

**TAXONOMIC STUDIES ON *BLUMEA* DC., *LAGGERA* SCH.
BIP. EX BENTH. & HOOK. F. AND *PSEUDOCONYZA*
CUATREC. (ASTERACEAE) IN
PENINSULAR INDIA**

*Thesis submitted to the
University of Calicut
For the award of the Degree of*

**DOCTOR OF PHILOSOPHY IN
BOTANY
Under the Faculty of Science**

By

DILSHA M.V.

Under the Guidance of

Dr. SATHEESH GEORGE



**CENTRE FOR POST GRADUATE STUDIES AND RESEARCH IN BOTANY
ST. JOSEPH'S COLLEGE (AUTONOMOUS) DEVAGIRI
CALICUT- 673008, KERALA, INDIA
JUNE 2023**

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CERTIFICATE

This is to certify that the Ph.D. thesis entitled "**TAXONOMIC STUDIES ON *BLUMEA* DC., *LAGGERA* SCH. BIP. EX BENTH. & *HOOK. F.* AND *PSEUDOCONYZA* CUATREC. (ASTERACEAE) IN PENINSULAR INDIA**" is an authentic record of the original research work accomplished by **Ms. Dilsha M.V.**, under my supervision and guidance at the Centre for Post Graduate Studies and Research in Botany, St. Joseph's College (Autonomous), Devagiri, Calicut, Kerala and that no part of this thesis has been published earlier for the award of any other degree or diploma. Also certified that the contents in the thesis are subjected to **Plagiarism Check** using the software **Ouriginal** and that no text or data is reproduced from other's work.

Dr. Satheesh George

DECLARATION

I, **Dilsha M.V.**, do hereby declare that this Ph.D. thesis entitled "**TAXONOMIC STUDIES ON *BLUMEA* DC., *LAGGERA* SCH. BIP. EX BENTH. & HOOK. F. AND *PSEUDOCONYZA* CUATREC. (ASTERACEAE) IN PENINSULAR INDIA**" is the summary of the research work carried out by me under the supervision of **Dr. Satheesh George**, Assistant Professor, and Head of the Department of Botany, St. Joseph's College (Autonomous), Devagiri, Calicut, Kerala in partial fulfilment of the requirement for the award of the **Degree of Doctor of Philosophy in Botany** under the faculty of **Science** of the **University of Calicut**, I also declare that no part of this thesis has been submitted by me for the award of any other degree or diploma, and it represents original work done by me.

St. Joseph's College, Devagiri

Dilsha M.V.

ACKNOWLEDGEMENTS

In the preparation of this thesis, I have received encouragement and support from various quarters. I am greatly indebted to the various authorities who have provided me an insight into the subject matter.

*I am extremely grateful to my research supervisor **Dr. Satheesh George**, Assistant Professor and Head, Department of Botany, St. Joseph's College (Autonomous), Devagiri, Kozhikode, for his valuable guidance, consistent encouragement, patience, and creative suggestions for the successful completion of this research work. From my heart, thank you dear sir for investing your time in me.*

*I express my sincere gratitude to the Principal, **Dr. Bobby Jose**, and formal principals, **Dr. Sabu K. Thomas**, **Dr. Jose John Mallikasseri**, and **Dr. Sibichen M. Thomas**, St. Joseph's College (Autonomous), Devagiri, Kozhikode for providing all the necessary facilities for the completion of my research work.*

*I would like to convey my gratitude to **Dr. George P.S.** former faculty member and HOD of Botany. St. Joseph's College (Autonomous), Devagiri, Kozhikode. I am Thankful to all faculty members viz., **Dr. Jojo Joseph**, **Dr. Delse P. Sebastian**, **Dr. Binu Thomas**, **Dr. Manudev K.M.** and **Dr. Ron Sunny**, Department of Botany, St. Joseph's College (Autonomous), Devagiri, Kozhikode.*

*A special word of thanks to **Dr. Radhakrishnan V.V.**, Professor, and Subject Expert, Department of Botany, University of Calicut, and **Dr. Abraham Joseph**, Professor, Department of Chemistry, University of Calicut, for the valuable suggestions and support rendered for this work.*

*I will forever be thankful to **CSIR, New Delhi** for providing me with financial assistance as a fellowship.*

*I gratefully acknowledge **Dr. K. N. Gandhi**, Harvard University Herbaria, United States, for his valuable comments and suggestions to all the queries during the study. I owe my deep sense of gratitude to **Dr. A.K. Pradeep**, Assistant Professor, Department of Botany, for his valuable guidance and suggestions. I am thankful to **Dr. N. Sasidharan**, Retd. Chief Scientist, KFRI, Peechi, for his valuable advice and suggestions.*

*I wish to thank the Directors/In-charges, Curators and Librarians of the Herbaria viz., Botanical Survey of India – Coimbatore (MH), Deccan Regional Centre Hyderabad (BSID), Kolkata (CAL), Pune (BSI); Blatter Herbarium, Bombay (BLAT); Calicut University Herbarium (CALI); Kerala Forest Research Institute, Peechi (KFRI); Maharaja Sayajirao University of Baroda, Gujarat (BARO); Rapinat Herbarium, Thiruchirappally (RHT); Shivaji University Herbarium, Maharashtra (SUK); St. Joseph's College Herbarium, Devagiri (DEV) and Tropical Botanical Garden and Research Institute Herbarium, Palode (TBGT) for allowing me to consult the herbarium and library. It is my gratification to express my thanks to the Curators of **K, P, G, BM, GH, NY, FI, E, U, B, LINN, L, M, TUB** and **C** for providing the digital images of types.*

*We extend our thanks to **Library & Archives at Royal Botanic Gardens, Kew and Harvard Herbaria Botany Library** for providing literature relevant to the study.*

*I am deeply indebted to **Chief Wildlife Warden** and staffs of **Kerala Forest Department** for providing permission to collect specimens from protected areas.*

*The following are thanked for their extending hospitality and helping me in the field work, **Dr. Jagdish Dalavi, Pradip Deshmukh, Ratan V. More, Rohan M. Bhat, Shubham T. Bole** (Shivaji University), **Sreenivasan** (Karnatak University), **Ms. Drisya V, Dr. Soumya P, Dr. Manu Philip** (Calicut University), **Sheena Vellakkattuthodi** (Extension Inspector, Coffee Board, Gudalur), **N. Naveenraj** and **Dr. Sivarathinavel** (Coimbatore Research Range, Forest department, Government of Tamil Nadu).*

*I wish to thank, **Dr. Anand Kumar** (Botanist, Central National Herbarium) for his help during the visit to Central National Herbarium. I am thankful to **Dr. K.M. Prabhukumar**, Senior Scientist, CSIR-NBRI, Lucknow) for his various helps. I sincerely thank **Dr. Roby A. J., Dr. Dantus K.J, Roy M, Dr. Muhammad Anaz. K, Dr. Sanil Madambi** and **Jithin Vijayan** for their support during the various stages of this study. I extend my sincere thanks to **Harinarayanan CM**, Scientist, CMPR for his assistance.*

*I express my heartfelt gratitude to **Dr. Prithipal Singh** (Retired Professor, Kirori Mal College, Delhi) for providing necessary information to complete my*

research work. I sincerely acknowledge, **Florian Jabbour**, curator at Paris herbarium to clarify doubts regarding nomenclature in various aspects.

I thank **Ravi Gollamandala**, Telangana for providing research papers related to my study. I express my deep gratitude to **Ms. Manju**, former herbarium keeper, University of Calicut for immense help during my research work. I express my profound gratitude to **Ms. Malavika KJ**, for accompanying me during herbarium visits.

I also thank my lab mates **Akshaya Prakash C., Navya C.P., Ms. Athira C.K., Dr. Abin Kurien, Aswin Das T.P., Aparna Balakrishnan, P., Bhavana R., Mahesh Mohanan, Neena A., Prasanth M.K., Rekha C., Aparna Prasad, Jameema Sidhique., Sindhu E.S., Naseeha C.P, Jaseela, Suvarnika, Dr. Prashy P., Dr. Sini S., Dr. Prasob P.,** and well-wishers for their affection, encouragement, and prayers for the completion of this research.

