and sect. *Burmannia* (as "*Euburmannia*"), with 52 species including both autotrophs and (semi-) mycoheterotrophs. The chlorophyllous autotrophic species generally occur as sparse individuals in open and often wet habitats; the mycoheterotrophic species, however, occur almost exclusively on humus and decaying leaves (occasionally decaying wood) in the dense shade of wet tropical forests (Zhang & Saunders 1999).

Recent floristic investigations in the southern Western Ghats of Kerala revealed some interesting specimens of *Burmannia* with purple flowers and narrow perianth wings. Detailed study based on literature (Jonker 1938, Maas *et al.* 1986) and consultation of type specimens demonstrated that these are quite different from any of the known taxa, and hence described and illustrated here as *Burmannia munnarensis sp.nov. Burmannia indica* Jonker (1938: 161), is so far known only by the type collection by Meebold in 1909 from Peermade in the Idukki district. During our recent field work we have collected this species in Meenuliyanpara in the same district and the present collection represents a rediscovery of this species after 110 years.

Accepted by Prabhukumar K.M.: 25 Apr. 2021; published: 4 Jun. 2021

Materials and methods

The plant materials were collected during field trips in Idukki district, Kerala and preserved in 4% formalin and 70% ethanol for laboratory study. The distribution and abundance of the species were observed by frequent field trips to the study area. Photographs were taken with an Axiocam 105 colour camera attached to a Stemi 508 stereomicroscope (Zeiss, Oberkochen, Germany). Herbarium sheets were prepared following recommendation in Bridson and Forman (1991) and deposited in Calicut University Herbarium (CALI). The identity of the species was confirmed in comparison with the types, protologues of related species and herbarium specimens deposited at B, BM, CAL, CALI, E, K and MH (Thiers, continuously updated). Provisional conservation status assessments were based on IUCN Red List Categories and Criteria (2019).

Taxonomic treatment

Burmannia munnarensis Dani & Nampy *sp. nov.* **(Figs. 1, 4).**

The new taxon is morphologically close to *Burmannia indica* Jonker but differs by the narrow flower wings (0.3–0.5 mm vs. 1.5–6 mm), nature of the perianth lobes (involute vs. not involute), length of the perianth tube (5–8 mm vs. 10–13 mm) and inflorescence (rarely branched, 1–4 flowered vs. branched at the top, 1–8 flowered).

Type:—INDIA. Kerala: Idukki district, Munnar, way to Rajamala, ± 1355 m a.s.l., 10°08′00.2″ N, 77°03′22.5″ E, 18 November 2020; *Dani Francis, Vishnu Mohan & Santhosh Nampy 173331* (holo CALI, iso CAL).

Annual, erect, chlorophyllous herbs, 8–18 cm tall. Roots fibrous, short. Stems slender, seldom branched, green, glabrous. Radical leaves absent; cauline leaves appressed, scale like, linear-lanceolate, 2–3.5 mm long, cuneate at base, entire at margin, acute-acuminate at apex, greenish, glabrous, single veined. Bracts lanceolate, ca. 2.5 × 0.8–1 mm, obtuse at apex, green, glabrous. Inflorescence rarely branched, 1–4 flowered. Flowers bisexual, 10–15 × 2–5 mm, narrowly 3-winged, sessile or shortly stalked; stalk 1–5 mm long, glabrous. Perianth pale purple; perianth wings half elliptical, 8–11 × 0.3–0.5 mm, running from the base of the limb to the base of the ovary and decurrent along the pedicel, rounded at apex, glabrous; perianth tube cylindrical, 5–8 × 1–1.5 mm; outer perianth triangular, 1–1.5 × ca. 0.6 mm, acute at apex; margin single, involute, slightly thick, purple, glabrous; inner perianth erect, narrow, linear, 0.5–1 mm long, acute at apex, margin single, slightly involute, pale purple, glabrous. Stamens 3, sessile in the perianth throat, ca. 1 mm long, yellow; anthers 2, thecae lateral, connective with two curved, divergent, obtuse, apical crests, and an obtuse, basal spur. Gynoecium 9–15 mm long; ovary 3–7 mm long, obovoid, tricarpellary, syncarpous with axile placentation, glabrous; ovules many, green; style filiform, ca. 6 mm long, glabrous; stigma trifid, funnel shaped, sub-bilabiate, style with stigma 7–8 mm long. Capsules obovoid, 3–7 mm long, truncate at base, dehiscing in transverse slits, glabrous. Seeds numerous, obovate, 0.1–0.3 mm long, slightly curved; testa spirally twisted.

Distribution and Ecology:—Known only from two localities in Idukki district, where it grows as sparse individuals in open wet grasslands and on dripping rocks along with species of *Utricularia striatula* Sm. (1818: 37) (Lentibulariaceae) and *Jansenella griffithiana* (Mull.Hal. 1856:14) Bor (1955: 10) (Poaceae) at an elevation of ± 1355 m.

Flowering & fruiting:—Flowering from October to November. Fruiting from November to December.

Etymology:—The specific epithet refers to the type locality 'Munnar' of the new species.

Notes:—*Burmannia munnarensis* also shows some similarity with *Burmannia wallichi* Hooker f. (1888: 5) in having narrow perianth wings and overall appearance of flowers and lacking radical rosette leaves, but differs by its habit (chlorophyllous, autotrophic vs. achlorophyllous, mycohetrotrophic), flowers (10–15 mm vs. 6.5 mm long), bracts (ca. 2.5 × 0.8–1 vs. ca. 1.5 × ca. 0.5 mm), connectives (two crest at apex vs. without crest at apex), ovary (3–7 mm vs. 2.5 mm long) and perianth wings (8–11 × 0.3–0.5 vs. ca. 4.5 × ca. 0.5 mm).

Additional specimens examined:—INDIA. Kerala: Idukki district, Pettimudi, near Subran shed, ± 1897 m a.s.l., 10° 9' 39.76"N, 77° 0' 39.51'E, 29 December 2019, *Dani Francis & Santhosh Nampy 170099* (CALI!).

Provisional conservation status:—*Burmannia munnarensis* is known only from two localities with about 50 mature individuals in each population. The extent of occurrence (EOO) of the species is estimated to be less than 50 km^2 and the area of occupancy (AOO) less than 10 km^2. The type locality is located in a tourist destination, and vulnerable to flood. There is a chance of a reduction in the number of plants in the near future. Hence the species is provisionally categorized as Critically Endangered (CR) based on the criteria A3 + B1 + B2 (bii + iii) + C2 (ai) + D (IUCN 2019).

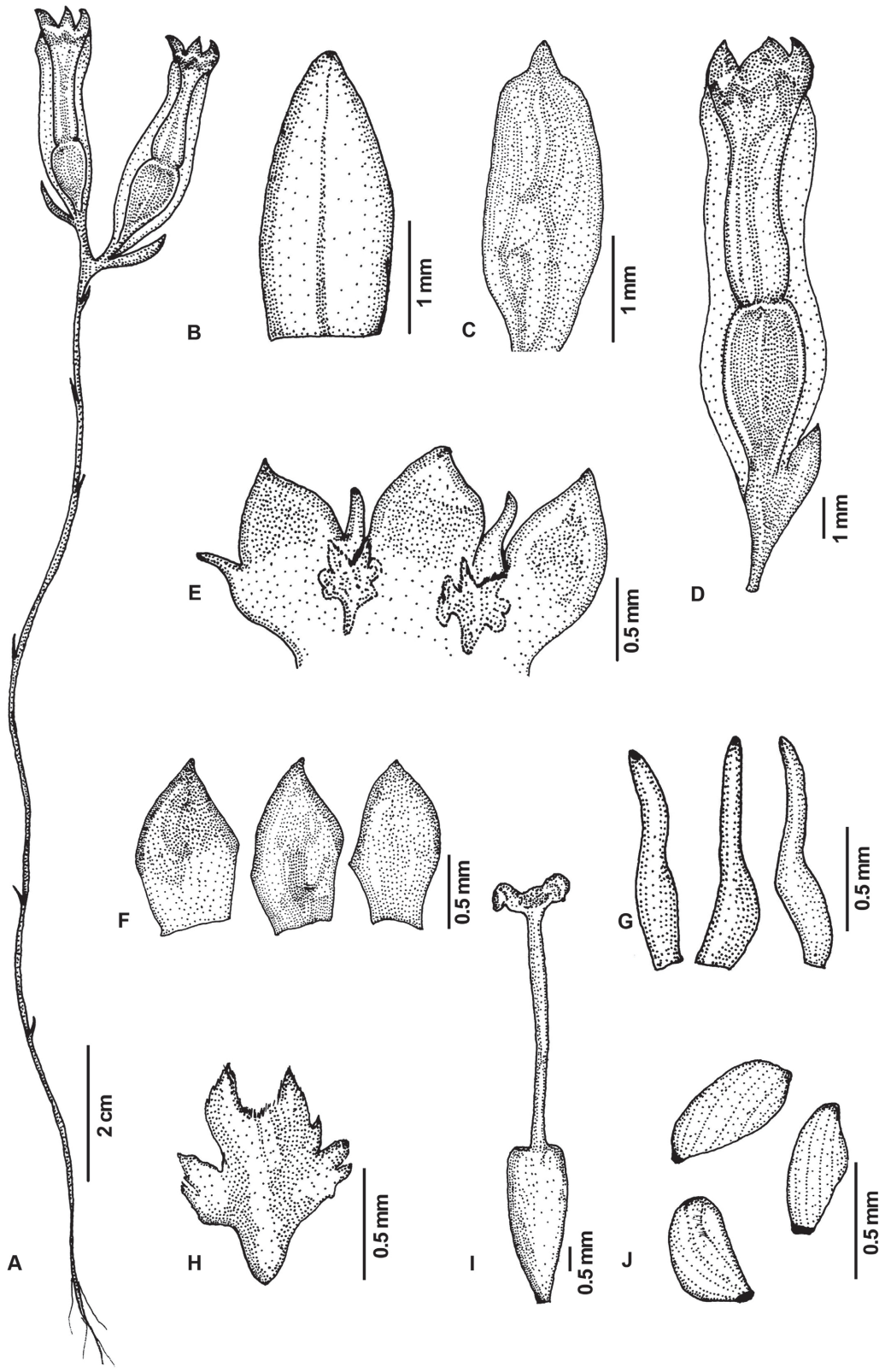

FIGURE 1. *Burmannia munnarensis* Dani & Nampy *sp. nov.*, A. Habit; B. Scale leaf; C. Bract; D. Single flower; E. Upper part of flower split open showing perianth lobes and stamens; F. Outer perianth lobes; G. Inner perianth lobes; H. Stamen, see the two lateral thecae, apical crests and basal spur; I. Gynoecium; J. Seeds. (Drawn by *Dani Francis* from *Dani Francis, Vishnu Mohan & Santhosh Nampy 173331*).

Burmannia indica Jonker (1938: 161) **(Figs. 2, 3, 4)**

Type:—INDIA. Kerala: Travancore, Peermade, December 1909, *Meebold, A. 12915* (B0296386, digital image!)

Annual, erect, chlorophyllous herbs, 15–35 cm tall. Roots fibrous, short. Stems slender, profusely branched, pale green-straw coloured, glabrous. Radical leaves absent; cauline leaves appressed, scale like, linear lanceolate, 1–3.5 mm long, cuneate at base, entire at margin, acute-acuminate at apex, greenish, glabrous; 3–5 veined. Bracts lanceolate, 2–4.2 × ca. 1.3 mm, acute at apex, green, glabrous. Inflorescence branched distally, 1–8 flowers on each branch. Flowers bisexual, 10–20 × ca. 5 mm, sessile or shortly stalked; stalk 1–7 mm long, glabrous. Perianth pale purple; perianth wings half elliptical, 10–16 × 1.5–6 mm, running from the base of the limb to the base of the ovary and decurrent along the pedicel, rounded or cordate at apex, glabrous; perianth tube cylindrical, 10–13 × 1–1.5 mm; outer perianth erect, triangular, 1–2 × 1.5–2 mm long, acute at apex, margin single, thick, swollen, purple, glabrous; inner perianth erect, thick, linear, 0.5–1 mm long, acute at apex, margin single, swollen, pale purple, glabrous, white. Stamens 3, sessile in the perianth throat, ca. 1 mm long, yellow; anthers 2, thecae lateral, connective with two curved, divergent, obtuse, apical crests, and an obtuse basal spur. Gynoecium 13–18 mm long; ovary ellipsoid or obovoid, 1–6 mm long, tricarpellary, syncarpous with axile placentation, glabrous; ovules many, green; style filiform, 8 mm long, glabrous; stigma trifid, funnel shaped, sub-bilabiate, style with stigma 5–12 mm long. Capsules obovoid, 1–6 mm long, truncate at base, dehiscing in transverse slits, glabrous. Seeds numerous, obovate, 0.1–0.3 mm long, slightly curved; testa spirally twisted.

Distribution and Ecology:—Endemic to southern Western Ghats of Kerala. The species is found in open and often wet rocky surfaces along with *Burmannia coelestis* D.Don (1825: 44) (Burmanniaceae), *Utricularia striatula* Sm. (1818: 37) (Lentibulariaceae), and *Tripogon bromoides* Roth (1817: 2) at an elevation of ± 1200 m.

Flowering & Fruiting:—Flowering from October to November. Fruiting from November to December.

Notes:—*Burmannia indica* was first described by F.P. Jonker in 1938 in his monograph of Burmanniaceae based on the homogenous collection of A. Meebold in 1909 from Peermade (now in Idukki district of Kerala). Hazra (1988) in *Fascicles of Flora of India* and Sasidharan (2011) in his *Flowering plants of Kerala* mentioned the occurrence of this species based on Meebold's collection and stated that it is endemic to Kerala. There was no subsequent collection of this species anywhere from south India after the original collection by Meebold in 1909 (Hooker 1888, Gamble 1928, Matthew, 1983). Thus, the present report forms a rediscovery after a lapse of 110 years and proves its existence in the area. The new locality Meenuliyanpara also belongs to the same district but is separated by approximately 270 km from the type locality. Jonker (1938) mentioned *B. indica* as a saprophytic species, which indicates the mycohetrotrophic nature of the species, but our collection is chlorophyllous and not mycohetrotrophic. It is likely that Jonker didn't see living material and his description is based solely on Meebold's specimens. Moreover, the open and often wet habitats of *B. indica* also indicates an autotrophic nature.

Additional specimens examined:—INDIA. Kerala: Idukki district, Meenuliyanpara, ± 1200 m a.s.l., 9° 99' 84" N, 76° 86' 49" E, 29 December 2019, *Dani Francis & Vishnu Mohan 164619* (CALI); *Ibid.*, 25 October 2020, *Santhosh Nampy 170085* (CALI).

Provisional conservation status:—*Burmannia indica* is known only from two localities, with only one of them extant. The number of mature individuals is about 30 in this population. The extent of occurrence (EOO) of the species is estimated to be less than 50 km^2 and the area of occupancy (AOO) less than 10 km^2. Since the only extant locality is a tourist destination, and a flood prone area, it is possible to infer a reduction in the past of the potential habitat of the species. For this reason, the species can be categorized as Critically Endangered (CR) based on criteria B1 + B2 (a + bii + iii) + C2 (ai) + D (IUCN 2019).

Key to the Indian species of *Burmannia*

1.	Mycoheterotrophic, achlorophyllous herbs	2
–	Non mycoheterotrophic, chlorophyllous herbs	4
2.	Rhizome tuberous; basal hanging connective spur absent	*B. championii*
–	Rhizome not tuberous; basal hanging connective spur present	3
3.	Perianth wings ca. 4.5 × ca. 0.5 mm, narrow, linear	*B. wallichii*
–	Perianth wings 5–10 × 2–3 mm, broad, half obovate-orbiculate	*B. candelabrum*
4.	Radical rosette of leaves absent	5
–	Radical rosette of leaves present (absent in *B. pusilla*)	7
5.	Stems unbranched; stem leaves thorn-like	*B. stricta*
–	Stems branched; stem leaves not thorn-like, linear	6

6. Wings 1.5–6 mm broad; margin of the perianth lobes swollen, not involute or revolute ..... *B. indica*
– Wings 0.3–0.5 mm broad; margin of the perianth lobes rather thin, involute..... *B. munnarensis*
7. Margin of the perianth lobes double.....8
– Margin of the perianth lobes single ..... *B. pusilla*
8. Robust herbs, up to 75 cm high, with well developed, radical rosette of leaves up to 15 × 1.3 cm .....*B. disticha*
– Slender herbs, up to 30 cm high; reduced, radical rosette of leaves about ca. 1 × ca. 0.3 cm ..... *B. coelestis*



FIGURE 2. *Burmannia indica* Jonker, A. Habitat; B. Inflorescence; C. Basal part of the plant, see the absence of radical leaves; D. Scale-like leaves; E. Bract; F. Flowers; G. Upper part of flower split open showing perianth lobes and stamens; H. Upper part of flower showing closeup of perianth; I. Outer perianth lobes; J. Inner perianth lobes; K. Stamen, see the two lateral thecae, apical crests and basal spur; L. Gynoecium; M. Enlarged view of stigma; N. Seeds; O. Cross section of ovary. (A–M from *Santhosh Nampy 170085*; O from *Dani Francis & Vishnu Mohan 164619*).

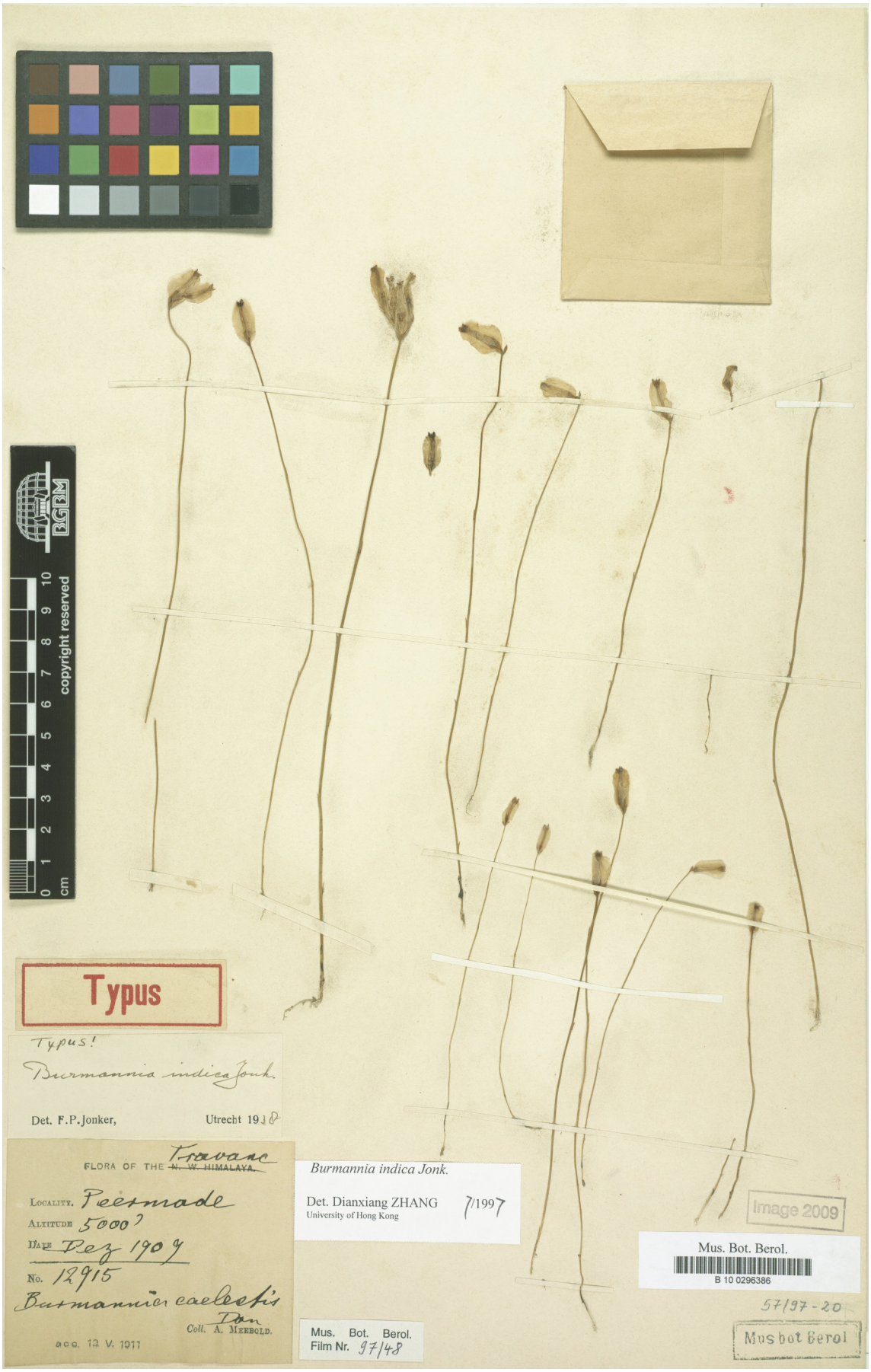

FIGURE 3. Type of *Burmannia indica* Jonker.

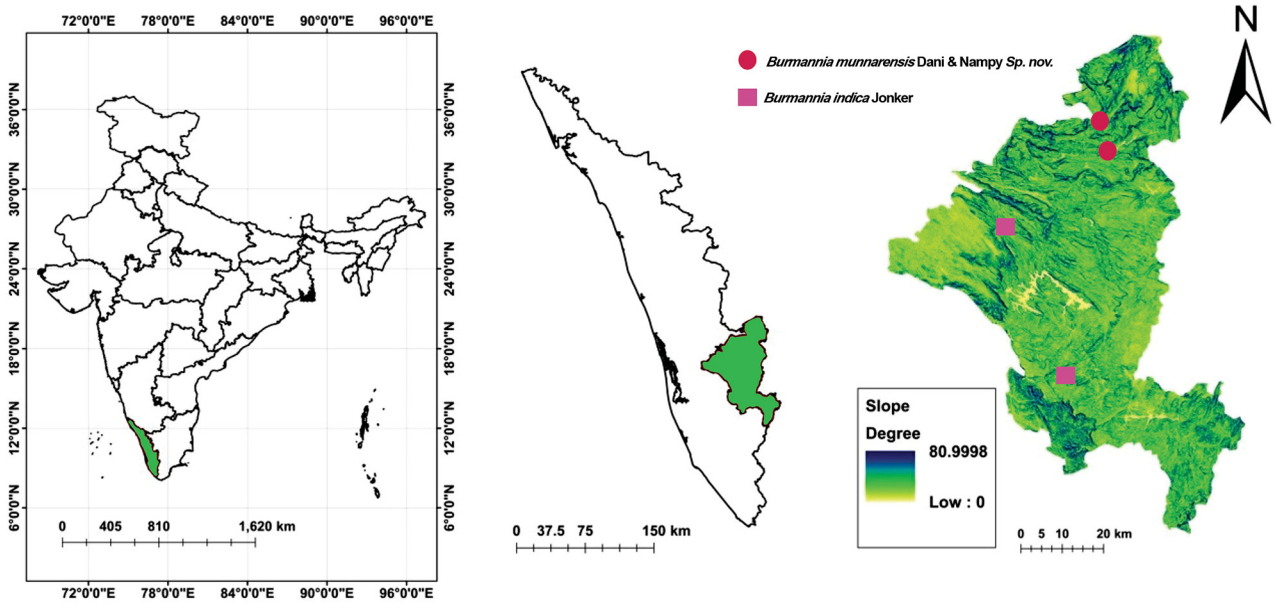

FIGURE 4. Map showing the distribution of *Burmannia munnarensis* Dani & Nampy and *B. indica* Jonker.

Acknowledgements

The authors are thankful to the Head, Department of Botany, University of Calicut, for facilities; officials of Kerala Forest Department for permission to undertake field trips to Idukki district and Dianxiang Zhang, Scientist, Chinese Academy of Sciences (CAS) for the confirmation of identity of *Burmannia indica*. The research is supported by Kerala State Council for Science, Technology and Environment, Thiruvananthapuram (126/2016/KSCSTE dated 26 May 2016).

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doi: 10.1017/S0960428620000013

A NEW SPECIES OF *ERIOCAULON* (ERIOCAULACEAE) FROM THE SOUTHERN WESTERN GHATS OF KERALA, INDIA

D. Francis, V. Mohan, D. K. Venugopal & S. Nampy

A new species of *Eriocaulon*, *E. vamanae*, is described from the southern Western Ghats of Kerala, India. It resembles *Eriocaulon nepalense* var. *luzulifolium* (Mart.) Praj. & J.Parn. but differs in the shape of its involucral bracts and receptacle, the fusion of the sepals in male flowers, the shape and indumentum of the sepals in female flowers, the size and indumentum of the petals in female flowers, and the seed coat appendages. *Eriocaulon vamanae* is so far known only from the type locality, Meesapulimala in Idukki District, Kerala, and is assessed as 'Critically Endangered' according to the IUCN's *Red List Categories and Criteria*.

Keywords. Critically Endangered, *Eriocaulon duthei*, *Eriocaulon nepalense* var. *luzulifolium*, *Eriocaulon thwaitesii*, grassland, Meesapulimala.

Introduction

Eriocaulon L., commonly known as pipeworts, is a genus of about 470 species (WCSP, 2019) in the Eriocaulaceae. The genus is widely distributed but with its centre of diversity in tropical regions (Stützel, 1998). Species of *Eriocaulon* live exclusively in damp or aquatic places (De Oliveira & Bove, 2011) and are mostly acaulescent herbs with a monoecious head inflorescence.

Regional infrageneric classifications of the genus based on morphological data have been provided by various authors: for Indian species by Fyson (1919, 1921, 1922) and Ansari & Balakrishnan (1994, 2009), for Chinese species by Ma (1991, 1997), and for East Asian species by Zhang (1999). In a recent molecular phylogenetic analysis using ptDNA and PHYC datasets by Larridon *et al.* (2019), the existing morphology-based infrageneric classification was reassessed, but the authors refrained from suggesting a new classification because of inadequate sampling. Ansari & Balakrishnan (2009) recognised twelve numbered sections (I–XII) based primarily on seed surface characters for the Indian species of *Eriocaulon*, but these are not supported by Larridon *et al.* (2019).

Ansari & Balakrishnan (2009) reported 80 species from India. Several new taxa were subsequently described from India, bringing the total number to 107 (Shimpale *et al.*, 2009; Shimpale & Yadav, 2010; Vivek *et al.*, 2010; Nampy *et al.*, 2011; Biju *et al.*, 2012; Swapna *et al.*, 2012; Sunil *et al.*, 2013; Rashmi & Krishnakumar, 2014; Sunil *et al.*, 2014; Manudev *et al.*, 2015; Sunil & Naveen Kumar, 2015; Anto & Reshma, 2017; Darshetkar *et al.*, 2017; Manudev *et al.*, 2017; Paithane *et al.*, 2017; Biju *et al.*, 2018; Khanna & Kumar, 2019).

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During floristic investigations in Idukki District, some interesting specimens of *Eriocaulon* were collected on the way to Meesapulimala (2640 m), the second highest peak in South India. A critical study using the available literature and specimens demonstrated that these are quite different from any of the known taxa, and they are described and illustrated here as *Eriocaulon vamanae*.

Materials and Methods

The material for the present study was collected during field trips in Idukki District, Kerala. Specimens were pickled in 4% formalin and 70% ethanol for laboratory study. The distribution and density of the species were observed by frequent field trips to the study area. Photographs were taken with a Stemi 508 stereomicroscope (Zeiss, Oberkochen, Germany) attached to an Axiocam 105 colour camera (Zeiss). Herbarium sheets were prepared by conventional methods (Bridson & Forman, 1991) and deposited in Calicut University Herbarium (CALI).

The identity of the species was confirmed with types or protologues and through consultation of online data sources (B, BM, CALI, E, K and MH). Detailed descriptions were prepared after proper diagnosis by examining the specimens. Seed micromorphology was studied with a scanning electron microscope (Zeiss Gemini SEM 300 Microscope).

Species Descriptions

Eriocaulon vamanae Dani & Nampy, **sp. nov.**

Eriocaulon vamanae is morphologically close to *Eriocaulon nepalense* var. *luzulifolium* (Mart.) Praj. & J.Parn. but differs in the shape of its involucral bracts (oblong versus broadly ovate) and receptacle (obovoid versus convex), nature of male sepals (free versus fused), shape and hairiness of female sepals (boat-shaped and glabrous versus linear to narrowly oblanceolate and hoary at apex), size and hairiness of female petals (1.1 mm long, barbate versus 1.5 mm long, hairy at apex) and number of seed coat appendages (1 or very rarely 2 versus 1–4). – Type: India, Kerala, Idukki District, Munnar, Meesapulimala, ± 2445 m, 10°05′22.7″ N, 77°11′27.1″ E, 21 xii 2018, *Dani Francis & Santhosh Nampy* 167894 (holo CALI!, iso CAL). **Figs 1–4.**

Acaulescent herbs, 1–3 cm tall. *Root stock* absent. *Leaves* green, linear, 0.9–2 × 0.1–0.2 cm, apex acute, broadening slightly towards base, margin entire, ciliate. *Sheath* 0.6–2 cm long, terete, ciliate; limb 6–9 × 2 mm, lanceolate, apex narrowly acute, ciliate. *Head* 2–3 mm across, hemispherical, black to straw-coloured. *Peduncles* many, 0.6–2.7 cm long, pubescent. *Receptacle* obovoid, 1 × 1 mm, pilose. *Involucral bracts* 2–2.1 × 1–2 mm, oblong, apex obtuse to subtruncate, base truncate, glabrous to sparsely hoary, blackish, margins entire. *Floral bracts* 2 × 0.8 mm, oblanceolate, apex acuminate, base cuneate, sparsely hoary towards apex, straw-coloured. *Male flowers*: stipe 0.2–0.3 mm, basally hairy. *Sepals* 3, free, obovate to oblanceolate, 1 × 0.8 mm, obtuse to acute at apex, cuneate at base, sparsely hoary towards apex, straw-coloured. *Stipe* of corolla 0.6 mm. *Petals* 3, equal,

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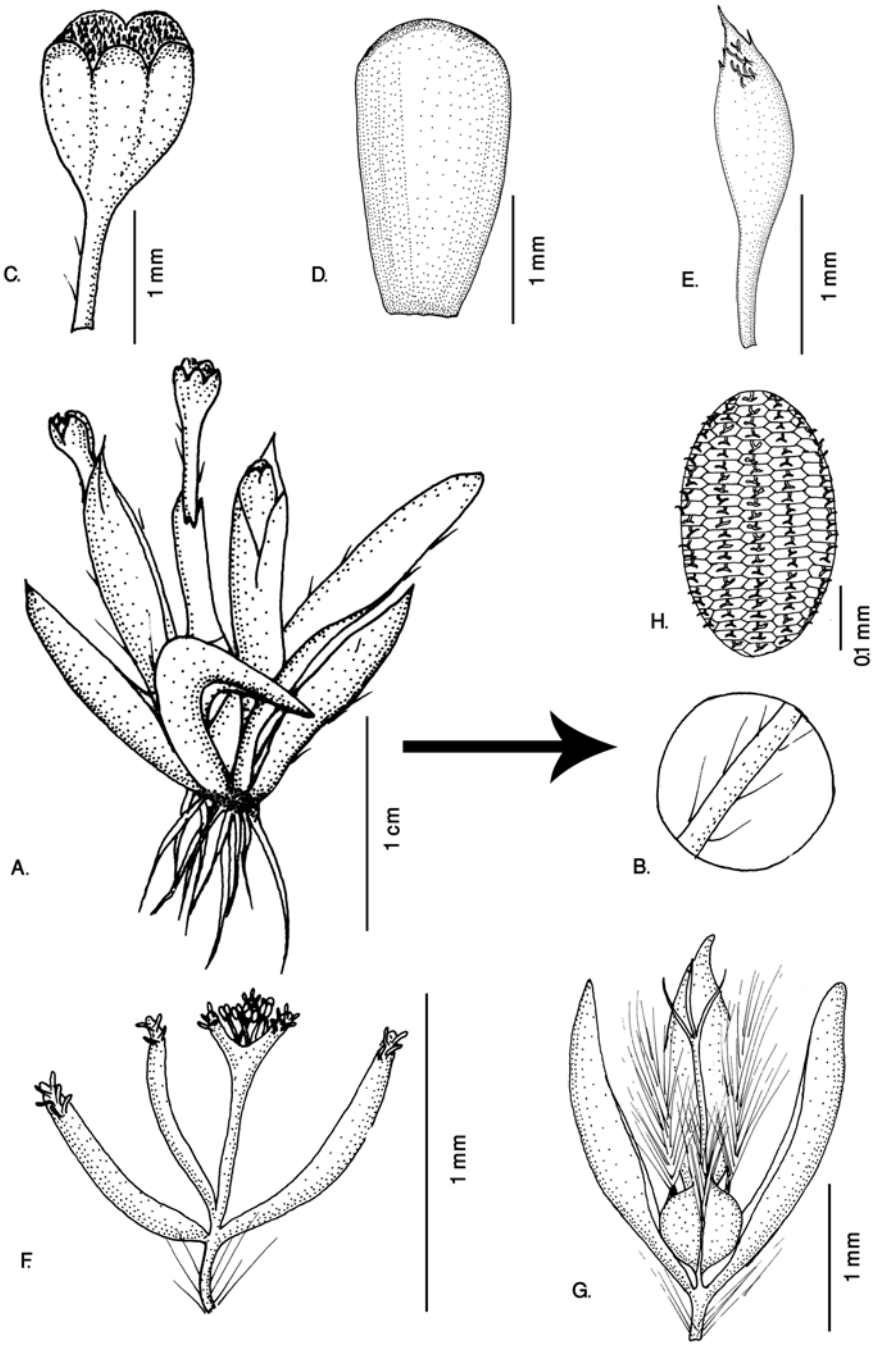

FIG. 1. *Eriocaulon vamanae* Dani & Nampy, sp. nov. A, Habit; B, hair pattern; C, head; D, involucral bract; E, floral bract; F, male flower; G, female flower; H, seed. Drawn by Dani Francis.