I would like to convey my thanks to **Peter A.A., Jithin Jayapal,** and **Divakaran**, lab assistants of the Department of Botany, St. Joseph's College (Autonomous, Devagiri, Kozhikode).

I am extremely thankful to my Dear friends **Vishnu Prasad, Jayasree PV, Suada EP, Archana ER, Dhanya P, Prasanth Unnikrishnan, Vibi Panakkal, Linto Antony, Dr. Siji Mol** for their support throughout this journey.

I sincerely thank my elder brother, **Dribin Das** and my cousin brothers, **Shibin & Amar** for assisting me in the field work during Covid pandemic period.

I am deeply thankful to my Achan (**Mohan Das**), Amma (**Pushpa**), and my father-in-law (**Rajan PK**) and my mother-in-law (**Rama Bhai**) for their consistent and valuable support and motivation throughout these years.

Finally, my heartfelt thanks to my partner, **Yuvraj P.K.**, for supporting me throughout the ups and downs of my research period.

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INTRODUCTION

Flowering plants, or Angiosperms (also known as Magnoliophytes or Anthophytes), are a monophyletic cluster group currently considered to be the twin group of Gymnosperms. Angiosperms are by far the largest, most diverse, and most successful group of plants, containing well over 95% of all terrestrial plant species living today. Flowering plants grow in virtually all habitable regions and are dominant in some aquatic ecosystems and most terrestrial ecosystems, with the notable exception of the latter in coniferous forests. Angiosperms make up the majority of our economically important plants, including our most valuable food crops (Simpson, 2019).

The morphological diversity of Angiosperms is astounding, and they have a wide range of adaptive types. Compared to other groups of land plants, Angiosperms are significantly more diversified in their vegetative form and the structure of their reproductive organs (Endress, 1994). Angiosperms live in a remarkable variety of habitats, including freshwater wetlands, deserts, tropical rain forests, and the Antarctic Peninsula. Angiosperm diversity also comprises a wide range of physiology and biochemistry. The majority of angiosperms are autotrophs, although there are various parasites and saprophytes (Friis *et al.*, 2011). If there were no effective system for classifying similar species of vascular plants, studying and recording information about them would be utter chaos. Whatever the classification criteria, the fundamental procedures are the same (Singh, 2010).

The theory and practise of describing, naming, and classifying organisms is called taxonomy (Lincoln *et al.*, 1998). It is derived from two words: 'taxis, meaning arrangement, and 'nomos, meaning study. The duty of taxonomists is mainly to determine species (or subspecies), differentiate one species from others using keys and descriptions, scrutinise their interrelationships, and solve nomenclature problems using international rules of nomenclature (Spooner *et al.*, 2003). It has a particular position in biology, like the role of mathematics in physical sciences. It is called the queen and servant of biology (Sivarajan, 1991).

Taxonomy is also outlined because it involves the study of the principles and practise of classification. In this general sense, it involves a standard and elementary technique for handling data of all sorts, biological and non-biological. However, it happens that the term was first introduced by the French biologist A. P. Delaware Candolle in his "Theorie elementaire de la botanique" of 1813, in a very biological connotation, and through usage, it's come back to use notably with the methods, principles, and even partly with the results of biological classification (Heslop-Harrison, 1967).

Angiosperms or flowering plants are classified into 453 plant families with at least 260,000 living species. The three largest flowering plant families containing the greatest number of species are the Asteraceae, Orchidaceae and Fabaceae (Simpson, 2019).

Asteraceae

Asteraceae, or Compositae, is one of the largest families of Angiosperms. Around 1300 genera and 18000-23000 species are so far reported in Asteraceae, distributed nearly throughout the globe (Bremer, 1987; Broholm *et al.*, 2014; Jeffrey, 2007; Rao *et al.*, 1988). The family members inhabit all the continents except Antarctica (Jeffrey, 2007). The majority of members in the family are annual evergreen shrubs or undershrubs or perennial rhizomatous herbs (Heywood, 1978). Other morphological forms like tap-rooted or tuberous-rooted perennials and biennial and annual herbs are also numerous. Large trees are unusual. Epiphytes and true aquatics are also in the rare category (Chinya, 1994).

The presence of an inferior ovary, a single basal ovule, and introrsely dehiscent anthers that are more or less connate (or at least connivent) around the style, which climbs up through the anther tube and pushes the pollen out, is the most distinguishing trait of this family. The flowers are borne in involucrate, centripetally blossoming capitula, but the flowering sequence is generally cymose among the capitula. Pollen is trinucleate, and seeds are devoid of endosperm. When the calyx is present, it is changed into a series of scale-like, bristle-like, or hair-like structures known collectively as the pappus (Anderberg *et al.*, 2007; Hooker, 1882).

Native peoples all around the world utilise members of the Asteraceae, especially for medicinal purposes. Traditional medicine widely uses the Compositae members that are growing in the wild. Preparations from Compositae members are variously used because of their valued properties like antibiotic, antifungal, antihelmintic, antiplasmodial, expectorant, sedative, diuretic, spasmolytic, hemostatic, immunostimulatory, or anti-inflammatory properties. Wild members of the Compositae are also used as fish poisons, sources of oil and nectar, fodder, and food. For the preparation of insecticides, medicines, soaps, detergents, varnishes, paints, cosmetics, rubber, perfumes, food products, and flavourings and colourants for foods and drinks, various Compositae members are providing raw materials (Garg & Sastry, 1996; Viswanathan & Singh, 1996). Many members are highly used as ornamentals in both commercial and recreational horticulture (Anderberg *et al.*, 2007).

Eleven subfamilies and 35 tribes are accepted in the subfamilial and tribal classification of Compositae proposed by Panero and Funk (2002). In it, the most derivable one is the asteroid group of tribes (subfamily Asteroideae) (Bremer, 1987; Bremer & Anderberg, 1994; Kadereit, 1989; Kim *et al.*, 1992). An asteroid group of tribes consists of the tribes Inuleae (including Plucheeae), Heliantheae s.l. (including Eupatorieae), Gnaphalieae, Astereae, Anthemideae, Calenduleae, Corymbieae, and Senecioneae (Panero & Funk, 2002). Within Inuleae sensu lato, various groups at subtribal level have been recognised (Anderberg, 1991b).

The dispute over the tribe Inuleae's boundaries has been solved by the result of molecular studies of Anderberg *et al.* (2005). His study confirms that Inulea and Plucheeae together form a well-supported group containing two main clades. The first clade was treated as subtribe Inuleae-Inulinae and the latter clade as subtribe Inuleae-Plucheinae (Anderberg, 2009).

Antiphiona, *Blumea*, *Blumeopsis*, *Caesulia*, *Carpesium*, *Cyathocline*, *Duhaldea*, *Epaltes*, *Inula*, *Laggera*, *Merrittia*, *Pluchea* are some of the diverse genera in the tribe Inulea (Anderberg, 2009). One of the largest and taxonomically challenging genera in the tribe Inulea is *Blumea* (Randeria, 1960). Previous

researchers have already identified issues with species-level identification (Hooker, 1882; Koster, 1941). The genera *Laggera* and *Pseudoconyza* have always been associated with *Blumea* in the past. Still, these different genera are treated as *Blumea*. For this reason, the three genera (*Blumea*, *Laggera*, and *Pseudoconyza*) are selected for this study.

Blumea

The genus *Blumea* is included in the tribe Inuleae and subtribe Inulinae of the Asteraceae. It is the largest genus in the tribe, and it includes largely herbs and undershrubs and infrequently shrubs (Pornporngrueng *et al.*, 2016; Randeria, 1960). Most members of this genus are extensive weeds in disturbed areas. Only a few are restricted to the evergreen forest, and some of the species play important roles in other habitats like undisturbed, open vegetation types. Highest diversity of this genus is seen in tropical Asia and some species in Australia and Africa. It contains nearly 100 species distributed throughout the Old World tropics (Randeria, 1960; Anderberg, 1994; Anderberg & Eldenas, 2007). Both geographically and ecologically restricted species are also seen (Pornporngrueng *et al.*, 2007). This genus is eminently characteristic of India, and the species can be called the groundsels of that country (Hooker, 1882). The radial anther endothecium thickenings, disciform capitula, one big oxalate crystal present in each cell of the cypsela epidermis, and tailed anthers are the characteristics that define the genus *Blumea* (Pornporngrueng *et al.*, 2016).

Many *Blumea* species are used in traditional Chinese medicine. The dry plants are used for decorative purposes. *Blumea* is primarily found in tropical Asia, Africa, and Oceania, with tropical Asia having the greatest diversity (Pornpongrueng *et al.*, 2016). With the exception of the most common weeds in disturbed habitat, some *Blumea* species have very limited distribution areas at the forest's edge (Peng *et al.*, 2020).

Many species in the genus *Blumea* are used in traditional medicine. *Blumea balsamifera*, also known as 'Dafengai,' is said to have stomachic expectorant, antispasmodic, and sudorific properties. Its leaves and roots are used as a crude

medicine for beriberi, menorrhagia, leucorrhea, lumbago, rheumatism, and other ailments (Perry & Metzger, 1980; Burkill, 1966). In Guangxi, *B. riparia* is used as a folk medicine for puerperal metrorrhagia, puerperal oedema, and barrenness (Huang *et al.*, 2001). Because of their multifaceted activities, the *Blumea* genus and its chemical constituents have recently received a lot of attention. Extensive research on the *Blumea* genus has resulted in the identification of several compounds (Chen *et al.*, 2009).

Because of its weedy nature, the percentage of endemism is low in this genus. Only 7 endemic taxa are present in India (Hajra *et al.*, 1995; Ahmedullah & Nayar, 1986).

Laggera

The genus *Laggera* comprises approximately 10 species. It is one of the small genera in the family Asteraceae (Nylinder & Anderberg, 2015). Tropical Africa and Asia are the main centres of distribution for *Laggera*. It belongs to the tribe Inuleae and subtribe Plucheinae of Asteraceae (Anderberg & Bengtson, 2022). The key identification features of *Laggera* include winged stems or at least distinctly decurrent leaf bases, the absence of anther tails, and styles with obtuse sweeping hairs reaching below the bifurcation (Pornpongrungrueng *et al.*, 2007). The genus is represented in India by two species that are typically found in flatland and at altitudes up to about 1500 m in tropical regions (Getahun *et al.*, 2019). In the areas where they are distributed, the two species of the genus *Laggera* are found growing as weeds (Dantanko & Malann, 2020).

Laggera has been associated with *Blumea* in the past. Schultz-Bipontinus (1843) erected the genus *Laggera*. Based on the absence of tails on the anthers and a decurrent leaf base, he transferred all members of the de Candolle (1836) defined *Blumea* series Caulopterae to *Laggera*. According to Wild (1969) and Grierson (1974), *Blumea* and *Laggera* should be combined. This was suggested because the two characters that distinguish the two genera—anther tails, which are present in *Blumea* but absent in *Laggera*, and leaf base shape, which is decurrent in *Laggera* but not in *Blumea*—were found to be extremely problematic, and both genera are

polymorphic for them. However, according to molecular information, *Blumea* belongs in the subtribe Inulinae, whereas *Laggera* is in Plucheinae (Anderberg *et al.*, 2005). Pornpongrungrueng *et al.* (2007) assert that the similarities between *Laggera* and *Blumea* noted by earlier authors are apparently the result of parallel evolution.

Most of its species are aromatic plants that have long been used in traditional and folk medicine, particularly for the treatment of jaundice. They are also known as powerful herbal remedies for the treatment of leukaemia, bronchitis, dyspepsia, wounds, constipation, dysentery, rheumatoid arthritis, asthma, nasal congestion, malaria, intercostal pains, fever, cough, hepatitis, nephritis, respiratory virus infection, angina, sore throat, pneumonia, scabies, burns, bites from poisonous snakes, and injuries from falls (Getahun *et al.*, 2019).

Pseudoconyza

Pseudoconyza Cuatrec. is a monotypic genus found widely in North and Central America, Asia, and Africa (Beentje, 2002). Concerning its systematic position, this species has baffled botanists. This species is separated from the Astereae and placed in the Inuleae due to a number of technical characteristics of the flowers, including the plump, numerous veined seeds, tailed anthers, pubescence along the entire dorsal surface of the style branches, and lack of deltoid appendages (D'Arcy, 1973). One of the Inuleae's most complicated nomenclatural histories belongs to this pantropical genus. Recent phylogenetic studies on Inuleae reveal that *Pseudoconyza* is more closely related to *Laggera* and *Pluchea*, even though it shares characteristics with *Blumea*, *Laggera*, and *Pluchea* (Anderberg *et al.*, 2005). According to Nylander and Anderberg (2015), *Pseudoconyza* is placed in clade F together with *Pluchea sordida* as sister to *Laggera* in the Inuleae-Plucheinae.

The natural habitat of *Pseudoconyza* is in the Tropics and Subtropics. It is an annual or biennial plant that thrives primarily in tropical biomes with dry seasons. It has uses in food, the environment, medicine, and the treatment of unidentified medical conditions (Beentje, 2002).

Significance of the work

The genus *Blumea* is one among the largest and taxonomically difficult genera in the tribe Inuleae (Randeria, 1960; Anderberg, 1991a; 1994; 2009; Pornpongrungrueng *et al.*, 2016). Problems of identification at the species level due to the extreme variability of the genus were already pointed out by previous workers like Hooker (1882) and Koster (1941). Notwithstanding the fact that a previous revision for the genus *Blumea* exists in Southeast Asia, only herbarium materials were used in this investigation. A complete revision based on field studies is absent in this region. *Blumea* is a heterogeneous genus. It's very difficult to determine its species boundaries. This makes it a difficult genus for taxonomists. Due to overlapping characters, it's difficult to identify at the species level. Even though there are so many studies came on this genus in various aspects like numerical taxonomy, cytology, anatomy, chemotaxonomy, etc., this genus is very difficult for experts too. The range of variation within the species is very high, which makes delimitation of the species very difficult. Several authors have noted the difficulties with generic delimitation, especially in regards to genera like *Blumeopsis* Gagnep., *Merrittia* Merr., and *Laggera* Sch.Bip. ex Koch (Mattfeld, 1929; Randeria, 1960; Wild, 1969; Grierson, 1974; Dakshini & Prithipalsingh 1978; Anderberg, 1991a;b;1994). The genera *Laggera* and *Pseudoconyza* have always been associated with *Blumea* in the past. Still, these two different genera have been treated as *Blumea* in some works. In this context, an attempt is made to revise these three genera (*Blumea*, *Laggera*, and *Pseudoconyza*) in Peninsular India through a study based on field observation and fresh specimens. This research serves as a foundation for a revision of *Blumea*, *Laggera*, and *Pseudoconyza* in Peninsular India.

De Candolle (1836) divided all the *Blumea* species into sections. Later workers like Clarke (1876), Hooker (1882) and Randeria (1960) almost followed the sectional classification. Randeria (1960) and Dakshini and Prithipalsingh (1978) pointed out the problems in the sectional classification proposed by De Candolle (1836) even though they followed the sectional classification. We only studied the Peninsular Indian species of *Blumea*, and it's difficult to put the species into sections

because only a small number of species are studied. Because of this, the study does not use sectional classification.