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FIG. 2. *Eriocaulon vamanae* Dani & Nampy, sp. nov. A, Habit; B, involucral bract; C, floral bract; D, male flower; E, male flower with sepals and petals spread out; F, female sepals; G, female petals; H, gynoecium with petals; I, seeds. A–I from *Dani Francis & Santhosh Nampy* 167894.

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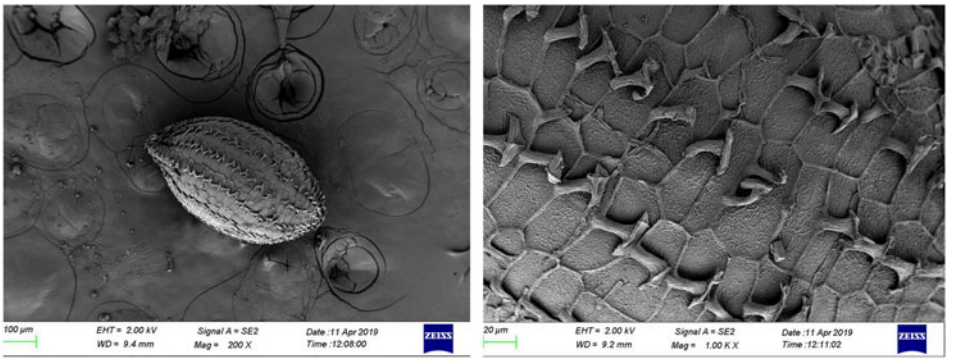

FIG. 3. Scanning electron micrograph showing seeds of *Eriocaulon vamanae* Dani & Nampy.

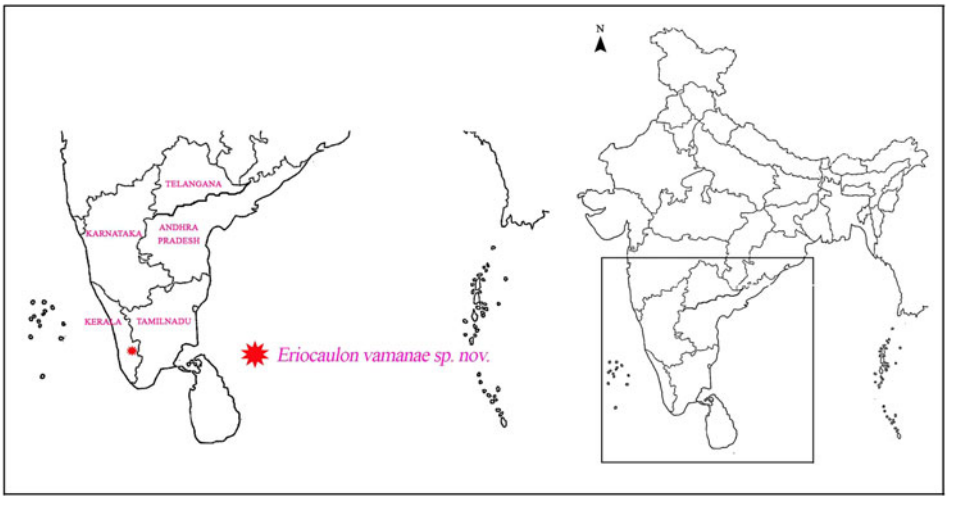

FIG. 4. Map showing the distribution of *Eriocaulon vamanae* Dani & Nampy.

0.2 mm, oblong, apex obtuse, hoary towards apex with a black gland, hyaline. *Stamens* 6; filaments 0.2 mm, white; anthers black. *Female flowers*: stipe 0.2 mm, basally hairy. *Sepals* 3, free, subequal, 1.6–2 mm, boat-shaped; lateral sepals conduplicate, apex obtuse to subacute, base cuneate, glabrous, blackish to straw-coloured. *Petals* 3, 1.1 mm, linear, narrow, barbate, eglandular, hyaline, not clawed, stipitate between sepals and petals. *Ovary* oblong, 0.4×0.4 mm; style 1.1 mm; stigma trifid. *Seeds* 0.4×0.3 mm, elliptic to oblong, seed coat cells transversely elongated, appendages solitary or very rarely two from the middle of each transverse radial wall, setiform, dilated at apex.

Distribution and habitat. Known only from the type locality, where it grows in wet meadows around mountain springs, along with species of *Utricularia* L. (Lentibulariaceae), *Apocopis*

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TABLE. Diagnostic morphological characters of *Eriocaulon vamanae* sp. nov., *E. nepalense* var. *luzulifolium* (Mart.) Praj. & J.Parn., *E. duthiei* Hook.f. and *E. thwaitesii* Körn.

Character	*Eriocaulon vamanae*	*Eriocaulon nepalense* var. *luzulifolium*	*Eriocaulon duthei*	*Eriocaulon thwaitesii*
Peduncles	0.6–2.7 cm, pubescent	Up to 3–22 cm, glabrous	2.5–12 cm, glabrous	Up to 18 cm, glabrous
Sheath	0.6–2 cm, ciliolate	1–7 cm, glabrous	Up to 3 cm, glabrous	Up to 6 cm, glabrous
Limb	Lanceolate	Ovate	Ovate	Ovate
Receptacle	Obovoid, pilose	Convex, villous	Ovoid to cylindric, glabrous	Convex, villous
Involucral bracts	Oblong	Broadly obovate	Oblong to lanceolate	Oblong
Floral bracts	Oblanceolate, sparsely hoary towards apex	Oblanceolate to oblong, hoary towards apex	Oblong to lanceolate, glabrous	Oblanceolate to cuneate, sparsely hoary towards apex
Male flower				
Sepals	3, free, 1 × 0.8 mm, obtuse to acute at apex, sparsely hoary towards apex	3, fused, 1.5–2 mm long, acute at apex, hoary towards apex	2, free, c.1 mm long, subacuminate at apex, glabrous	2 or with a minute protuberance in between the lobes, connate into a spathe, c.1 × 1.25 mm, obtuse, glabrous or sparsely hoary at apex
Petals	Hoary towards apex	Glabrous, or if unequal the longest petal hairy	Glabrous	Sparsely hoary towards apex
Female flower				
Sepals	3, 1.6–2 mm, boat-shaped, obtuse to subacute, glabrous	3, 2 mm, linear to narrowly oblanceolate, acute, densely hoary at apex	2, c.0.75 mm, linear to elliptic, acuminate, glabrous	3 (or 2), 1.75–2 mm, lateral sepals obovate to oblanceolate, conduplicate, sparsely hoary at apex
Petals	Linear, narrow, barbate, 1.1 mm	Linear, hairy at apex, 1.5 mm	Linear, glabrous, c.0.75 mm	Linear, barbate, c.0.75 mm
Seed coat appendages	1 or very rarely 2 from the middle of transverse radial walls	1–4 from the middle of transverse radial walls	1–3 from the middle of transverse radial walls	1 from the middle of transverse radial walls

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Nees (Poaceae), *Eriocaulon idukkianum* Manudev, Robi & Nampy and a few bryophytes (*Campylopus* sp.), at an elevation of ± 2445 m.

Phenology. Flowering and fruiting from November to January.

Additional specimens examined. INDIA. Kerala, Idukki District, on the way to the summit of Meesapulimala, ± 2445 m, 31 xii 2018, *Dani Francis & Vishnu Mohan* 167899 (CALI!).

Conservation status. The extent of occurrence of the species is estimated to be less than 100 km^2 and the area of occupancy less than 10 km^2. A single population consisting of 95 individuals was observed in the area. Because the type locality is a tourist destination, it is vulnerable to destruction. According to IUCN criteria (IUCN, 2012; IUCN Standards and Petitions Subcommittee, 2017), *Eriocaulon vamanae* is assigned to the category 'Critically Endangered'.

Eriocaulon vamanae is morphologically close to *E. nepalense* var. *luzulifolium* (Mart.) Praj. & J.Parn. but differs by the shape of the involucral bracts (oblong versus broadly ovate) and receptacle (obovoid versus convex), fusion of male sepals (free versus fused), shape and hairiness of female sepals (boat-shaped and glabrous versus linear to narrowly oblanceolate and hoary at apex), size and hairiness of female petals (1.1 mm, barbate, versus 1.5 mm, hairy at apex) and number of seed coat appendages (1 or very rarely 2 versus 1–4). *Eriocaulon vamanae* differs from *E. duthiei* Hook.f. by the length of the peduncle (0.6–2.7 cm versus 2.5–12 cm), nature of receptacles (obovoid and pilose versus ovoid to cylindric and glabrous), shape of floral bracts (oblanceolate versus oblong to lanceolate), number of male and female sepals (2 versus 3) and indumentum of the female petals (barbate versus glabrous). It differs from *Eriocaulon thwaitesii* Körn., a common species in the area, in the size of plants (1–3 cm tall versus c.18 cm), size of leaves (0.9–2 × 0.1–0.2 cm versus c.9 × 0.2 cm), shape of limb (lanceolate versus ovate), shape and hairiness of receptacle (obovoid and pilose versus convex and villous), fusion of male sepals (free versus fused) and nature of female sepals (not keeled versus keeled). The characters differentiating *Eriocaulon vamanae* from other species are listed in the Table.

Etymology. The epithet *vamanae* means 'dwarf' in Sanskrit and refers to the small size of the plant.

KEY TO SPECIES OF *ERIOCAULON* IN IDUKKI DISTRICT, KERALA

1a. Female petals 2.7–3.2 mm broad, distinctly clawed _____ *E. rhodae*
1b. Female petals 0.1–1 mm broad, not clawed _____ 2

2a. Plants without tubers. Anthers black _____ 3
2b. Plants with tuber. Anthers white _____ *E. idukkianum*

3a. Seed coat cells transversely or vertically elongated _____ 5
3b. Seed coat cells isodiametric _____ 4

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4a. Root stock absent, peduncles 5–17 _____ *E. biappendiculatum*
4b. Root stock present, peduncles 1–3 _____ *E. nairii*

5a. Seed coat appendages ribbon-like or rectangular _____ 6
5b. Seed coat appendages setiform _____7

6a. Sepals 2 in male flowers. Seed coat cells vertically elongated _____ *E. truncatum*
6b. Sepals 3 in male flowers. Seed coat cells laterally elongated _____ *E. quinquangulare*

7a. Male sepals free _____ 8
7b. Male sepals fused _____ 9

8a. Female sepals broadly keeled outside _____ *E. eurypeplon*
8b. Female sepals not keeled outside _____ **E. vamanae**

9a. Seed coat appendages with appendages arising from their angles ____ *E. vasudevanii*
9b. Seed coat cells with appendages arising from their transverse radial walls _____ 10

10a. Male petals unequal _____ *E. odoratum*
10b. Male petals equal or subequal _____ 11

11a. Seed coat appendages solitary from the transverse radial wall _____ 12
11b. Seed coat appendages 2 to many from the transverse radial wall _____ 13

12a. Leaves 9×0.2 cm, glabrous _____ *E. thwaitesii*
12b. Leaves $15–40 \times 1.2$ cm, pubescent _____ *E. brownianum*

13a. Seed coat appendages arranged in vertical rows on the surface of seeds *E. nepalense*
13b. Seed coat appendages arranged in transverse ring on the surface of seeds _____ 14

14a. Male sepals obtuse or acute at apex _____ *E. parviflorum*
14b. Male sepals truncate at apex _____ *E. xeranthemum*

Acknowledgements

The authors are thankful to the Head of the Department of Botany, University of Calicut, for the use of facilities; officials of Kerala Forest Development Corporation for permission to undertake field trips to areas under KFDC authority in Idukki District; and Ms Resmi S. (research scholar, Calicut University) for various assistance. The research is supported by Kerala State Council for Science, Technology and Environment, Thiruvananthapuram (126/2016/KSCSTE dated 26 May 2016).

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Received 5 August 2019; accepted for publication 6 December 2019; first published online 3 February 2020

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Phytotaxa 539 (3): 273–279
https://www.mapress.com/pt/
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Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

https://doi.org/10.11646/phytotaxa.539.3.6

Eriocaulon pandeyana (Eriocaulaceae), a new species from southern Western Ghats, India

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Abstract

Eriocaulon pandeyana from the Idukki district in Kerala is here described as a new species of Eriocaulaceae. It closely resembles *E. ramnadense* but is distinct by having oblong-lanceolate, lobed, acute, hyaline involucral bracts, oblanceolate, acuminate floral bracts, 3 sub-equal male petals, 3 unequal, slightly hoary female sepals and yellow, elliptic seeds with transversely elongated or isodiametric seed coat cells. The differences between the other similar species are also discussed. Since adequate data on abundance and distribution are lacking, the new species is provisionally listed under the category Data Deficient (DD) as per IUCN Red List Categories and Criteria.

Keywords: Data Deficient, *Eriocaulon quinquangulare*, *Eriocaulon truncatum*, Idukki district, Koymanchola

Introduction

The genus *Eriocaulon* Linnaeus (1753: 87) [Eriocaulaceae Martinov (1820: 682)] is distributed in New World, Europe, tropical and subtropical, Old World to Russian Far East and America with about 484 accepted species (Govaerts *et al*. 2021). It is the only genus of the family in Asia (Leach 2017) with an acaulescent habit and monoecious capitate inflorescence. The genus has been revised for various countries/regions: India (Fyson 1919, 1921, 1922, Ansari & Balakrishnan 1994, 2009, Darshetkar *et al*. 2021), tropical East Africa (Phillips 1997), China (Ma *et al*. 2000), Brazil (De Oliveira & Bove 2015), Japan (Miyamoto 2015), Australia (Leach 2017) and Thailand (Prajaksood *et al*. 2017). De Andrade *et al*. (2010) and Giulietti *et al*. (2012) did molecular phylogenetic studies using few *Eriocaulon* species. Larridon *et al*. (2019) in a recent study using both ptDNA and PHYC datasets reassessed the existing regional infrageneric classifications. The infrageneric classification of the Indian species by Ansari and Balakrishnan (1994, 2009), mostly based on seed surface characters, was not fully supported by Larridon *et al*. (*l.c*.). Ansari and Balakrishnan (2009) reported 80 species under 12 sections from India. Subsequently several new species were described, bringing 113 species in India (Shimpale *et al*. 2009, Shimpale & Yadav 2010, Vivek *et al*. 2010, Nampy *et al*. 2011, Biju *et al*. 2012, 2017, Swapna *et al*. 2012, Sunil *et al*. 2013, 2014, 2017, Rashmi & Krishnakumar 2014, Manudev *et al*. 2015, 2017, Sunil & Naveen 2015, Darshetkar *et al*. 2017, 2019, Paithane *et al*. 2017, Anto & Reshma 2017, Naveen *et al*. 2017, Chandore *et al*. 2019, Khanna & Kumar 2019, Francis *et al*. 2020, Nampy & Akhil 2021). Darshetkar *et al*. (2021), in a recent molecular systematic analysis of the Indian species using 552 accessions from 66 species, recognized 94 species, synonymising six and excluding five species.