The present study aims at the following objectives:

1. Field exploration and assessment of present distributional status of the genus *Blumea*, *Laggera* and *Pseudoconyza* from Peninsular India.
2. Preparation of herbarium specimens for future references.
3. Identification of each taxa in consultation with type specimens or other authentic collections and relevant literature.
4. Key preparation based on vegetative and phenological characters

Study Area

When looking at the geological map of India, we can clearly see a division into three great geographical regions, known as the Peninsula, the Indo-Gangetic alluvium, and the extra-Peninsular area. The peninsula area has been, for a long geological time, a terrestrial area that has not been depressed under the sea since the end of the Paleozoic era, while the sea has repeatedly crossed the extra peninsula territory, or at least that portion of which we have any extensive knowledge up to the beginning of the Tertiary. Beyond that, there are very striking differences in the geological structure and surface contours of the two regions (Oldham, 1894). Location wise peninsula is a triangular plateau which is bordered on the North by the Vindhyan ranges. The peninsula contains different age grouped rocks. Archaean and Precambrian rocks of very ancient origin are found majorly in this region (Sharma *et al.*, 1993).

The Peninsular Uplands of India are the most notable development zones in the country. A mass of mountain and hill ranges ranging in height from 460 to 1,220 meters separates the Peninsular Plateau from the Ganga and Indus plains. The Aravalli, Vindhya, Satpura, Maikala, and Ajanta are among the most famous. The Peninsula is bordered on one side by the Eastern Ghats, which have an average elevation of around 610 meters, and on the other by the Western Ghats, which have

an average elevation of 915 to 1,220 meters and rise to over 2,440 meters in places (Balasubramanian, 2017; Kale & Vaidyanadhan, 2014).

Endemism

Almost 2100 endemic flowering plants occur in Peninsular India, which constitute 32% of its total flora while the rest of India has 27% endemics. In this, 890 woody species, 254 semi-woody, and 859 herbaceous species are present. No endemic families were represented in this region (Nayar, 1977). In Peninsular India, which is a landmass of ancient origin and also which represents the Indian plate of Gondwanaland, primitive families like Magnoliaceae, Schisandraceae, Annonaceae, Ranunculaceae, etc. are sparingly represented. With respect to the endemic angiosperms, about 56 genera are distributed over 25 families. Poaceae and Acanthaceae represent the families with the largest number of endemic genera. The nature of endemics is analyzed in terms of phytogeography, Paleobotany, and taxonomy, and found that the endemic flora of Peninsular India is the old one. According to a study palaeoendemics belonging to the humid tropic belt represent a majority of endemics in Peninsular India. Some endemic genera undergo epibiotic speciation wherever climatic variations occur with various ecotones (Nayar, 1980).

A diverse assemblage of trees, shrubs, undershrubs, climbers, and herbs represents the total endemic genera of Peninsular India. Tree species are poorly represented in this region. Turril (1964) has the opinion that peninsular regions provide favorable conditions for endemism next to oceanic islands. A considerable degree of endemism is seen in the flora of Peninsular India. Next to the Himalayan region, the peninsular region rates as the second richest center of endemism in the Indian subcontinent. The high degree of endemism is due to it being cut off on three sides by seawater and the Indian peninsular region evolved in isolation to the degree that its autochthonous flora contains a high level of endemism while being separated from the towering Himalayan highlands to the north by the Indo-Gangetic peaks, which operate as a barrier. The endemism of the flora of the Indian peninsula reflects its biogeographic and adaptive evolution. The Eastern Ghats are very poor in endemic content compared to the Western Ghats (Ahmedullah, 1993).

Rivers

There are countless rivers crossing the Indian Peninsula. Damodar, Subarnarekha, Brahmani, Mahanadi, Godavari, Krishna, Pennar, Cauvery, Tamraparm, Narmada, and the Tapi are the most important ones on the list. In this Narmada and Tapi flow into the Arabian Sea and all others into the Bay of Bengal. In Northern India, there are certain peninsular rivers that are part of the Ganges system examples are The Banas, Luni, Chambal, Sind, Betwa, Southern Tons, Kens, and the Sone. Others run into the Rann of Kutch and the Gulf of Cambay, rising in Central India and the Aravallis (Krishnan, 1956).

The majority of the Peninsular Rivers have reached an advanced stage of development in the lower part of the valleys. Due to the strong ocean currents which flow along the coasts, delta formation is prevented in smaller valleys instead the larger rivers have accumulated deltas at their mouths. Rivers show an early stage of development in the Western Ghats, presumably because the western portion of the peninsula may have experienced both an uplift and an upward tilt during the Tertiary Period (Krishnan, 1956).

Peninsular rivers are more or less dry in the summer season and entirely fed by the rains in the monsoon. The coastal rivers and the inland rivers are the two groups of Peninsular Rivers. Relatively small streams barely 80 km in length are the coastal rivers. Over six hundred coastal rivers are present on the West coast from Gujarat in the North to Kanyakumari in the South. They empty the Western side of the Western Ghats, flow through narrow plains, and reach into the Arabian Sea. Inland rivers include some. West-flowing rivers Narmada and Tapi and the East-flowing rivers such as Mahanadi, Godavari, Krishna, and Kauvery constitute the inland rivers. Extensive deltaic deposits and wide and fan-shaped catchment areas are the specialties of the East-flowing inland rivers. But in the case of western inland rivers, their catchment areas are narrow and elongated and lack delta formation at their mouths by cause of the flow between the mountain ranges (Sharma *et al*, 1993). The river Godavari has the largest catchment and Krishna has the second

largest catchment. These two rivers together drain greater than 0.5 million Km² area (Gadgil & Joshi, 1983).

Climate

The Peninsular Indian region exhibits various major climatic regions. A large part of it indicates dry sub-humid conditions, East and the Western Ghats shows moist sub-humid conditions, semi-arid conditions prevail in the Central and South central part and the characteristic climate of the Western section is the arid climate (Gadgil & Joshi, 1983). More than 3000mm of rainfall can be observed in the regions along the Western Ghats but only less than 500mm of rain falls in the central part (Das, 2020).

Origin and Physiography of Peninsular India

The rocks of Peninsular India have been originated more than 3600 million years ago. It was part of the Gondwanaland before the Carboniferous period. Geologists have the opinion that the Indian Peninsula never subsided under the sea permanently during the Archaean period. It was stiffer, more stable, and hardly affected by mountain-building forces. Nevertheless, in the subsequent periods, it experienced block faulting and displacement. It is evidenced by the formations of Dharwar and Gondawana and also the fault valleys of the Narmada, Tapi, and Son rivers (Husain, 2012).

During the Carboniferous period, coal was formed in the Damodar, Son, Mahanadi, and Godavari basins. Deccan Trap (the Lava Plateau of India) was produced as a result of large-scale vulcanicity during the Cretaceous period. Deccan trap comprises lava sheets of several thousand meters in depth. It originated almost 146 million years back when magma flowed from a depth of about 40 km below the crust (Husain, 2012).

Significance of Peninsular Plateau

Peninsular India has a very significant role in the economic development of the country because it is richly endowed with natural resources. This region is rich

with metallic and non-metallic minerals. Mineral ores such as iron, manganese, copper, bauxite, chromium, mica, gold, silver, zinc, lead, mercury, coal, diamond, precious stones, marble, building materials, and decorative stones are found in plenty. The peninsular region contains almost 98 percent of India's Gondwana coal resources. Black earth covers a large portion of Peninsular India (Regur soil). Cotton, millet, maize, pulses, oranges, and citrus fruits can all be grown well in the regur soil. Tea, coffee, rubber, cashew, spices, tobacco, groundnut, and oilseeds can all be grown in some parts of south peninsular India. Large areas of Archaean, Dharwar, Cuddapah, and Vindhyan formations in the South and East of Peninsular India have formed red, brown, and laterite soils over time. The rural economy is built on these soils (Husain, 2012).

Thick tropical moist deciduous and semi-evergreen forests cover the Western, Nilgiris, and Eastern ghats. Teak, Sal, Sandalwood, Ebony, Mahogany, Bamboo, Cane, Rosewood, Ironwood, and Logwood, as well as a wide range of forest products, are all found in these forests. The woods of the Western and Eastern Ghats are rich in medicinal plants in addition to Teak and fuel wood. The rivers that flow eastward into the Bay of Bengal provide a series of gorges, waterfalls, rapids, and cataracts that have been used to generate hydropower. The rivers that originate in the Western Ghats provide excellent opportunities for hydropower generation and irrigation of agricultural crops and orchards. Ooty, Udhagamandalam, Kodaikanal, Mahabaleshwar, Khandala, Matheran, Pachamarhi, and Mount Abu are among the most important hill stations and hill resorts. Many scheduled tribes live in the Peninsula's hilly and mountainous regions. Dravidian culture predominates south of the Vindhyans (Husain, 2012).

REVIEW OF LITERATURE

Taxonomic History of *Blumea*

De Candolle (1833) named the genus *Blumea* in honor of C. L. Blume, the author of the Flora of Java, who discovered several species and made significant contributions to Indian botany. De Candolle created a distinct genus (i.e., *Blumea*) from *Conyza* Less by focusing on achene characteristics such as cylindrical-shaped achenes compressed by the sides in the shape of a flattened disc. Of the two genera to which the name of *Blumea* had been previously assigned, one is the *Reinwardtia*, and the other is the *Talauma*. De Candolle stated in the publication that the genus *Blumea* includes almost 80 species.

Despite the fact that the genus was discovered in the botanical world only in 1790, some species were recognized and even mentioned in literature as early as the beginning of the 17th century (Randeria, 1960). According to Burkill (1935), Indians, Malaysians, and Chinese have been aware of three or four species of *Blumea* and their commercial usefulness for four or five centuries. In No. 107 of the Bulletin of Miscellaneous Information, Anonymous (1985), provides information about Camphor (i.e., *Blumea balsamifera*). It is a translation from the Pen-ts'ao Kang muh or great Materia Medica, by Li Shi-chen, dated 1600 AD. *Blumea Balsamifera* was known as *ngai* at that time. Materia Medica has a detailed description of the species.

Flora Cochinchinensis published by Loureiro (1790) was the first to designate it as a different genus. He based it on two species, *Placus tomentosus* and *P. laevis*, and gave it the generic name *Placus* (which was eventually superseded). Different authors such as Linnaeus, Lamarck, Blume, Wallich, Wight, and others have previously described its species under the genus *Conyza*, *Baccharis*, *Pluchea*, and other related genera.

Contributions to the Botany of India of Wight (1834) was published with the peninsular Compositae elaborated by A. P. de Candolle. In it, De Candolle added 19

species of *Blumea* in 2 series. The series Apteræ has 17 species and Caulopterae has 2 species. Later De Candolle (1836) in his *Prodromus Systematis Naturalis Regni Vegetabilis* (Vol 5) added altogether 95 species into 2 series. The series is again divided into various sections. The genus was not given a type species when it was first described. The characters De Candolle used to demarcate one species from another are still used to subdivide the genus. *Blumea* belongs to the Asteroideae tribe and subtribe Plucheineae, having affinities to *Phagnalon*, *Erigeron*, *Lannecia*, and *Pluchea*, according to De Candolle.

Richard (1847) combined *Blumea* and *Pluchea* into one genus in his treatment. He couldn't observe any characters to distinguish the two genera as separate. He also pointed out the similarity between the genera *Blumea*, *Conyza*, and *Pluchea* and also observed that the only character given by De Candolle to distinguish *Pluchea* is anthers as appendices do not exist. Based on this, he united *Pluchea* and *Blumea* together.

The series Caulopterae of De Candolle was removed by Schultz-Bipontinus (1843) after Hochstetter (1841). In flora 24, the genus was not described but simply documented three species: *Laggera crassifolia* (Schimper, n. 154); *L. purpurascens* (Schimper, n. 153), and *L. tomentosa* (Schimper, n. 236). Schultz-Bipontinus (1843) segregated all the species in the series Caulopterae into a new genus named *Laggera*, which is characterized by decurrent leaves and the absence of anther tails. But the name is unpublished and it is validated later by Bentham and Hooker (1873). Schultz-Bipontinus (1843) put forward much modification in the classification of Compositae. Both *Blumea* DC (in part) and *Pluchea* Cass (in part) were merged under *Conyza* Linn ex parte non Lessing. It is placed in the division Euconyzae, subdivision Conyzae Legitimate. Schultz-Bipontinus (1843) also erected a new genus named *Doellia* but before that *Doellia kotschyi* appeared as a nude name in a list of plants collected by Kotschy in Nubia and Cordofan (Schultz-Bipontinus, 1842). But Schultz-Bipontinus (1843) did not mention the nude name while describing the genus *Doellia*. Anderberg (1995) stated that the diagnosis provided by Schultz-Bipontinus corresponds to majority of African *Pulicaria* Gaertn. From

the protologue, it is clear that Schultz-Bipontinus was not satisfied with the characters used for diagnosis. And simply stated that numerous *Blumea* species could be *Doellia*. Miquel (1856) in *Florae Indiae Batavae* (alternatively called *Flora van Nederlandsch Indie*) followed these modifications.

Placus Lour and *Doellia* Sch.-Bip. were likewise reduced to synonyms of *Blumea* by Bentham (1873). He rejected the name *Conyza* Linn used by Schultz-Bipontinus but maintained the status of *Laggera* as a distinct genus. Clarke (1876) considered 26 species of *Blumea* in his work on the Indian Composite. He divided all the Indian species of the genus into 3 series: Minusculae (Herbs), Scandentes (Scandent herbs), and Majusculae (perennial herbs and shrubs). De Candolle's sectional classification is arranged under these series.

Hooker (1882) later completed a full floristic work on British India (which included Pakistan, Ceylon, and Burma at the time), which culminated in the *Flora of British India* (1876 to 1897). He identified 36 species in India and described all of them. He also described eight new species from India. Cooke (1904) described 13 species while surveying for the flora of Bombay Presidency.

The International Botanical Congress, Vienna (1905) accepted the proposal for conserving the name *Blumea* DC. over *Placus* Lour (Maiden, 1906). Later the *Conyza balsamifera* Linnaeus is conserved as the type of the genus *Blumea* (Rickett & Stafleu, 1960).

Gagnepain (1920a) stated in a note to the Botanical Society of France that two species must be removed from the genus *Laggera*: *L. aurita* (DC.) and *L. flava* Benth. In the same year, Gagnepain (1920b) erected a new genus *Blumeopsis* to accommodate the species *Laggera flava*. In his sense *Laggera aurita* becomes *Blumea aurita*. But *Blumeopsis flava* shows intermediate characters of both *Laggera* and *Blumea*. He found that its anthers are neither truncated nor shortly toothed at the base like *Laggera*, nor sagittate at the base like *Blumea*, but they are gradually attenuated. He is of the opinion that it must remain in the vicinity of the *Blumea* in the tribe of the Inuloides, a sub-tribe of the Plucheinees, with an autonomy well deserved by its distinctive characteristics and therefore a name of a particular genus.

Before this significant change, the species is shuttled between *Blumea flava* and *Laggera flava* by various authors.

Gamble (1957) included 19 species of *Blumea* in his Flora of the Presidency of Madras, which covered a large area of South India. Koster (1941) discussed problems of identification at the species level. He pointed out that, both extremities can be seen in the genus. Species in which dissimilar in several aspects and also that show more or less important differences are also seen. Often the differences are insignificant enough that a separate species cannot be distinguished. As a result, polymorphous species are unavoidable, and various authors' conceptions of them differ. He also described some new species, varieties, forms, and combinations.

Randeria (1960) in revisionary studies of *Blumea* dealt with 49 species throughout its geographical range. It included those species with sufficient herbarium material. She reduced many of De Candolle's names to the rank of synonyms. She used both anatomical and morphological characters for scrutinizing taxa and also pointed out the shortcomings of using anatomical characters for the separation of closely related taxa as far as the traditional morphological-based approach is concerned. But she also adds that any additional evidence would become an asset for a polymorphous genus like *Blumea*.

Hajra *et al.* (1995) documented 29 species and five varieties of *Blumea*. Narain *et al.* (2008) described a new species named *Blumea sonbhadrensis* from Uttar Pradesh, India. Critical examination of type material and protologue of *B. sonbhadrensis* by Tiwari *et al.* (2021) revealed that this species corresponds to *Erigeron sublyratus*.

A field-based work is absent in the Peninsular Indian region other than the treatments in regional and local floras.