During a recent field work in Idukki district in the southern Western Ghats of Kerala, we have collected a few specimens of *Eriocaulon* having lobed, acute, hyaline involucral bracts, unequal female sepals, and glandular male and female petals. A careful examination of the herbarium specimens of related species and relevant taxonomic literature (Fyson 1919, 1921, 1922, Ansari & Balakrishnan 1994, 2009, Phillips 1997, Ma *et al*. 2000, De Oliveira & Bove 2015, Miyamoto 2015, Prajaksood *et al*. 2017, Leach 2017, Darshetkar *et al*. 2021), we conclude that it represents an undescribed species and is described here as new to science. The new species is morphologically similar to *E. ramnadense* R.Ansari & N.P.Balakrishnan (1994: 125) in having rosulate, linear-lanceolate leaves, reflexed and smaller

Accepted by Arjun Tiwari: 15 Feb. 2022; published: 17 Mar. 2022

involucral bracts than floral bracts, black glanded free male petals, transversely elongated seed coat cells with ribbon like banded appendages, but differs by characters given in the diagnosis.

Materials & methods

The materials were collected during field trips in Idukki district, Kerala. Morphological description was prepared using live materials. The identity of the new species was confirmed by comparing with types or protologues and through consultation of online data sources (ASSAM, CAL, CALI, K, MH) of the similar species. Photographs were taken with a stemi 508 stereomicroscope (Zeiss, Germany) equipped with an Axiocam 105 colour camera. Voucher specimens were deposited in CAL and CALI. Seed micromorphology was studied using scanning electron microscope (Zeiss, Germany). The sample was dehydrated and mounted onto stubs coated with gold and palladium. The conservation status was assessed based on IUCN Guidelines and Criteria (2012, 2019). The distribution map was created using QGIS ver. 3.16.3 (QGIS 2021).

Taxonomy

Eriocaulon pandeyana Nampy, Harishma & Vishnu *sp. nov.* **(Figs. 1 & 2)**

Closely resembles *E. ramnadense* but differs by having oblong-lanceolate, lobed, acute, hyaline involucral bracts (vs. oblong-obovate, entire, obtuse, black), oblanceolate, acuminate floral bracts (vs. cuneate, obtuse), 3 sub-equal male petals (vs. 3 equal), 3 unequal, slightly hoary female sepals (vs. 2 equal, glabrous) and yellow, elliptic seeds with transversely elongated or isodiametric seed coat cells (vs. pale purple, ovoid seeds with almost transversely elongated).

Type:—INDIA. Kerala, Idukki district, Koymanchola, 10°16’52’’N, 77°08’49’’E, 1457 m, 10 February 2021, *Santhosh Nampy & Vishnu Mohan* 188713 (holotype: CALI, isotype: CAL).

Erect, acaulescent herbs. Root stock absent. Leaves rosulate, linear-lanceolate, 3–6 cm long, glabrous, acuminate at apex, margin entire, greenish, straw coloured when dry. Sheath 3.5–4.0 cm long, terete, glabrous; limb lanceolate, *c*. 0.2 mm long, acute. Head spherical, 0.4–0.7 cm across, off white or cream coloured. Peduncles many, 5–22 cm long, glabrous. Receptacle globose, pilose. Involucral bracts oblong-lanceolate, smaller than floral bracts, 1.2–2.0 × 0.8–1.0 mm, reflexed, margin entire or lobed, acute at apex, truncate at base, chartaceous, glabrous, hyaline, but straw coloured when dry. Floral bracts oblanceolate, 1.7–1.9 × 0.5–1 mm, acuminate at apex, truncate at base, hoary towards apex, chartaceous, hyaline. Male flowers: Pedicel *c*. 0.5 mm long. Sepals 2 or 3, free, oblanceolate, falcate, 1.0–1.2 mm long, glabrous, sparsely hairy towards apex; stipe 0.7–1.3 mm long. Petals 3, free, oblong, sub-equal, hyaline, one petal slightly longer than other two, 0.35–1.0 mm long, hoary towards apex, with a black gland. Stamens 6; anthers black, 0.27–0.29 mm long, filament *c*. 0.5 mm long, white. Female flowers: Pedicels 0.07–0.08 mm long. Sepals 3, free, unequal, 1.5–1.9 mm long, one smaller and narrower than other 2, slightly hoary, blackish at apex; hair 0.4 mm long, oblong; stipe 0.23–0.25 mm long. Petals 3, free, with a black gland at apex, oblanceolate, subequal, hyaline, 1.5–1.7 mm long, hoary at apex, not clawed, stipitate between sepals and petals. Ovary sessile, ovoid, *c*. 0.5 mm long, style 1.0–1.2 mm long, stigma 3-fid. Seeds elliptic, *c*. 0.47 × 0.27 mm, apiculate or acute, yellow, brownish at both ends, cells of seed coat transversely elongated or isodiametric, appendaged, appendages in the form of continuous ribbon like bands from transverse and vertical walls conforming its length; testa granular.

Distribution and ecology:—The new species is hitherto known only from a small area near a stream in Koymanchola in Idukki district in Kerala (Fig. 3). It grows along with *E. quinquangulare* Linnaeus (1753: 87), *E. truncatum* Buchanan-Hamilton ex Martius (1832: 29), etc. at an elevation of 1457m.

Flowering & fruiting:—January to February.

Etymology:—The specific epithet *pandeyana* is given in honour of Prof. A.K. Pandey (Vice Chancellor, Mansarovar Global University, Bhopal) for his valuable contribution to Indian Taxonomy.

Provisional conservation status:—The species is known only from a single locality with less than 250 mature individuals. Even though the location comes under a protected area, being a streamside, there is risk of human interference and natural adversities such as flooding. Since adequate data on abundance and distribution are lacking, the species is provisionally assessed as Data Deficient (DD) as per IUCN Red List Categories and Criteria (2012, 2019).

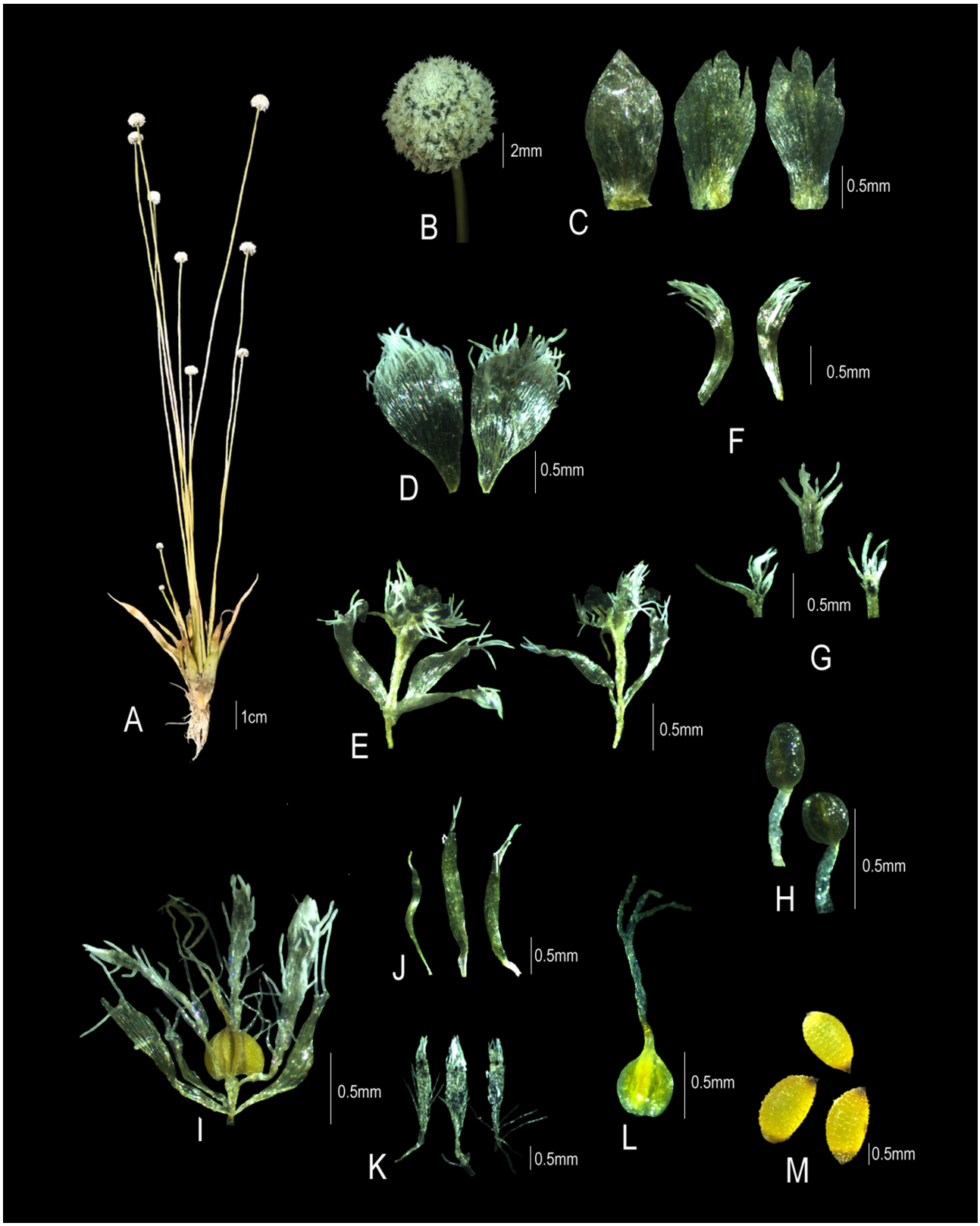

FIGURE 1. *Eriocaulon pandeyana*: A. Habit; B. Head; C. Involucral bracts; D. Floral bracts; E. Male flowers; F. Male sepals; G. Male petals; H. Stamens; I. Female flower; J. Female sepals; K. Female petals; L. Pistil; M. Seeds (from *Santhosh Nampy & Vishnu Mohan* 188713) Photos by Harishma K.H.

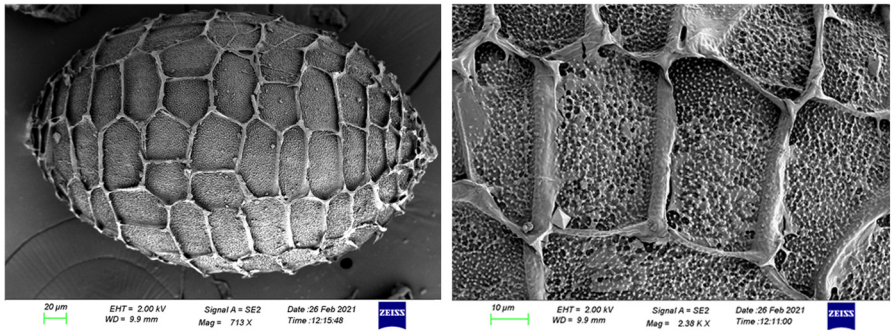

FIGURE 2. Scanning electron micrograph showing seeds of *Eriocaulon pandeyana.*

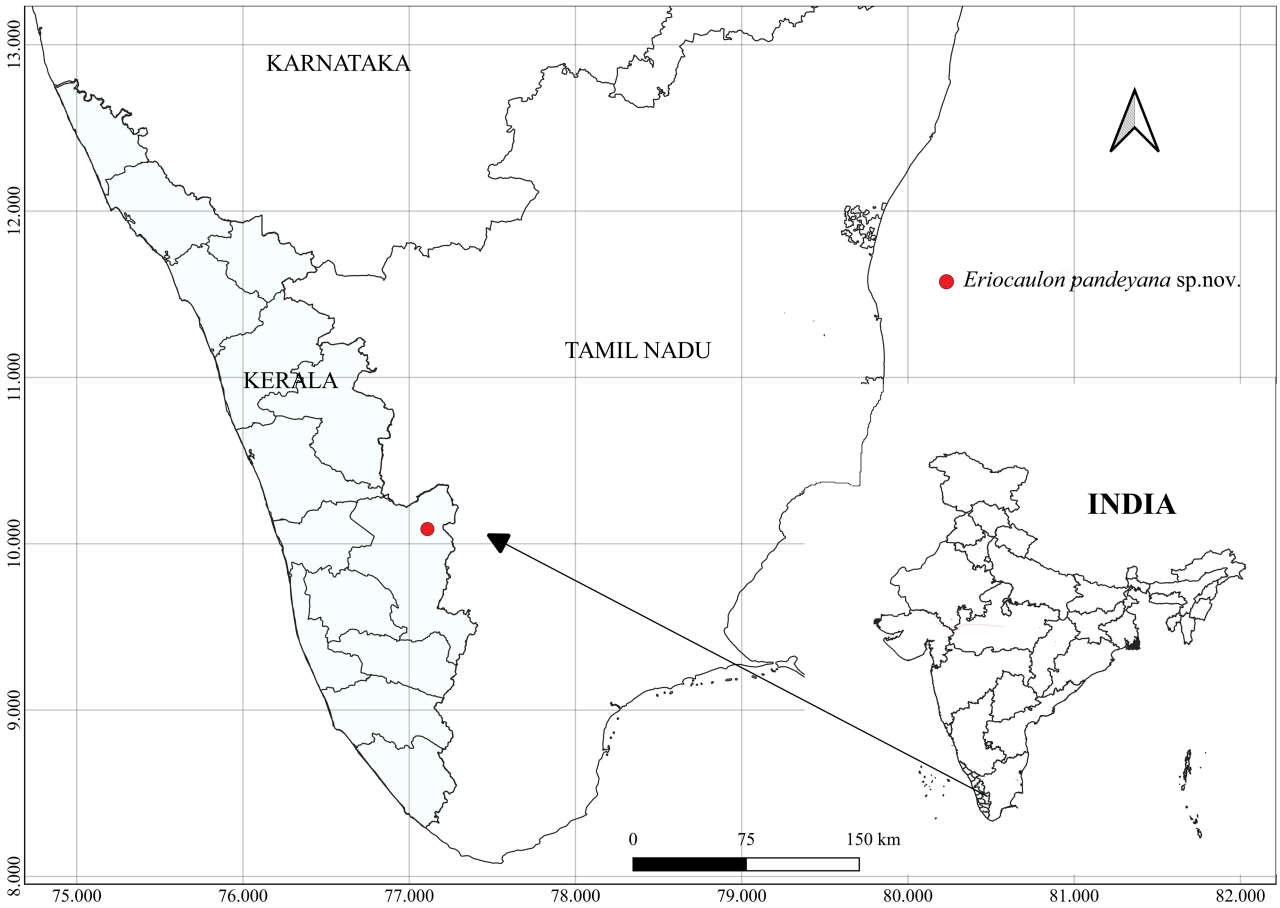

FIGURE 3. Distribution map of *Eriocaulon pandeyana* (created using QGIS ver. 3.16.3).

Notes:—The new species belongs to the section VII of Ansari and Balakrishnan (1994, 2009) in having free female sepals, black or dark brown anthers, and transversely elongated seed coat cells with ribbon like appendages on the surface of seeds. There are 13 species in this section from India including the one described here. The differences between the morphologically most similar *E. ramnadense* are given in diagnosis.

It also differs from *E. longicuspis* Hooker (1893: 573) by its elongated ribbon-like seed coat appendages and 3 sub-equal male petals, from *E. quinquangulare*, *E. conicum* (Fyson 1921: 260) C.E.C.Fischer (1931: 1620), *E. martianum* Wallich (1832: n.7279), *E. palghatense* R.Ansari & N.P.Balakrishnan (1994: 111), *E. cherrapunjianum* R.Ansari & N.P.Balakrishnan (1994: 113), *E. truncatum*, *E. edwardii* Fyson (1921: 313) and *E. cristatum* Martius (1832: 28) by having male flowers with 2 or 3 free sepals, from *E. raipurense* K.K.Khanna, Mudgal & An. Kumar (2001: 413) and *E. hamiltonianum* Martius (1832: 29) by one narrow, smaller female sepal and hairiness of floral bracts.

Acknowledgements

The authors are thankful to the Head of the Department of Botany, University of Calicut for the facilities; officials of Kerala Forest Department for permission to undertake field trips to protected areas in Idukki district; Kerala State Council for Science, Technology and Environment (KSCSTE) for financial assistance (Order No. 126/2016/KSCSTE dated 26/05/2016).

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Anales del Jardín Botánico de Madrid 78 (1): e106
https://doi.org/10.3989/ajbm.2585
ISSN-L: 0211-1322

A new species of *Parasopubia* (Orobanchaceae) from the southern Western Ghats, India

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Abstract. *Parasopubia raghavendrae*, a new species of Orobanchaceae is described from the southern Western Ghats of Kerala. It resembles *P. delphinifolia* and *P. hofmannii* var. *hofmannii* by its habit, shape, colour and hairiness of corolla lobes but differs by length of calyx tube, hairiness of staminal filaments and stomium, and shape and ornamentation of seeds. *Parasopubia raghavendrae* is hitherto known only from the type locality Mathikettan Shola National Park in Idukki district, Kerala. Detailed description of the new species along with colour photographs and comparison with its closely similar species are given. We also assessed provisionally the conservation status of the new species as Critically Endangered (CR) according to IUCN Red List Categories and Criteria.

Keywords. Critically Endangered, Idukki, Mathikettan Shola National Park, Orobanchaceae, *Parasopubia raghavendrae*.

Resumen. *Parasopubia raghavendrae*, una nueva especie de Orobanchaceae se describe para el sur del Ghats occidental de Kerala. Se asemeja a *P. delphinifolia* y *P. hofmannii* var. *hofmannii* por su hábito, forma, color e indumento de los lóbulos de la corola, y difiere de ellas por la longitud del tubo del cáliz, indumento del filamento estaminal y del estomio, y la forma y ornamentación de las semillas. Hasta ahora, *P. raghavendrae* solo se conoce para la localidad tipo del Parque Nacional de Mathikettan Shola, en el distrito de Idukki, Kerala. Se proporciona la descripción detallada de la nueva especie junto con fotografías en color y una comparativa con las especies más similares. Así mismo, se evalúa provisionalmente el estado de conservación de la nueva especie con la categoría en Peligro Crítico (CR) de acuerdo a los Criterios de la Lista Roja de la UICN.

Palabras clave. En Peligro Crítico, Idukki, Parque Nacional de Mathikettan Shola, Orobanchaceae, *Parasopubia raghavendrae*.

How to cite this article: Venugopal D.K., Nampy S., Pradeep A.K., Francis D., Mohan V., Sasi S.R. 2021. A new species of *Parasopubia* (Orobanchaceae) from the southern Western Ghats, India. *Anales del Jardín Botánico de Madrid* 78: e106. https://doi.org/10.3989/ajbm.2585

Title in Spanish: Una nueva especie de *Parasopubia* (Orobanchaceae) del sur de las Ghats occidentales, India.

Associate Editor: Ana Ortega. Received: 22 January 2021; accepted: 24 February 2021; published online: 15 June 2021

INTRODUCTION

Orobanchaceae, commonly called 'broomrapes', is the largest parasitic angiosperm family with morphologically diverse herbaceous plants (Young & al. 1999). Most of the species are facultative or obligate root parasites which may be photosynthetic (hemiparasites) or totally depend on host plants (holoparasites). *Parasopubia* H.-P.Hofm. & Eb.Fisch., a genus of Orobanchaceae recently segregated from *Sopubia* Ham. ex D.Don (Hofmann & Fischer 2004), is characterized by slightly zygomorphic flowers, corolla tube much longer than lobes and acuminate reduced thecae. The genus comprises four taxa, including the new species here described, distributed in South East Asia. *Parasopubia bonatii* H.-P.Hofm. & Eb.Fisch. is distributed in Cambodia, Laos, Vietnam, Thailand and China (Bonati 1927) while *P. delphinifolia* (L.) H.-P.Hofm. & Eb.Fisch., *P. hofmannii* Pradeep & Pramod var. *hofmannii* and *P. hofmannii* var. *albiflora* Pradeep & Pramod are found in India (Pradeep & Pramod 2013) (Fig. 1). Members of this genus are usually seen in grasslands, wet rocks, cultivated lands, marshy areas, lateritic hillocks and moist deciduous forests.

During our field work in Idukki district, Kerala, an interesting species of *Parasopubia* was collected from Mathikettan Shola National Park (MSNP). After careful comparison of *Parasopubia* specimens and consulting relevant literature, the authors found that it was quite distinct from other taxa in the genus and hence is described here as a new species.

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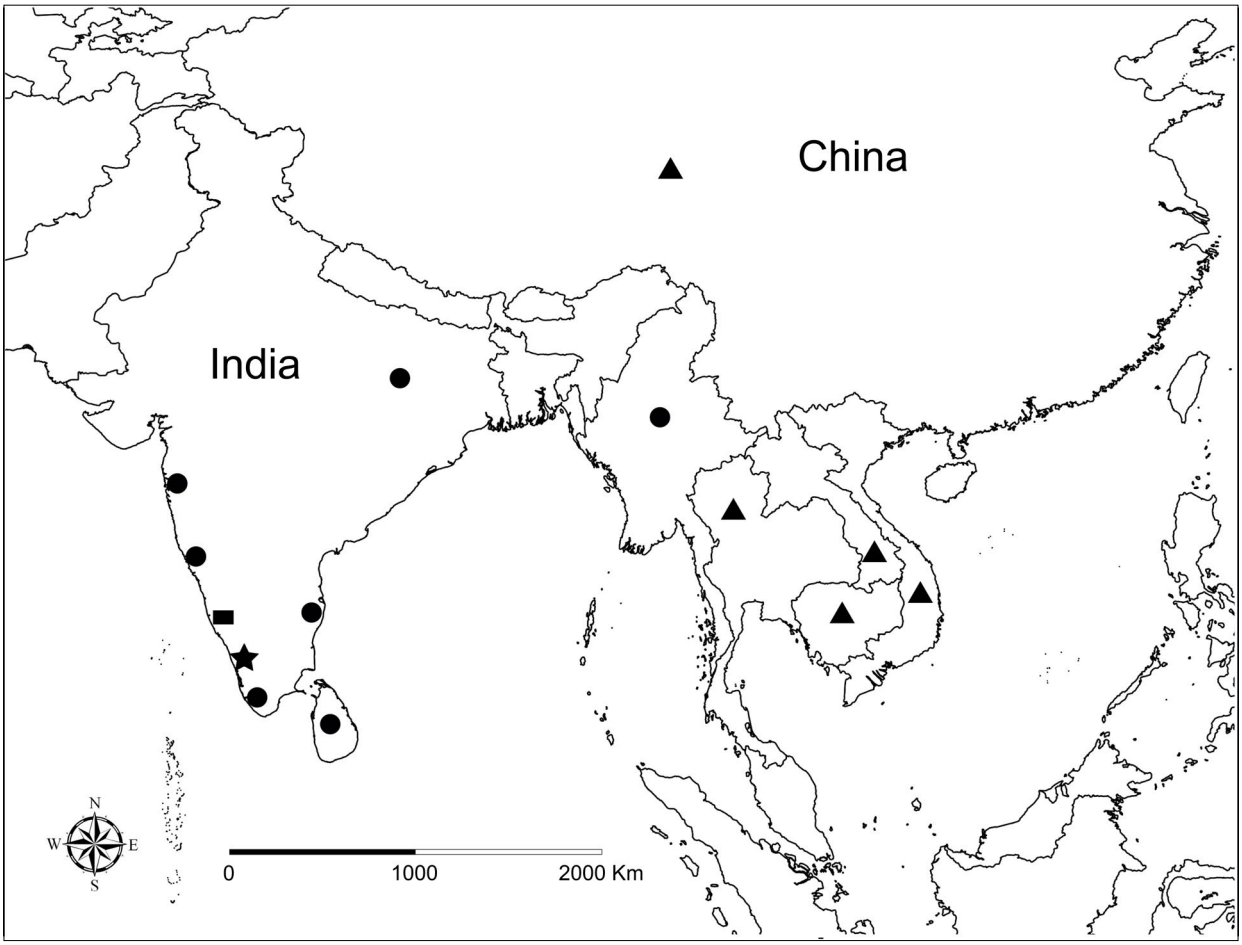

Fig. 1. Map showing the approximate location of the known herbarium records of *Parasopubia* species: *P. delphinifolia* (circle), *P. bonatii* (triangle), *P. hofmannii* (square), *P. raghavendrae* (star). Base map modified from version available at https://d-maps.com.

MATERIALS AND METHODS

Fresh specimens were collected from Mathikettan Shola National Park of Idukki district. Protologues and relevant literature (Bonati 1927; Hofmann & Fischer 2004; Pradeep & Pramod 2013) were examined for confirming the identity of the specimens and detailed descriptions were made. The following virtual herbaria were also searched for confirming the identity of the specimens: K, M and S (acronyms according to Thiers 2021, continuously updated). Herbarium sheets were prepared as per Bridson and Forman (1991). Conservation assessment was done using IUCN standards and petition committee criteria (IUCN 2019). The photographs of floral parts were taken with a Stemi 508 Stereomicroscope attached to an Axiocam 105 colour Camera (Zeiss, Germany). The ultra-morphological analysis of seeds was done using DM6 B Phase Contrast Microscope fitted with a DFC450 Camera (Leica, Switzerland) and Gemini 300 Scanning Electron Microscope (Zeiss, Germany).

RESULTS AND DISCUSSION

Taxonomic treatment

Parasopubia raghavendrae Divya & Nampy, sp. nov. Type: India, Kerala: Idukki district, Mathikettan Shola National Park (MSNP), Sivanpara, ± 1610 m, 11 Dec. 2016, D.K. Venugopal & S. Nampy 151405 (holotype: CALI!; isotypes: CALI!, CAL!). Fig. 2.

Diagnosis.—It is similar to *Parasopubia delphinifolia* and *P. hofmannii* var. *hofmannii* but can be easily distinguished by the calyx with tube exceeding lobes (4–4.5 mm against 3.5–3.8 mm long), the glandular hairy staminal filaments and stomium, the oblong capsules and seeds in contrast with the calyx tube less long than calyx lobes (2–2.5 mm against 4 mm long in *P. hofmannii* var. *hofmannii*; 4 mm against 7 mm long in *P. delphinifolia*), and glabrous staminal filaments and stomium. The capsules are elliptic and the seeds obovate in *P. delphinifolia* while obovoid and obovate, respectively in *P. hofmannii* var. *hofmannii*. The



Fig. 2. *Parasopubia raghavendrae* Divya & Nampy sp. nov.: **a**, habit; **b**, flowering twig with leaves; **c**, flower; **d**, didynamous stamens; **e**, glandular hairs on filaments; **f**, illustration of filament with glandular hairs; **g**, calyx tube and lobes; **h**, capsule; **i-j**, SEM images of seeds; **k**, phase contrast image of seed [from: MSNP 151405; photos: Divya K. Venugopal; scale: c = 1 cm; d = 1 mm; e = 1 mm; f = 2 mm; g = 1 mm; h = 5 mm; i =100 µm; j = 20 µm, k = 25 µm].

testa is uniformly ribbed and parallely reticulate with wide testa cells in *P. raghavendrae* while non-uniformly ribbed and obliquely reticulate in *P. hofmannii* var. *hofmannii* and *P. delphinifolia*. However, the testa cells are narrow in the former and wide in the latter.

Annual herbs up to 50 cm tall. Stems terete at base, 4-angular above, densely branched (branches 6–30), green. Leaves opposite, 2–5 cm long, sessile; lower leaves 5–7 segmented; segments linear-lanceolate to filiform; upper leaves entire; midrib prominent abaxially, strigose on

margins, green. Flowers axillary, solitary, bisexual, zygomorphic, 1–1.5 × 0.5–1 cm. Pedicels 1–1.5 cm long, tomentose, green; bracteoles 2, linear, 2–2.3 × 0.5–1 mm, glabrous, green. Calyx 5-lobed, persistent in fruit; tube 4–4.5 mm long, longer than lobes, glabrous; lobes linear, 3.5–3.8 × 1–1.1 mm, acute at apex, glabrous, green. Corolla campanulate, puberulent on outer surface, glabrous on inner surface, pink; tube 6.8–7 × 1–1.5 mm; lobes nearly sub-rotund, 3–3.2 × 4–4.1 mm. Stamens 4, unequal, inserted on corolla tube; filaments deep pink, 2 longer (6 mm long), 2 shorter (5 mm long), glandular hairy; anthers 2, pendent, thecae pale brown, one fertile and one sterile, unequal; fertile thecae 2 × 1 mm; sterile thecae 1 × 1 mm; stomium hairy, opening whole length. Ovary superior, 1 × 1 mm, ellipsoid, 2-celled, glabrous, green; ovules many in each cell; style slender, 8–8.2 × 1–1.1 mm, puberulent distally, pale pink; stigma globose, glabrous. Capsules oblong, erect, 5–5.3 mm long, glabrous; ¾ portion enclosed in calyx tube; fruiting calyx lobes erect. Seeds numerous, oblong, 0.57 mm long, brown; testa uniformly ribbed and parallely reticulate with wide testa cells.

Distribution and habitat.—The new species is hitherto known only from the type locality. It grows in wet humus-rich rock crevices at an elevation of c. 1610 m along with *Murdannia satheeshiana* Joby, Nisha & Unni, *Cyanotis* sp. (both Commelinaceae), *Eriocaulon* sp. (Eriocaulaceae), *Polycarpaea corymbosa* (L.) Lam. (Caryophyllaceae), etc.

Phenology.—Flowering and fruiting from early December to late January.

Etymology.—The new species is named in honour of Dr. R. Raghavendra Rao, for his contributions in Indian botany.

Provisional conservation status.—The new species is currently known only from the type locality in the Mathikettan Shola National Park. Two populations with approximately 15 mature individuals were observed in two successive years (2017–2019) and the populations were separated by a distance of around 300 m. There is no possible threat as the area falls under a National Park. On the basis of available data, this species is categorized provisionally as Critically Endangered (CR) (by considering area of occupancy < 10 km^2 [B_2]; number of mature individuals in each population ≤ 50 [C_2 a]; very small or restricted population with number of mature individuals < 50 [D]) as per IUCN Red List Categories and Criteria (IUCN, 2019).

Notes.—It is worth mentioning that *Parasopubia raghavendrae* shares the habit and hairiness of corolla lobes with other taxa of *Parasopubia* in India. *Parasopubia raghavendrae* is peculiar by its hairy staminal filaments and stomium, uniformly ribbed testa and parallely reticulate wide testa cells. It grows in wet, humus rich non-lateritic rocks, while *P. hofmannii* var. *hofmannii* grows in lateritic rocks and *P. delphinifolia* in almost all habitats (in grasslands, cultivated lands, marshes, lateritic rocks and non-lateritic rocks, etc.). The flowering period of the three taxa are: *P. delphinifolia* from August to February, *P. hofmannii* var. *hofmannii* from July to September while *P. raghavendrae* from December to January. A comparison of diagnostic characters between *P. delphinifolia*, *P. hofmanni* var. *hofmannii* and *P. raghavendrae* is given in Table 1.

Table 1. Diagnostic morphological characters of *Parasopubia raghavendrae* Divya & Nampy sp. nov. and comparison with morphologically similar species.

Character	***P. delphinifolia***	***P. hofmannii* var. *hofmannii***	***P. raghavendrae***
Calyx tube length	4 mm; shorter than calyx lobes	2–2.5 mm; shorter than calyx lobes	4–4.5 mm; longer than calyx lobes
Calyx lobes length, shape	7 mm, lanceolate	4 mm, linear	3.5–3.8 mm, linear
Staminal filaments indument and length	Glabrous Longer filaments 5 mm Shorter filaments 4 mm	Glabrous Longer filaments 5 mm Shorter filaments 3 mm	Glandular hairy Longer filaments 6 mm Shorter filaments 5 mm
Fertile and sterile thecae	Equal, 2 mm long	Equal, 1.5 mm long	Unequal Fertile thecae > 2 mm long Sterile thecae 1 mm long
Stomium	Glabrous Opening from apex	Glabrous Opening from base	Hairy Opening whole length
Fruiting calyx lobes	Erect	Divergent from capsule	Erect
Capsules	Elliptic Slightly pubescent Enclosed in calyx tube	Obovoid Glabrous ½ of the capsule enclosed in calyx tube	Oblong Glabrous ¾ of the capsule enclosed in calyx tube
Seeds	Obovate Non-uniformly ribbed with wide oblique reticulate cells	Obovate Non-uniformly ribbed with narrow oblique reticulate cells	Oblong Uniformly ribbed with wide parallel reticulate cells

Key to the species of genus Parasopubia *including the new species*

1. Plants stout; calyx lobes broadly triangular, without linear extension ..... ***P. bonatii***
– Plants slender; calyx lobes linear or lanceolate, with linear extension 2

2. Fruiting calyx lobes erect 3
– Fruiting calyx lobes divergent 4

3 Calyx with tube shorter than lobes; calyx lobes lanceolate; stomium opening from apex; capsules elliptic, slightly pubescent ..... ***P. delphinifolia***
– Calyx with tube longer than lobes; calyx lobes linear; stomium opening whole length; capsules oblong, glabrous .....***P. raghavendrae***

4. Corolla pale pink; plant parts often purplish; testa cells narrow ..... ***P. hofmannii*** var. ***hofmannii***
– Corolla white; plant parts without purplish tinge; testa cells wide ..... ***P. hofmannii*** var. ***albiflora***

Additional specimens examined.—Parasopubia delphinifolia. INDIA. **Kerala**: Malappuram district, Kozhippara, 21 Oct. 2009, A.K. Pradeep 90072 (CALI 152574); C U Campus, 22 Nov. 1989, Ushakumari V.N. 4878 (CALI 152663); ibid., 02 Sep. 1990, Solly George 3238 (CALI 152665). **Tamil Nadu**: Coimbatore district, Mount Stouert, 27 Oct. 1961, J. Joseph 13377 (MH 00125774, MH 00125773); Dharmapuri district, Dhoddikere, 22 Dec. 1990, T. Ravishankar 95524 (MH 00125763, MH 00125762). s.d., s.coll., s.n. (M 0188641 digital image); s.loc., 1 Jan. 1777, Johann G. Konig s.n. (S 09-26708 digital image); s.loc., 1831, N. Wallich 3890 (K 000999981 digital image).—*Parasopubia hofmanni* var. *hofmannii*. INDIA. **Kerala**: Kannur district, Madayippara, 27 Nov. 2011, Pramod CU 151405 (holotype CALI); ibid., 11 Sep. 2009, Pramod CU 123592 (CALI); ibid., 01 Aug. 2010, Pramod CU 126510 (CALI); ibid., 20 Aug. 2010, Pramod CU 126555 (CALI).