Taxonomic History of *Laggera*

The generic status of the genus *Laggera* came only in 1843 when Schultz-Bipontinus (1843) segregated a new genus named *Laggera* characterized by decurrent leaves and the absence of anther tails. Schultz-Bipontinus (1843) erected

the new genus by removing the series Caulopterae of De Candolle published in the Wight (1834) contributions of India. But the name was unpublished and it is validated later by Bentham and Hooker (1873). But before that Hochstetter (1841) merely documented three species viz. *Laggera crassifolia*, *L. purpurascens* and *L. tomentosa* without giving a proper generic status.

In the validated description of *Laggera* by Bentham and Hooker (1873) pointed out that, Asian *Blumea* such as *B. alata*, *B. pterodonta*, *B. flava*, *B. senecionidea*, and *B. musra* belong to *Laggera*.

Blumea and *Laggera* are separated from one another by having tailed anther cells (Hooker, 1882). Moreover, according to him, this trait is not very consistent, with some forms of *B. virens* having anthers without tails whereas other forms of *Laggera* do. Furthermore, Hooker added that Kurz has made a strong case for the possibility that some *Laggers* are sexual variants of *Blumea*. Hooker (1882) introduced *Blumea aurita* DC. into the genus *Laggera* in flora of British India.

Gagnepain (1920a) stated in a note to the Botanical Society of France that two species such as *L. aurita* (DC.) and *L. flava* Benth must be removed from the genus *Laggera*. In the same year, Gagnepain (1920b) erected a new genus *Blumeopsis* to accommodate the species *Laggera flava*. In his sense, *Laggera aurita* becomes *Blumea aurita*. But *Blumeopsis flava* shows intermediate characters of both *Laggera* and *Blumea*. Before this significant change, the species is shuttled between *Blumea flava* and *Laggera flava* by various authors.

According to Randeria (1960), there is a substantial dispute regarding whether each of these two genera (*Blumea* and *Laggera*) is a natural one. The subtribe as a whole frequently exhibits decurrent leaves, and in one genus (*Pluchea*), there are species that exhibit one form or another. Moreover, *Blumeopsis* is exactly halfway between the two genera; it has leaves that are not decurrent, which is more typical of *Blumea*, and tailless anthers like *Laggera*.

According to Wild (1969) and Grierson (1974), the genus *Laggera* should not be split from *Blumea*, because the features employed to distinguish the two

genera were inconsistent within each genus and they observed that *L. aurita* has intermediate characters of both *Blumea* and *Laggera*. They observed that *L. aurita* comes in 2 kinds, one of which has decurrent leaf bases and the other does not. The anther tails in this species are a variable condition according to them.

The confusion regarding the generic delimitation between *Laggera* and *Blumea* can be seen in the work of Hepper and Wood (1983) and Merxmuller and Roessler (1984). This controversy is reconciled by Anderberg (1989). Because *Laggera* lacks crystals in the epidermal cells of the cypsela wall and has obtuse sweeping hairs scattered far below the bifurcation of style, cladistic research using morphological data determined that it belonged to the Plucheeae (now Inuleae-Pluchinae) (Anderberg, 1991a; b;1994). The conclusion using the cladistics is confirmed by the molecular work of Anderberg *et al.* (2005) and Pornpongrungrueng *et al.* (2007).

Gamble (1957) included 4 species of *Laggera* (viz. *L. flava*, *L. aurita*, *L. pterodonta*, and *L. alata*) in his Flora of the Presidency of Madras. Hajra *et al.* (1995) documented 3 species of *Laggera* in India. They are *L. aurita*, *L. alata*, and *L. crispata*.

Taxonomic History of *Pseudoconyza*

One of the Inuleae's most complicated nomenclatural histories belongs to this pantropical genus (Nylinder & Anderberg, 2015). Badillo (1946) created a combination *Blumea lyrata* using *Conyza lyrata*. A separate genus named *Ernstia* was published without a latin description before *Pseudoconyza* came into existence by Badillo (1947). It was Cuatrecasas (1961) who validly erected a new genus named *Pseudoconyza* based on *Conyza lyrata* and placed it in the tribe Astereae. Before that, it is described under the genera *Conyza*, *Erigeron*, and *Eschenbachia* (Merxmuller & Roessler, 1984). Cuatrecasas (1961) established a species named *Pseudoconyza lyrata* from *Conyza lyrata*. He explained that it has resemblance with *Conyza* Less. and *Baccharidastrum* Cabrera (synonym of *Baccharis*).

Randeria (1960) was aware of Badillo's (1946) combination, *Blumea lyrata*, and listed it under "taxa and names of uncertain status" on the grounds that its generic replacement was insufficient (Nesom, 1983).

Leins (1971) created a new combination named *Laggera lyrata* from *Conyza lyrata* and placed *Pseudoconyza lyrata* as a synonym.

Later D'Arcy (1973), established a name change in the genus *Pseudoconyza* based on the work of McVaugh (1972). *Conyza lyrata* is a later term for *Conyza viscosa*, according to McVaugh (1972), who examined type material in London and Paris. Yet, both names correspond to species that some botanists have regarded as separate kinds. Although the flowers of *Conyza* and *Erigeron* appear similar on the exterior, D'Arcy (1973) noted that these two taxa are unusual for having large, dentate, glandular leaves with somewhat clasping leaf bases. This species is distinguished from the tribe Astereae and placed in the tribe Inuleae by a variety of technical characteristics of the flowers, including the plump, many-veined seeds, pubescence along the entire dorsal surface of the style branches, tailed anthers, and lack of deltoid appendages. D'Arcy (1973) also pointed out that as opposed to the neotropical genera where *Pseudoconyza viscosa* is found, this genus has affinities with old world Inuleae genera like *Blumea* and *Laggera*. He pointed out another suggestion that although *Pseudoconyza* is often different, it is anticipated that a number of African species eg., *Blumea aurita* DC; *Laggera kotschyi* Sch.-Bip, etc. will be found to be congeneric with *Pseudoconyza* when these groups are studied and the generic lines are resolved.

Cuatrecasas (1973) agreed with the points of D'Arcy (1973) about the placement of *Pseudoconyza* in the tribe Inuleae instead of in the tribe Astereae. In this work, he mentions another work of his, i.e., Cuatrecasas (1969). In that, he pointed out that, because of the conyzoid habit, *Pseudoconyza* was only reluctantly included in the Astereae. *Pseudoconyza lyrata* was later transferred from the Astereae to the subtribe Plucheinae of the Inuleae by Cuatrecasas. The work of D'Arcy (1973), which corrected the tribal position of *Pseudoconyza* and provided a new, accurate description that was supplemented with a few images, was

appreciated by Cuatrecasas (1973). Typically, the basal tails of the anthers are regarded as the specific tribal traits of Inuleae. However, this character is not mentioned in *Pseudoconyza*'s original publication. This is also mentioned by D'Arcy (1973). However, Cuatrecasas (1973) commented that this character alone would not justify the inclusion of *Pseudoconyza* in the tribe Inuleae. *Pseudoconyza* would also be justified in being included in the order Inuleae due to the unusually blunt anthers seen in this species. According to Cuatrecasas (1973), the crucial factor for defining the correct subtribal position of the genus *Pseudoconyza* is its kind of style.

Later, D'Arcy (1975) again brought a combination named *B. viscosa* from *Conyza viscosa* Mill. In that work he commented that, the earlier work i.e., D'Arcy (1973) was made without study of Randeria's revision of *Blumea*. Through analyzing the work of Randeria (1960), D'Arcy (1975) came to the conclusion that *B. viscosa* belongs to the section Paniculatae of *Blumea*.

The evolutionary history of *B. viscosa* was discussed by Nesom (1983). According to the author, it only differs from *B. lacera* in a few micromorphological characteristics. It resembles *B. lacera* much more than *B. mollis*, which Randeria (1960) thought to be *B. lacera*'s closest relative. *B. viscosa* is most likely a direct descendant of *B. lacera*. Both are successful colonisers of damaged areas, and the latter has a very broad geographic range and seems to share *B. viscosa*'s ecological characteristics. According to Merxmuller and Roessler (1984), *Blumea viscosa* is conspecific with *Laggera aurita*.

The genus did not cluster with any of the *Laggera* species, according to Anderberg *et al.* (2005). The three species *Laggera gariepina*, *Pseudoconyza viscosa*, and *Doellia bovei* were found to have been merged into *Blumea* at some stage. However, *Blumea* is a member of the Inuleae-Inulinae as well as the three other species in the Inuleae-Plucheinae. According to Nylinder and Anderberg (2015), as a sister species to *Laggera* in the Inuleae-Plucheinae, *Pseudoconyza* was assigned to the same clade as *Pluchea sordida*. *Pseudoconyza* is nested in a group of uniquely African species, and although its current distribution is practically

pantropical, they draw the conclusion that it originated in Africa before spreading to other parts of the world.

Sectional Classification

De Candolle (1836) in his *Prodromus Systematis Naturalis Regni Vegetabilis* (Vol 5) divided the genus into 2 series: Apteræ (characterized by nempe foliis caulinis non decurrentibus which means the leaves of the stems not running down and Caulopterae (characterized by nempe foliis secus caulem ramosve decurrentibus means namely, leaves running along the stem or branches). He divided the series again into different sections. In the series, Apteræ 8 sections, and altogether 86 species are grouped in these sections. Caulopterae has 2 sections and 9 species. Sections in Apteræ are Dissitifloræ (9spp), Paniculatatae (29spp), Senecionifloræ (14 spp), Fasciculifloræ (12 spp), Oxyodontæ (4 spp), Semivestitæ (8spp), Macrophyllæ (7spp) and Appendiculatæ (3 spp). Alatae (5spp) and Auritæ are the sections of Caulopterae. For sectional classification, De Candolle used characteristics such as the degree of incision of leaves, the pubescence, the type of inflorescence, the color of the pappus, and the type of receptacle.

Clarke (1876) divided the genus into 3 series: Minusculæ (including herbs rarely exceeding 3 feet, if rather large the capitula are fasciculate or narrowly paniculate), Scandentes (Scandent herbs), and Majusculæ (including perennial erect 4-20 feet plants with large corymbose panicles). Minusculæ is again subdivided into two based on capitula characters. Majusculæ again divided into two based on receptacle with long hairs and receptacle scarcely hairy. De Candolle (1836) divided sections into three series based on their habits, and in virtually every case, the sequence organization of the species in the series mirrored De Candolle's sectional arrangement. However, the majority of the species were categorized into the Minusculæ series, but only members of the sections Semivestitæ, Macrophyllæ, and Appendiculatæ of De Candolle being dispersed across all three series. Clarke reduced (or synonymized) many of De Candolle's names and for some species, he was unaware (mihi ignota). Only 6 sections of De Candolle were recognized by Clarke. He united the sections Semivestitæ and Macrophyllæ and also did not

recognise the section *Appendiculatae*. And placed *Blumea balsamifera* (De Candolle placed it in section *Appendiculatae*) too in the section *Semivestitae cum Macrophyllae*.

Hooker (1882) did not divide the genus into any series instead he directly divided it into 6 sections without giving any names to the sections. Hooker divided the sections mainly on the basis of inflorescence characteristics, habit, type of pubescence, and leaf characteristics. Hooker placed some names of De Candolle in varietal ranks.

Like De Candolle and Hooker, Randeria (1960) also classified the genus into sections. She also pointed out that she followed the convention of previous authors but she has the opinion that the sectional classification is not satisfactory or even convenient. She also commented that most members of the section are more closely interrelated with each other than they are with members of other sections. But there are always intermediate species that could, with relative ease, be put under one section or another. Altogether Randeria (1960) recognized 49 species in 7 sections namely *Semivestitae* (8 spp), *Macrophyllae* (10 spp), *Sagittatae* (1 sp), *Hieraciifoliae* (5 spp), *Paniculatae* (11 spp), *Oxyodontae* (4 spp) and *Dissitiflorae* (10 spp). Randeria reduced many of De Candolle's names to the rank of synonyms and some are placed in taxa and names of uncertain status and two names in the category of excluded species names in her revision. She also brought about some sectional rearrangements in her treatment. Two new sections viz *Sagittatae* and *Hieraciifoliae* were erected by Randeria in her treatment. The section *sagittatae* has only one species. This section is demarcated from others based on the leaves sagittate at the base and female florets with unequally 2-lipped corollas. Section *Hieraciifoliae* includes nine taxa. The section *Hieraciifoliae* contains members of De Candolle sections *Paniculatae* (*B. hamiltonii* DC. as *B. hieraciifolia* var. *hamiltonii* in Randeria's treatment), section *Fasciculiflorae* (*B. macrostachya* as *B. hieraciifolia* var. *macrostachya* and *B. hieraciifolia*) and the section *Semivestitae* (*B. elongata* as a synonym of *B. clarkei*). Randeria (1960) combined the De Candolle sections *Senecioniflorae* and *Fasciculiflorae* into the section *Paniculatae*. She reduced most

of the names in these sections Senecioniflorae and Fasciculiflorae as synonyms. One name in the section oxyodontae DC (ie, *Blumea spinellosa*) is also reduced to a synonym of *B. fistulosa* in the section Paniculatae Randeria. Randeria (1960) also combined the Section Appendiculatae DC. to Section Macrophyllae DC. But one name *B. sylvatica* DC (De Candolle placed it in Section Macrophyllae) is placed as a synonym of *B. lanceolaria* in the section Semivestitae by Randeria.

Dakshini and Prithipalsingh (1977a) studied the chemotaxonomy of 12 taxonomically problematic species of *Blumea*. In their work, they commented that with the exception of the section Oxyodontae, it was not able to remark on the structure of sections within the genus *Blumea* because all species of different sections could not be examined. Furthermore, the chemical compounds are not characterized. In order to comprehend the biosynthetic pathway and the chemical evolutionary sequence, the molecular structure of the chemical compounds must be determined. Such information would bring about a correlation between chemical and morphological characters and helps in the sectional classification.

Dakshini and Prithipalsingh (1978) thoroughly studied the section Hieraciifoliae of Randeria and they made some rearrangements. They undertook morphologic and chemotaxonomic studies on the genus *Blumea* occurring in India (Dakshini & Prithipalsingh, 1977a; b). They observed that *B. hieraciifolia* (D. Don) DC and *Blumea clarkei* Hook. f. of the section Hieraciifoliae Randeria have morphological features that are quite similar to *Blumea fistulosa* (Roxb.) Kurz and *Blumea sessiliflora* Decne. placed it in the section Paniculatae Randeria. These four species form a closely knit group on detailed analysis of capitulum characters and also on the correlative assessment of these characters. This observation made them examine the sectional classification of the genus. Based on their studies they have attempted a reassessment of section Hieraciifoliae Randeria. Randeria distinguished the section Hieraciifoliae based on corolla lobes of bisexual florets with multicellular hairs and anther tails equal to the thickened portion of the filament. And section Paniculatae is distinguished by corolla lobes of bisexual florets with unicellular hairs and anther tails longer to shorter than the thickened portion of the

filament. The sections Fasciculiflorae and Paniculatae were distinguished by De Candolle mainly on inflorescence characteristics. Capitula as spiciform interrupted clusters in Section Fasciculiflorae whereas it is arranged as panicles in Section Paniculatae. The authors thoroughly studied and observed all species and found that the characters chosen by Randeria (1960) to distinguish the sections collapse when the complete variance is assessed. As a result, the taxonomic distinction between sections Hieraciifoliae and Paniculatae does not appear to be solid. So, the characters used by De Candolle to separate the sections Fasciculiflorae and Paniculatae appear to be more logical. Dakshini and Prithipalsingh (1978) conclude that *Blumea clarkei*, *B. hieraciifolia*, *B. fistulosa* and *B. sessiliflora* better belongs to the section Fasciculiflorae of DC. (although De Candolle categorised *B. sessiliflora* in Paniculatae). They never studied the three other species (*Blumea crinita*, *B. ramosii* and *B. veronicifolia*) because it is not available in India and also data on detailed capitulum morphology is lacking for these species. They also advised that, because of their affinity with *Blumea hieraciifolia*, these taxa be classified in the section Fasciculiflorae of De Candolle.