ACKNOWLEDGEMENTS

Authors are grateful to the head of the Department of Botany, University of Calicut for the facilities; curators and staffs of CALI and MH for permitting to study the specimens; Chief Wildlife Warden (Kerala) and Officials of MSNP for granting permission to explore the MSNP; Central Sophisticated Instrumentation Facility (CSIF), University of Calicut for SEM facility. The study is funded by Kerala State Council for Science, Technology and Environment, Thiruvananthapuram (126/2016// KSCSTE dated 26 May 2016).

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NORDIC JOURNAL OF
BOTANY

Research

Asyneuma cupulare, a new species of Campanulaceae from southern Western Ghats, India and lectotypification of *Campanula fulgens* (*Asyneuma fulgens*)

Divya K. Venugopal, Santhosh Nampy, Vishnu Mohan and Dani Francis

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Nordic Journal of Botany
2021: e02889
doi: 10.1111/njb.02889

Subject Editor and
Editor-in-Chief: Torbjörn Tyler
Accepted 14 October 2020
Published 16 January 2021

Asyneuma cupulare (Campanulaceae) is described as a new species from the southern Western Ghats, India. The new species belongs to the section *Eupodanthum* and is morphologically close to *Asyneuma fulgens* in the same section, mainly for the absence of appendages on calyx, erect nature of capsules and calyx lobes after anthesis, presence of 3-lobed stigma and absence of agglutination in upper part of corolline lobes, but differs in having 4-angular puberulent stems, puberulent leaves, glabrous filaments and stigma, and cupular 6-ribbed capsules. Its description is given and diagnostic morphological characters of closely related species are compared and discussed. Information on habitat and conservation status is provided. The typification of *Asyneuma fulgens* is also discussed.

Keywords: *Asyneuma* sect. *Eupodanthum*, conservation assessment, Idukki, Meesapulimala

Introduction

Asyneuma Griseb. & Schenk, one among the 80 genera of Campanulaceae, consists of about 33 species in the world (Lammers 2007). Commonly called 'harebells', the genus is native to North Africa and Eurasia and is almost exclusively distributed from the Mediterranean to Caucasus and East Asia (Mabberley 2017). The genus is characterised by 1) corolla more or less rotate, with petals fused only at base; 2) calyx appendages lacking; 3) stigma 2–3(4)-partite and 4) capsules opening by median or subapical pores (Dambolt 1968).

Recent works based on molecular data indicated that *Asyneuma* is not monophyletic (Frajman and Schneeweiss 2009, Mansion et al. 2012, Jones et al. 2017, Chao and De-Yuan 2020). Dambolt (1968) divided the genus into three sections: *A.* sect. *Clinocarpium* (Boiss.) Rech.f. & Schiman-Czeika, *A.* sect. *Eupodanthum* Boiss. and *A.* sect. *Podanthum* Boiss. The section *Eupodanthum* is characterized by erect capsules with apical or medial dehiscence (Boissier 1875). *Asyneuma fulgens* (Wall.) Briq. and *A. thomsonii* (Hook. f.) Bornm. are species of this section present in India. Our literature study revealed that typification of *Asyneuma fulgens* is not done yet. Hence, a lectotype

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is designated below following Shenzhen Code (Turland et al. 2018).

A recent floristic survey in Meesapulimala, Idukki district in Kerala, the second highest peak in Western Ghats, resulted in the collection of a few specimens of *Asyneuma*. Detailed examination of the specimens and literature of the genus revealed that the morphological characters of the specimen do not fit any known species of *Asyneuma* and that they deserve the status of a new species, which we describe below as *Asyneuma cupulare* sp. nov. With this new taxon, there are three species in India.

Material and methods

Live specimens of the new taxon were collected from Idukki district and photographs of floral parts were taken with a camera attached to a stereomicroscope. Protologues of related species and other relevant literature (Clarke 1882, Gamble 1921, Dambolt 1968, Sasidharan 1998) were examined in detail for confirming the novelty of the species, and a detailed description was made. In order to designate a lectotype, the protologue of *A. fulgens* was examined and the following virtual herbaria were searched for locating the Wallich's specimens: K, E, BR, KFTA, M, GDC and PH (acronyms according to Thiers 2020 continuously updated). IPNI (<www.ipni.org>) was followed for the plant name authors.

Taxonomy

Asyneuma cupulare Divya & Nampy, sp. nov. (Fig. 1, 2)

Type: India, Kerala, Idukki District, Meesapulimala, ± 2640 m a.s.l., 14 Oct 2019, Divya K. Venugopal & Santhosh Nampy 170375 (holotype: CALI; isotype: CAL).

A species morphologically close to *Asyneuma fulgens* but differing by the nature of stems (4-angular versus terete), hairiness of stems and leaves (puberulent versus glabrous), hairiness of filaments and stigma (glabrous versus pubescent), shape of capsules (cupular versus obovoid-conical), number of ribs on capsules (10 versus 6) and way of capsule dehiscence (medial valves versus apical pores).

Etymology

The specific epithet 'cupulare' refers to the cup shaped nature of the capsules.

Description

Perennial herb, up to 10 cm tall. Subterranean organs not seen. Stems 4-angular, branched, puberulent, green. Leaves simple, alternate; petioles 4–5 mm long, puberulent; lamina oblanceolate, 3.0–5.0 × 1.0–1.5 cm, cuneate at base, acute at apex, dentate at margins, with both surfaces puberulent, pale green. Cymes terminal, erect, 2–3-flowered; flowers bisexual, actinomorphic, 1.0–2.0 × 1.0–1.5 cm; peduncles 4-angular, 3–4 cm long, puberulent, green; pedicels 3.0–3.2 cm long, puberulent, green. Bracts linear, leafy, 6.0–6.2 × 1.0–1.1 mm, puberulent, green; bracteoles 2, linear, leafy, 2.0–2.1 × 1.0–1.2 mm, glabrous, green. Calyx 5-lobed, cupular; tube 4.0–4.3 × 5.0–5.1 mm; lobes lanceolate, acute at apex, truncate at base, without appendages, 6.0–6.1 × 1.0–1.1 mm, glabrous, green. Corolla rotate, deeply 5-lobed, divided almost to the base; tube absent; lobes nearly elliptic, 0.8–1.0 cm long, glabrous, pale pink. Stamens 5, equal, inserted on the corolla; filaments dilated at base, 3.0–3.2 mm long, glabrous, cream coloured; anthers oblong, 2.9–3.0 × 1.0–1.2 mm, dithecous, basifixed, glabrous, cream coloured. Ovary inferior, 3-celled; ovules many in each cell; styles slender, 4.0–4.2 × 0.8–1.0 mm, hairy at the tip; stigma trilobed, lobes 1 mm long, glabrous, purple. Capsules cupular, erect, 5.0–5.3 mm long, prominently 10-ribed, puberulent along the ribs, dehiscense by medial valves. Seeds numerous, obovoid, smooth (without appendages), ca 1.0–1.2 × 0.5–1.0 mm, straw coloured.

Phenology

Flowering and fruiting in October–December.

Distribution and associated species

Extremely rare; presently known only from the type locality (Fig. 3). It occurs in wet and damp grasslands often associated with *Callitriche wightiana* Wall. ex Wight & Arn. (Plantaginaceae) and *Funaria* sp. (bryophytes), at an elevation of 2640 m a.s.l.

Conservation status

The new species is currently known only from a single population in Meesapulimala in Idukki district, with approximately 10 mature individuals in an area of 0.5 km^2. The locality being a tourist destination, there is the possibility of disturbances in the future due to human activities. Extensive field surveys in similar habitat are required to determine its exact IUCN status. Hence, the species shall be regarded as Data Deficient according to IUCN Guidelines (IUCN 2019).

Notes

Asyneuma cupulare is similar to the widespread and morphologically variable species *A. fulgens* in its erect and prominent calyx teeth without appendages, and the division of the corolline lobes to the base. But there are significant differences that allow them to be easily distinguished as outlined in the diagnosis and in the table below (Table 1) including flowering period (October–December versus June–July), nature of stem (4-angular versus terete), shape of capsules (cupular versus obovoid-conical), etc. *Asyneuma fulgens* produces numerous blue flowers on an elongated peduncle (10–15 cm) whereas in *A. cupulare*, the flowers are 2 or 3 (sometimes one) pale pink on short peduncles (3–4 cm).

Lectotypification of *Campanula fulgens* Wall.

Campanula fulgens Wall. in Roxb. (1824, p. 99).

Based on the same type: *Asyneuma fulgens* (Wall.) Briq. (1931, p. 334–335).

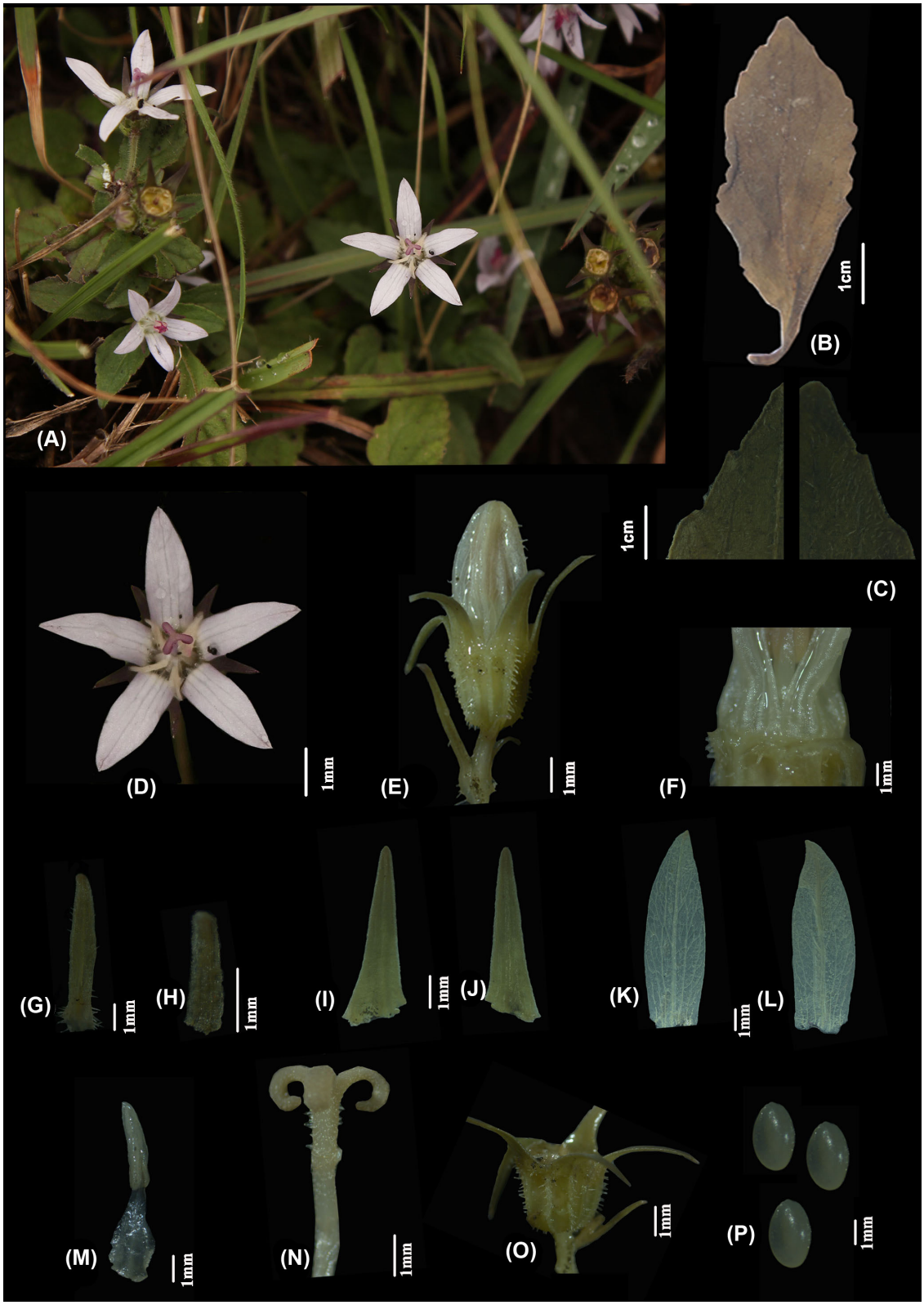

Figure 1. *Asyneuma cupulare* sp. nov. (A) habit, (B) leaf, (C) a portion of leaf showing pubescence, (D) flower, (E) flower bud, (F) corolla lobes split up to the base, (G) bract, (H) bracteole, (I) calyx lobe (adaxial view), (J) calyx lobe (abaxial view), (K) corolla (adaxial view), (L) corolla (abaxial view), (M) stamen, (N) style and stigma, (O) capsule, (P) seeds (all Divya K. Venugopal & Santhosh Nampy 170375, CALI). Photos by Vishnu Mohan.

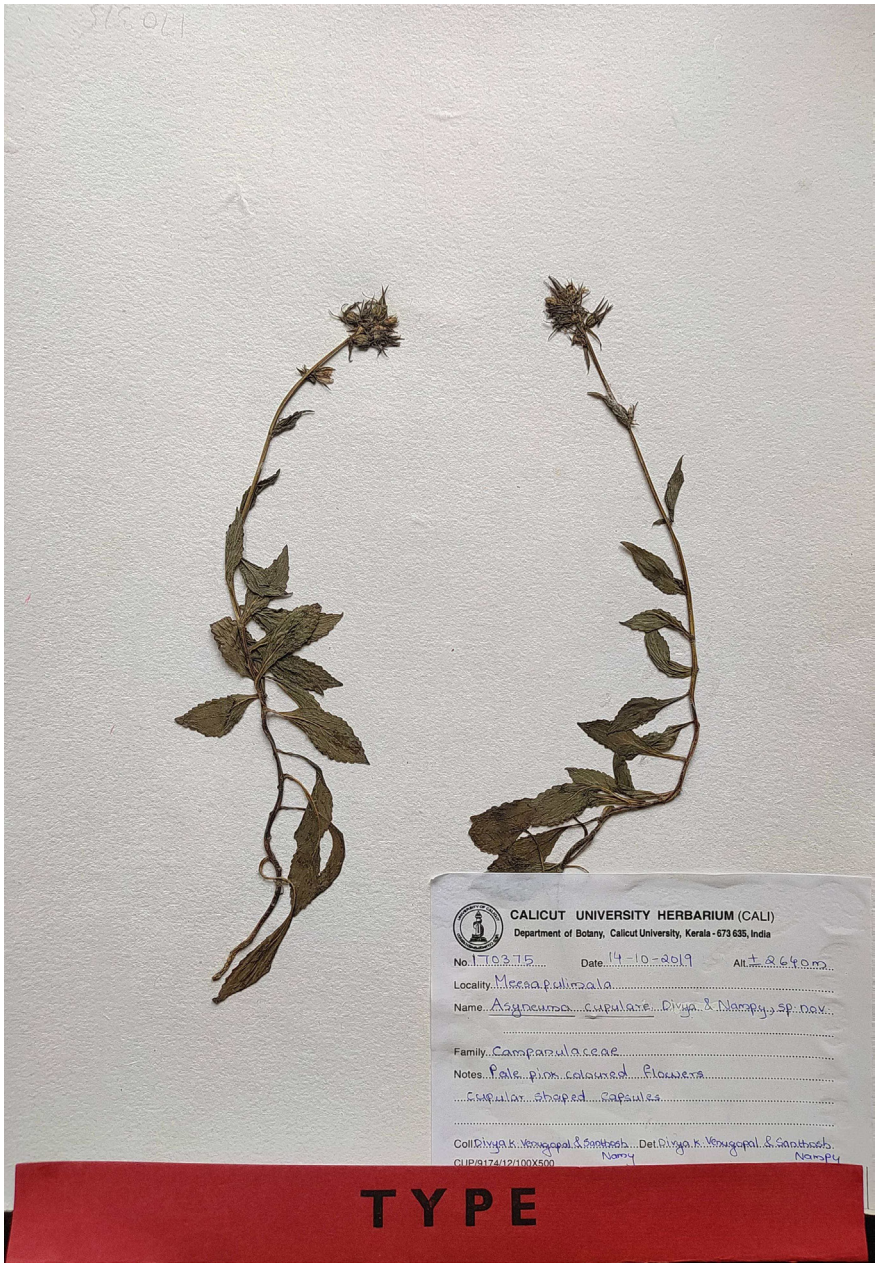

Figure 2. Holotype of *Asyneuma cupulare* sp. nov. deposited at CALI.

Type: Nepal, 1821, Nathaniel Wallich 1283 (lectotype K (barcode, K0001112638, <http://specimens.kew.org/herbarium/K0001112638>, designated here, digital image*) (Fig. 4).

Notes

Campanula fulgens was originally described by Wallich (1824) with the citation: 'I have found this species in the valley of Chitlong which is considerably higher than that of Nipal, and on mount Chanda-giri which separates the two. It has also been brought to me by a collecting party from the road to Gosnin-Thau'. When Briquet (1931) described *Asyneuma* Briq., he transferred this species to this genus as *Asyneuma fulgens* (Wall.) Briq. A detailed search in online databases of various herbaria revealed seven specimens collected by Wallich from Nepal: three at K (K0001112638, K000814285, K000814286), one each at E (E 00275106), BR (BR 696959), M (M0217898), GDC (G00321458) and PH (PH00000404). Among them, the sheets K000814286, BR696959, M0217898 and G00321458 were collected in 1821 while K000814285 in 1829 and the others E00275106 and PH (PH00000404) are without any year/date of collection. Hence the sheet at K (K0001112638) which agrees with the protologue is designated here as the lectotype following the Schenzen Code (Turland et al. 2018) and BR696959, M0217898 and G00321458 are consequently isolectotypes.

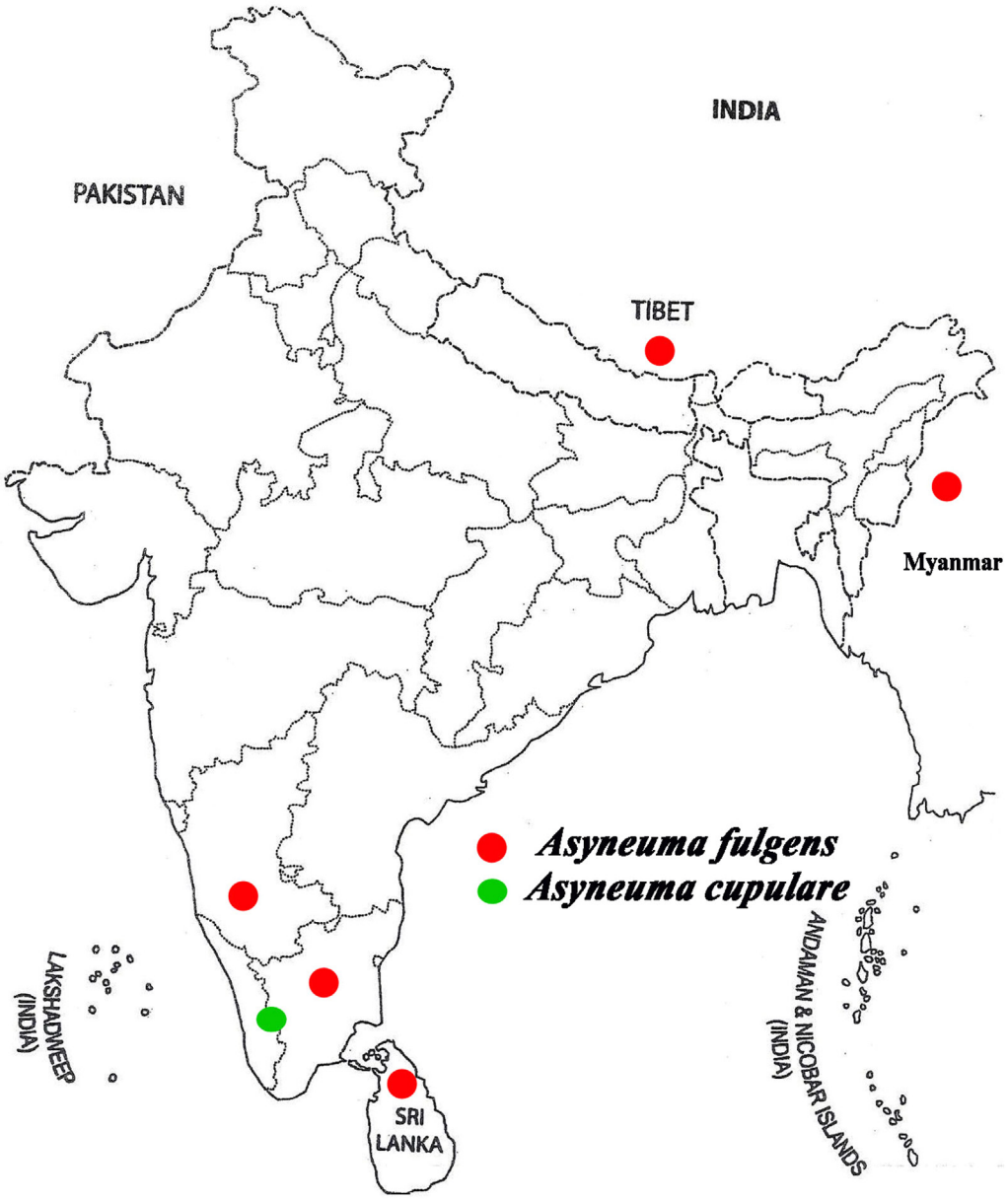

Figure 3. Distribution map of *Asyneuma cupulare* sp. nov. and *Asyneuma fulgens*.

Table 1. Diagnostic morphological features of *Asyneuma cupulare* and *A. fulgens*.

Characters	*A. cupulare* sp. nov.	*A. fulgens*
Hairiness of stems and leaves	Puberulent	Glabrous, sometimes sparsely hirsute below
Stem	4-angular	Terete
Venation	Nerves reticulate underneath	Nerves parallel oblique underneath
Racemes	Up to 5 cm long with usually 2-3 flowers, sometimes ending in a single flower	10–15 cm long with numerous flowers in an elongated peduncle
Pedicels	3 cm long	Sub-sessile
Calyx lobe	6.0–6.1 mm long, much shorter than corolla lobes	5–10 mm long, equal to the corolla lobes
Corolla	Pale pink	Blue
Filament	Glabrous	Margins densely ciliate
Stigma	Glabrous	Pubescent
Capsules	Erect, cupular; base rounded with 10 prominent ribs; dehisce by median valves.	Erect, obovoid-conical; base acute or acuminate, with 6 prominent ribs; dehisce by apical pores.

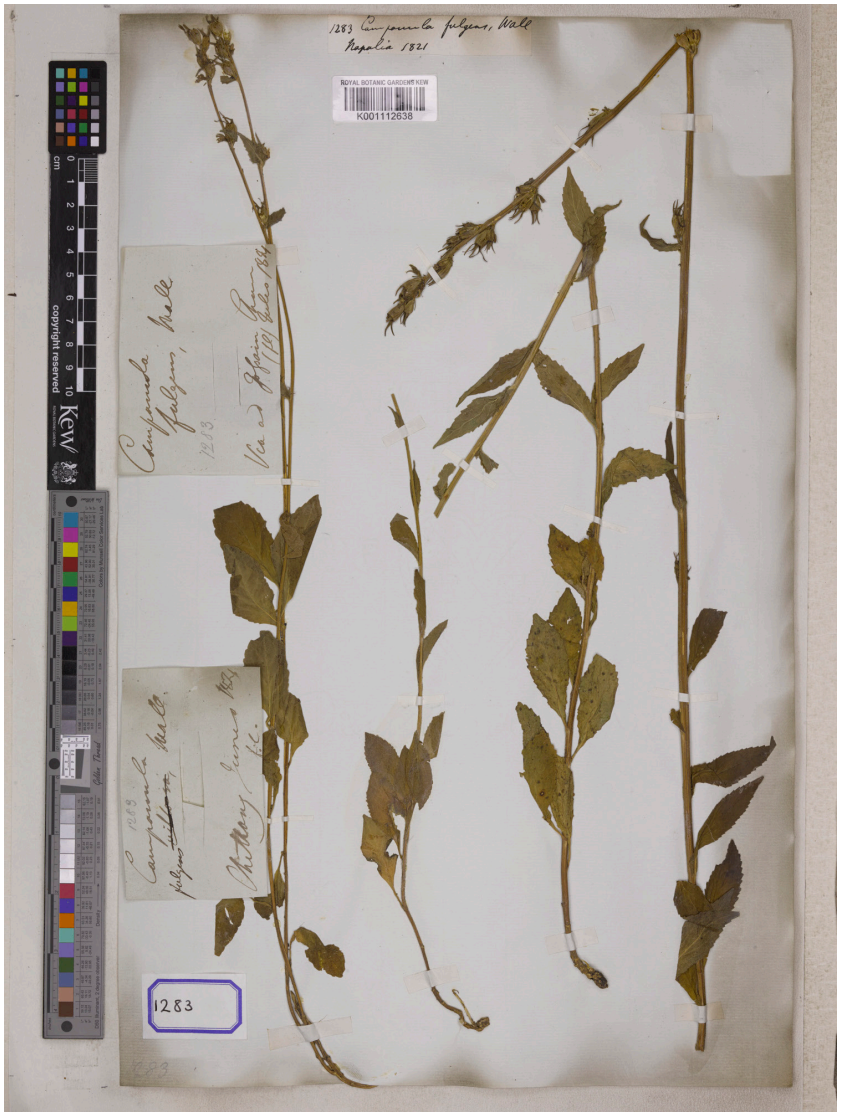

Figure 4. Lectotype of *Asyneuma fulgens* (Wall.) Briq. (K0001112638). (c) The board of trustees of Royal Botanic Gardens, Kew. Reproduced with permission.

Acknowledgements – Authors are grateful to The Head, Dept of Botany,Univ. of Calicut for the facilities; Chief Wildlife Warden (Kerala) and Officials of KFDC for granting permission to explore the Meesapulimala; Dr. K. N. Gandhi (Harvard University) for correcting the specific epithet according to the gender of the species. *Funding* – This study was supported by research grants from Kerala State Council for Science, Technology and Environment, Thiruvananthapuram (126/2016/KSCSTE dated 26 May 2016).

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Phytotaxa 360 (3): 292–295
http://www.mapress.com/j/pt/
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Correspondence

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

https://doi.org/10.11646/phytotaxa.360.3.10

Notes on taxonomic identity and typification of *Fagraea coromandelina* (Gentianaceae)

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The genus *Fagraea* Thunberg (1782: 132), belonging to the family Gentianaceae, is represented by 70 species in the world (Struwe *et al*. 2002). It is distributed in India, Sri Lanka, Sumatra, Malay Peninsula, Borneo, New Guinea, French Polynesia, China, Philippines and Australia. Clarke (1885) reported 5 species from the present political boundary of India, of which 2 species were recorded by Gamble (1921) from South India. The genus includes glabrous epiphytic trees or shrubs, with simple, opposite and coriaceous leaves, fragrant flowers and pulpy berries with a persistent calyx.

During a recent scientific survey, as a part of preparing the inventory of floristically rich Idukki district in Kerala (India), we came across a few interesting specimens of the genus from Mathikettan shola National Park and Periyar Tiger Reserve. Critical examination revealed that these specimens belong to *F. coromandelina* Wight (1848: t. 1316), which however, has long been treated as synonym of *F. obovata* Wallich (1824: 33) by Trimen (1895), Clarke (1885) and Gamble (1921) or *F. ceilanica* Thunberg (1782: 132) by Leenhouts (1962). Detailed studies in consultation with type and protologue revealed that the former is quite distinct and can be separated from the latter by the nature of leaves, shape of fruits and floral characters (see Table 1). Since no holotype was indicated at the time of original description, a lectotype is chosen among the original material traced.

TABLE 1. Comparison of diagnostic characters of *F. coromandelina*, *F. obovata* and *F. ceilanica.*

Characters	*F. coromandelina*	*F. obovata*	*F. ceilanica*
Petioles	Absent	1.2 cm long	1 cm long
Corolla tube	Gradually tapering towards base	Abruptly tapering towards base	Abruptly tapering towards base
Stamens	Exserted	About the length of corolla	About the length of corolla
Shape of filaments	Thickened at base	Slender at base	Slender at base
Berries	Round	Elliptic	Oval

Materials and methods

Live specimens were collected from Idukki district and detailed descriptions were made. Photographs were taken using Stereomicroscope (Leica EZ4HD). Protologues and relevant literatures were examined for confirming the identity and for typification. The following virtual herbaria were searched for locating Wight's original materials: A, ADB, B, BHU, BM, BR, C, CAL, CGE, DD, E, FH, FI, G, GH, GL(E), GOET, GZU, HAL, L, LE, M, MH, MO, NSW, NY, OXF, P, PH, S, TCD, W, Z (acronyms according to Thiers 2018). The morphological information on *Fagraea obovata* was taken from live individuals and that of *F. ceilanica* from literature (Trimen 1895, Leenhouts 1962) and protologue. In designating the lectotype, we follow the Shenzhen Code (Turland *et al*. 2018).

Results

Taxonomy

Fagraea coromandelina Wight (1848: t. 1316)

—*Fagraea obovata* sensu Gamble p.p. (1921: 865)

—*Fagraea obovata* sensu C.B. Clarke p.p. in Hooker (1885: 83)

Lectotype (designated here):—INDIA. Tamil Nadu: Courtallum, 1835, *Robert Wight 548* (E barcode E00173543 [digital photo!]).

 Accepted by Fabrizio Bartolucci: 14 May 2018; published: 17 Jul. 2018

Description:—Trees or shrubs, 1.5–2 m tall, often epiphytic or lithophytic. Stems branched, woody with prominent leaf scars, glabrous. Leaves simple, opposite, 10–12 × 4–6 cm, obovate, coriaceous, sessile, obtuse to rounded at apex, cuneate at base, entire at margins, both surfaces glabrous, fleshy; veins prominent only on adaxial surface; stipules absent. Cymes terminal, 3-flowered; peduncles 2–3 cm long, glabrous, green; bracts absent. Flowers bisexual, ca. 6 × 2 cm. Calyx deeply 5-lobed, ca. 1 × 1 cm; oblong, lobes thick, rounded at apex, imbricate, green, glabrous, persistent. Corolla 5-lobed, ca. 5.6 × 2 cm, widely obovate, twisted and slightly overlapping to the right in bud, cream coloured, glabrous, fleshy; apex rounded, reflexed; corolla tube ca. 1 cm wide from base. Stamens 5, equal, adnate to the corolla tube, exserted; filaments ca. 4 cm long, slender with a thickening at base, cream coloured; anthers oblong, ca. 0.5 × 0.3 cm, dithecous, dorsifixed, glabrous. Ovary 2-celled, oblong, ovules many; styles slender, ca. 4.9 × 0.1 cm, exserted; stigma capitate. Berries rounded, ca. 4.5 × 3.5 cm, green with persistent calyx; seeds nearly oblong-reniform, numerous, cells of seed coat isodiametric, hilum prominent at the base, brownish at maturity.

Distribution:—South India, endemic.

Ecology:—In shola forests, usually along banks of streams at an elevation about 1600m, epiphytic or lithophytic.

Flowering and fruiting:—March-December.

Nomenclatural notes:—Wight (1848) in the protologue, cited only the collection locality "Courtallum and Coonoor (Nilgiris)". We traced 5 specimens collected by Robert Wight: one at K collected from Nilgiris (barcode K000883562) and 4 at E collected from Courtallum (barcodes E00173543, E00173544, E00179254, E00179255). These specimens completely agree with the protologue, and can be safely considered as original material (Art. 9.3. of the ICN, Turland *et al.* 2018). The specimen kept at E (barcode E00173543), shows all the characters mentioned in the protologue, and is designated here as the lectotype for the name *Fagraea coromandelina*.

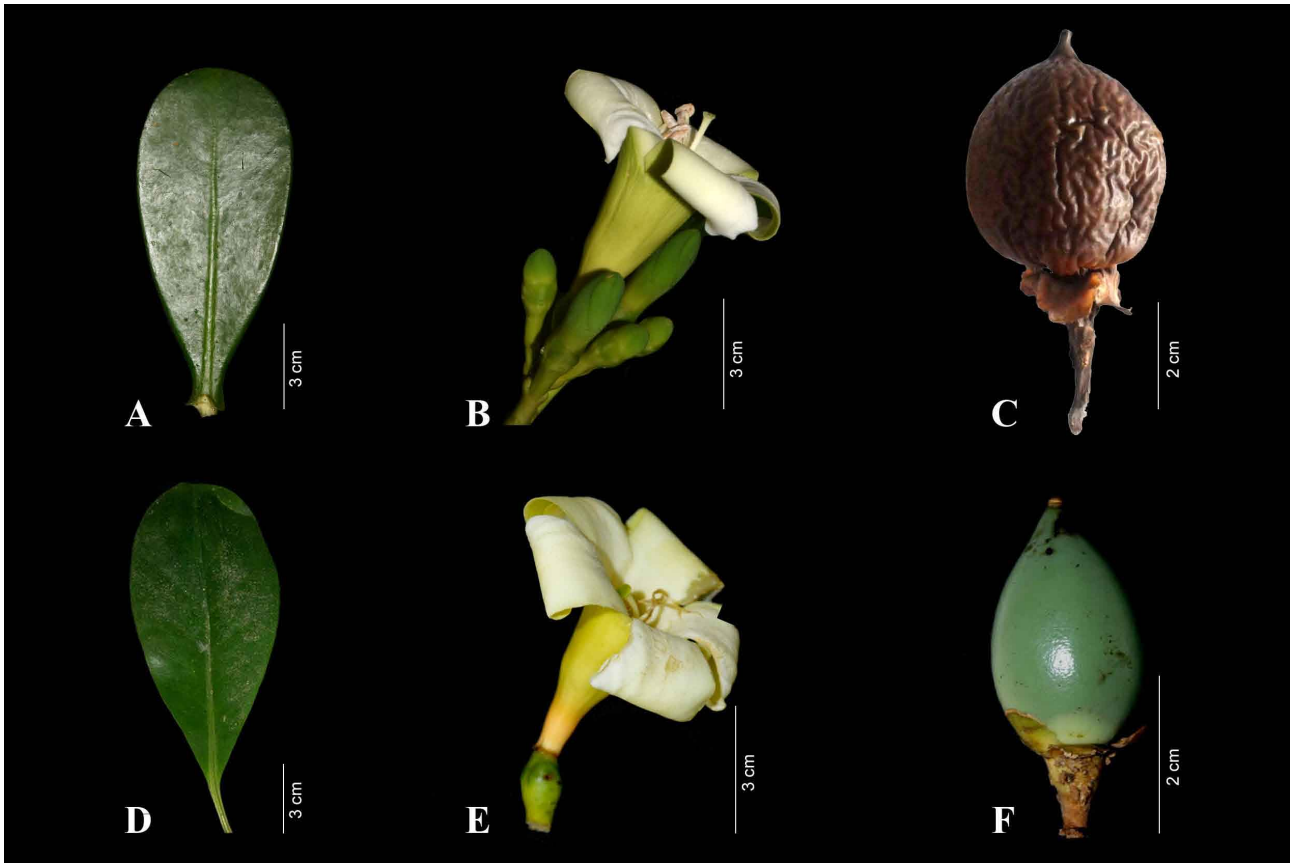

FIGURE 1. A-C. *Fagraea coromandelina* Wight, **D-F.** *Fagraea obovata* Wall. **A and D.** Leaves; **B and E.** Flowers; **C and F.** Fruits.

Taxonomic notes:—Wight (1848) described two species of *Fagraea* in his *Icones Planatarum Indiae Orientalis*: *F. coromandelina* Wight and *F. malabarica* Wight. The two species can be distinguished from each other by presence (vs absence) of petiole, round (vs elliptic) fruits, nature of corolla tube (wide vs slender) and presence or absence of thickening at the base of filaments. Wight considered *F. malabarica* as closely related to *F. ceilanica* Thunb. but *F. coromandelina* as a quite distinct species. Later, other authors treated *F. coromandelina* as a synonym of *F. obovata*

(Type: BANGLADESH. Silhet, *s.die*, *Desilva 1595.1* (K001113547 [digital photo!]) or *F. ceilanica* (Isolectotype designated by Wong & Sugumaran 2012: 75): SRI LANKA. *s.die*, *Thunberg S07-8227* (GOET [digital photo!]). Detailed analyses of the type material, protologue and live specimens revealed that *F. coromandelina* (Fig. 1) is quite distinct and can be separated from *F. obovata* or *F. ceilanica* (see Table 1) and it is reinstated here as a distinct species.

Additional specimens examined:—INDIA. Kerala: Idukki district, Mathikettan shola National park, Choondal, 20 September 2017, *Divya K. Venugopal* & *Santhosh Nampy 154133*; Changalakavalai, 29 December 2014, *Syam Radh* & *Santhosh Nampy 137913*; Onnamthodu, 08 May 2015, *Santhosh Nampy* & *Syam Radh 137971*; Periyar Tiger Reserve, Mangaladevi hills, 15 July 2017, *Santhosh Nampy* & *Divya K. Venugopal 154122* (CALI!). Tamil Nadu: Nilgiri district, Nilgiri hills, *s.die*, *s. coll. s.n.*(MH00257131!); *s.loc*., 16 March 1983, *s.coll. s.n.* (MH00257282!); *ibidem,*1835, *Wight s.n.* (K000883562!). Tirunelveli district, Courtallum, 1835, *Wight s.n.* (E00173543!, 00173544!); *ibidem,* 1830, *Wight s.n.* (E00179254!, 00179255!).



FIGURE 2. Lectotype of *Fagraea coromandelina* Wight (E00173543). @The board of trustees of Royal Botanical Garden, Edinburgh. Reproduced with permission.

Acknowledgements

The authors are grateful to The Head, Department of Botany, University of Calicut for facilities; curators of CALI, E, GOET, K, MH to consult herbarium; Principal Chief Conservator of Forests (Kerala) and Forest Range Officers for permission to undertake field trips in Idukki district; Kerala State Council for Science, Technology and Environment, Thiruvananthapuram for financial assistance (126/2016/KSCSTE dated 26 May 2016).

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RHEEDEA
Journal of the Indian Association for Angiosperm Taxonomy

RESEARCH ARTICLE

Vol. 29(3): 222–226 (2019)
ISSN: 0971-2313 (Print edition)

https://dx.doi.org/10.22244/rheedea.2019.29.3.06

New record of *Iochroma arborescens* (Solanaceae) for India, a potential invasive plant from America with notes on its typification

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Abstract: *Iochroma arborescens* (L.)J.M.H.Shaw (Solanaceae), a potential invasive species from America, is authentically recorded for the first time in India. Perusal of relevant literature revealed that the name has yet to be typified. Details of the taxonomy, distribution and invasive nature of this species with notes on its typification are provided here.

Keywords: Allelopathy, Idukki district, *Iochroma*, Kerala, Maharashtra, Typification.

INTRODUCTION

While documenting the angiosperm diversity of the floristically rich Idukki district in Kerala, the authors collected some interesting specimens of the family Solanaceae. Detailed examination revealed its identity as *Iochroma arborescens* (L.) J.M.H. Shaw, a species so far not reported from India. The genus *Iochroma* Benth. includes nearly *c*. 26 species worldwide (Mabberley, 2017; but IPNI records 98 names under *Iochroma*), ranging from Mexico to Tropical America. *Iochroma arborescens* is an invasive weed distributed in American countries such as southern Mexico, central and South America (Shaw, 2018). The occurrence and distribution of this species in India is yet to be resolved, and this species has not been included in the list of invasive plants/ weeds in India. A perusal of relevant literature also revealed that the name is yet to be typified. The present paper discusses the taxonomy, distribution, invasive nature and typification of *Iochroma arborescens* in India.

Received: 30.8.2018; *Revised & Accepted*: 20.05.2019
Published Online: 30.09.2019

Taxonomic treatment

Iochroma arborescens (L.)J.M.H.Shaw, Plantsman 17(3): 200. 2018. *Atropa arborescens* L., Cent. Pl. II: 10. 1756. *Acnistus arborescens* (L.) Schltdl., Linnaea 7: 67. 1832. *Neotype* (designated here): Plumier, Pl. Amer. fasc. 2. t. 46. f. 1. 1756. **Figs. 1 & 2**

Unarmed shrubs or small trees, up to 2 m tall, glabrous throughout. Stems terete, branched, greyish-white. Leaves simple, alternate; petioles 1–2 cm long, glabrous; lamina elliptic, 18–24 × 6–9 cm, acute to attenuate at base, acute at apex, entire at margins, both surfaces glabrous, pale green. Inflorescence a many flowered fascicle, cauliflorous. Flowers bisexual, actinomorphic, *c*. 2 × 1 cm; pedicels *c*. 1 cm long. Calyx 5-lobed cupular; lobes *c*. 3 × 1 mm, hairy outside, acute at apex, green. Corolla 5-lobed; tube *c*. 4 × 1 mm; lobes *c*. 8 × 1 mm, nearly elliptic, greenish-white with yellow tinge on inner surface, papillate along margins. Stamens 5, equal, exserted; filaments *c*. 5.1 mm long, epipetalous, glabrous, cream coloured; anthers oblong, *c*. 2 × 2 mm, dithecous, dorsifixed, yellow coloured. Ovary 2-celled, ovoid, *c*. 2 × 1 mm; ovules many; styles slender, *c*. 7 × 1 mm; stigma capitate. Berries globose, *c*. 5 mm long.

Flowering & fruiting: April–June.

Distribution: South and central America (Brazil, Peru, Ecuador, Colombia, Venezuela, Costa Rica and Nicaragua), southern Mexico and now in India.

Habitat: Road side (damp areas); as fencing material at elevations around 1200 m.

Specimen examined: INDIA, **Kerala**, Idukki district, Painavu, 04.04.2018, *Divya K. Venugopal & Santhosh Nampy 158483* (CALI).



Figure 1. *Iochroma arborescens* (L.)J.M.H.Shaw: **a**. Habit; **b**. Flowering twig; **c**. Flower; **d**. Bud; **e**. Sepal; **f**. Flower opened; **g**. Corolla opened; **h**. Stamen; **i**. Carpel.

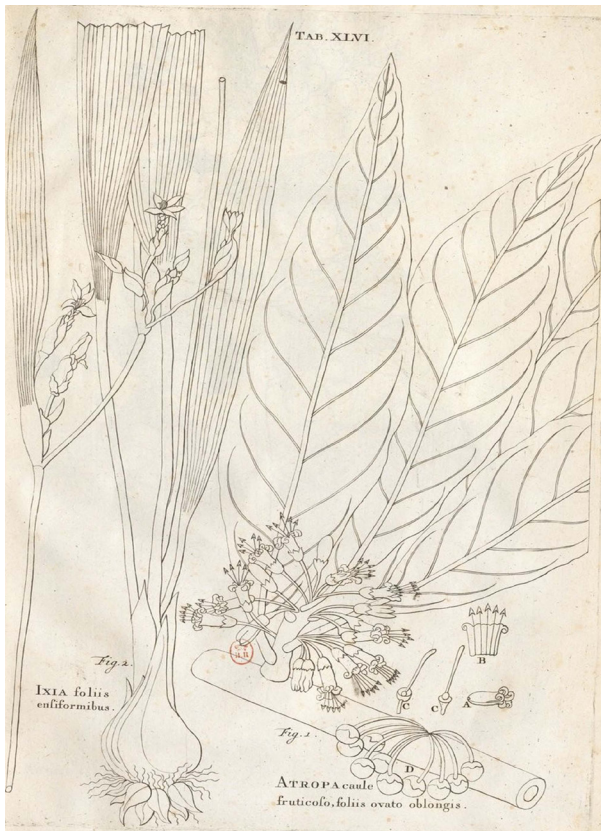

Fig. 2. Neotype of *Iochroma arborescens* (L.) J.M.H. Shaw (Plumier, Pl. Amer. fasc. 2. t. 46. f.1. 1756).

Notes: This species is usually found growing well in open sunny locations. It produces large number of cauliflorous flowers and fruits.

Typification

Iochroma arborescens was originally described as *Atropa arborescens* by Linnaeus (1756) in *Centuria II Plantarum* as "Atropa (arborescens) caule frutescens, pedunculis confortis, corollis limbo revolutis, foliis ovato-oblongis. Belladonna frutescens, flore albo, nicotianae foliis. Plum spec.1". The 'Plum spec. 1' refers to the species 1 in *Catalogus Plantarum Americanarum, Nova Plantarum Americanarum* of Plumier (1703), in which only the phrase-name (nomen specificum legitimum) cited by Linnaeus (1756) appears. Later, in Plumier's *Plantarum Americanarum*, in which Burman presented details of plants from Islands of Antilles once seen and drawn by Charles Plumier, included "*Bella Donna* frutescens, flore albo, Nicotianae foliis. *Plum. Cat. pl. Amer p. 1. Tourn. Inst. P.* 77." along with a description and illustration [fascicle 2, p. 34, t. 46, figure 1]. This set was seen by Linnaeus during his stay in Holland for the description of *Atropa arborescens* in *Centuria II plantarum* (Stafleu & Cowan, 1983). According to Jarvis (2007), the type of this name has not yet been designated as per Linnaean typfication databases. Although Howard (1989) attempted to typify the name in the *Flora of Lesser Antilles* by referring to *Plum. Spec. 1* as type, this is ineffective as he failed to indicate the illustration in *Plantarum Americanarum* (t.46. f.1). Moreover, Linnaeus also, did not refer to this illustration, and so as noted in the Linnaean typfication database no original material has been traced. Since no original material is present, the illustration t.46. f. 1 can be considered as a neotype (Art 40.3) as per *Shenzhen Code* (Turland *et al*., 2018).

Notes on invasive nature

The species is native to America and is commonly called Wild tobacco, Gallinero, Hollow heart etc. (Chimera, 2012). It is an edible non-crop plant, actively managed in home gardens as an ornamental plant and also for chicken fodder (berries), hedging and as a honey shrub in American countries (Eynden, 2004). It is a rapid growing plant propagated through seeds and stem cuttings and has some medicinal properties (Kupchan *et al.,* 1965, 1969; Barata *et al*., 1970).

How this plant got introduced in India is still a question unresolved. The name is not included in any of the Floras of India (Roxburgh, 1795; Clarke 1885; Gamble, 1921; *e-flora India*, 2014). It is also not included in *Invasive plants of India* (Reddy *et al*., 2008), *Invasive Alien Plant Species of Tamil Nadu* (Narasimhan *et al*. 2009), *Handbook on Weed identification* (Naidu, 2012) and *Weeds and weed management in India* (Rao & Chauhan, 2015). Even though this plant is reported as a cultivated species by Reema Kumari (2004, unpublished), based on a specimen collected from Pune, Maharashtra (*D.K. Kulkarni s.n.,* AHMA), it has not been reported in any of the subsequent floras (Sharma *et al*., 2000). Hence this is the first report of this species from India.

Chimera (2012) reported that, the plant is allelopathic in nature and has the ability to inhibit the growth of nearby plants and to colonize in a newly introduced area. In India, this species is planted as a fencing material and ornamental plant.

So there is a chance for this species to become massive in population in near future due to its rapid growth and allelopathic nature.

Acknowledgements

The authors are grateful to The Head, Department of Botany, University of Calicut for facilities; Dr. K.N. Gandhi (Harvard University), Dr. John McNeill (Royal Botanic Garden, Edinburgh) and Dr. Subir Bandyopadhyay (CNH, Kolkata) for nomenclatural discussions; Principal Chief Conservator of Forests (Kerala) and Range Officers for permission to undertake field trips in Idukki district; Dr. Sandra Knapp (BM), Ms. Lesley Scott (E), Mr. Jacek Wajer (BM) for providing relevant literature and Kerala State Council for Science, Technology and Environment, Thiruvananthapuram for financial assistance (126/2016/ KSCSTE dated 26.05.2016).

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