Later Pornpongrungrueng *et al.* (2009) studied relationships within *Blumea* (Inuleae, Asteraceae) and the utility of the 5S-NTS in species-level phylogeny reconstruction. Their results made them conclude that the sectional classification of De Candolle (1836) and Randeria (1960) is not supported by their study and this suggests a radical revision of the sectional classification of *Blumea*.

Phylogenetic analyses based on molecular data have found a number of more-or-less well-supported infrageneric groups that, nevertheless, do not match the classification systems previously published. For this reason, no sectional classification is followed in a revision of *Blumea* in continental South East Asia by Pornpongrungrueng *et al.* (2016).

Tribal Classification

Cassini (1816), was the first who undertook a general revision and redistribution of Compositae. He meticulously researched a huge number of species and proposed 19 tribes and a number of sub-tribes, which are largely responsible for

the tribal classification of the Asteraceae (King & Dawson, 1975). The majority of Cassini's findings were published in a French encyclopedia, which considerably diminished the significance of his work. The simplistic and artificial classification of the family Asteraceae by Lessing (1832), greatly influenced De Candolle (1836-1838) and Bentham (1873); Bentham and Hooker, (1873) in dealing with the classification of the family Asteraceae. Bentham's classification is more similar to Lessing's work (Bremer, 1987).

De Candolle (1836) placed *Blumea* in tribe Asteroideae, subtribe Tarchonantheae, division Plucheineae together with *Pluchea*, *Pterocaulon*, etc. Bentham (1873) recognized 13 tribes such as the Vernoniae, Eupatorieae, Astereae, Inuleae, Heliantheae, Helenieae, Anthemideae, Senecioneae, Calenduleae, Arctoteae, Cynareae, Mutisieae, and Cichorieae with various different endings (Bremer, 1987). Bentham's work was developed independently from that of Cassini, but the 13 tribes of Bentham do correspond to many of the 19—20 tribes of Cassini (Funk *et al.*, 2009). Bentham transferred *Blumea* to the tribe Inuleae and subtribe Plucheineae and it is placed with fifteen other genera (eg. *Laggera*, *Pluchea*, *Sachsia*, *Rhodogeron*, etc.) based on its filiform marginal florets, tailed anthers, and linear inappendiculate style branches.

Hoffman (1890-1894) slightly modified Bentham's tribal classification and added a new genus named *Pechuel-Loeschea* to the Plucheinae. Within the Asteraceae, Hoffmann (1894) distinguished two lineages: the Liguliflorae, in which he placed the only tribe Lactuceae, and the Tubuliflorae (Asteroideae of modern writers), in which he placed all the remaining tribes. Authors after him continue to recognize the two lineages (Bayer & Starr, 1998).

Anderberg (1989) proposed that the Inuleae should be separated into three tribes: Inuleae s.str., Gnaphalieae, and Plucheeae. Later findings from morphological and molecular data have indicated that the tribe Gnaphalieae is not closely linked to the Inuleae and Plucheeae (Karis, 1993; Kim & Jansen, 1995; Bayer & Starr, 1998; Panero & Funk, 2002; Wagstaff & Breitwieser, 2002). Despite numerous investigations using morphological and molecular data to determine the link

between tribes Inuleae s.str. and Plucheeae, their status remained unclear (Karis, 1993; Anderberg, 1994; Eldenas *et al.*, 1998).

Anderberg *et al.* (2005) used sequencing data from the cpDNA gene *ndhF* to study the evolutionary relationships between the tribes Inuleae sensu stricto and Plucheeae. Their findings support Bremer (1987) and Anderberg (1989) hypotheses that within the Inuleae-Plucheeae complex two separate monophyletic groups can be identified and also extended these hypotheses to show that Inuleae and Plucheeae together form a monophyletic group. The bulk of genera in the Inuleae s.str. form one clade, while all Plucheeae taxa, as well as some genera of Inuleae s.str. such as *Antiphiona*, *Calostephane*, *Geigeria*, *Ondetia*, *Pechuel-loeschea*, *Pegolettia*, and *Iphionopsis*, form another. The former clade was treated as a subtribe Inuleae-Inulinae, which includes the genus *Inula*. The latter clade was treated as Inuleae-Plucheeinae. According to this study, *Laggera* is in the Inuleae-Plucheeinae, whereas *Blumea* is in the Inuleae-Inulinae. Two main clades constitute the subtribe Inulinae. They are the *Duhaldea-Caesulia-Blumea* clade and its sister group comprising the remaining genera of the subtribe. Interrelationships between the first clade are investigated and it is found that *Blumea* is monophyletic (Anderberg *et al.*, 2005).

Cytology

The cytological investigation of *Blumea* was first done by Mehra *et al.* (1965). For *Blumea*, they counted $x=11$. Gupta (1969) investigated the cytology of *Blumea lacera* and *B. laciniata*. In the case of *B. lacera*, meiosis was irregular and showed structural heterozygosity, whereas in *B. laciniata*, meiosis is normal. *B. lacera* had $2n=11$ chromosomes, with eleven chromosomes displaying various sorts of chromosomal relationships, ranging from univalents to 11 chromosome affiliations. Almost always, bridges and pieces were seen in anaphase I and II. In *B. laciniata*, 10 bivalents were found at metaphase I, and the chromosomal distribution during anaphase I and II was also typical.

Mathew and Mathew (1975) investigated the cytology of seven *Blumea* species native to South India, including *B. barbata* ($n = 8$ and $2n = 16$), *B. virens* (n

= 9 and $2n = 18$), *B. oxyodonta* ($n = 9$), *B. wightiana* ($n = 9$ and $2n = 18$), *B. lacera* ($n = 18$ and $2n = 36$) and *B. jacquemontii* ($n = 9$ and $2n = 18$).

Mathew and Mathew (1982) described the karyomorphology of nine *Blumea* species, including *B. barbata* ($2n = 16$), *B. fistulosa* ($2n = 18$), *B. jacquemontii* ($2n = 18$), *B. lacera* var. *glandulosa* ($2n = 36$), *B. malcolmii* ($2n = 16$), *B. membranacea* var. *gardneri* ($2n = 18$), *B. oxyodonta* ($2n = 18$), *B. virens* ($2n = 18$), and *B. wightiana* ($2n = 18$). *Blumea* is a multibasic genus ($x = 8, 9, 10, 11$), according to chromosome data. The majority of the South Indian species investigated by the authors, as well as those described by others from this region (Chennaveeraiah & Patil, 1972), have $x = 9$, with only *B. barbata* and *B. malcolmii* displaying $x = 8$. The other two basic numbers ($x = 10$ and 11) are shared by many North Indian taxa (Mehra *et al.*, 1965; Gupta, 1969). According to Mathew and Mathew (1975), in *Blumea*, $x = 10$ could be the earlier evolved condition from which the other constitutions evolved through aneuploidy incidence in either direction. It was also proposed that the $x=10$ condition could be polyploid in origin, originating from ancestral taxa with $n=5$ (Mathew & Mathew, 1982).

Daruwalla (1995) investigated the cytology of 20 *Blumea* species from India. The most frequent base number for the *Blumea* genus is $n = 10$, which appears in 11 of the examined species, and this base number is identified in species from all sections. *B. membranacea* var. *membranacea*, *B. membranacea* var. *jacquemontii*, and *B. virens* have the base numbers $n = 9$ and $n = 11$ in *B. laciniata* and *B. mollis*. *B. hieraciifolia* ($n = 18$), *B. fistulosa* ($n = 20$), *B. lacera* ($n = 22$), and *B. eriantha* ($n = 30$) are polyploids.

Laggera have a base chromosome number of $n=10$ (Daruwalla, 1995). The count of $2n=10$ by Shetty (1964) on *L. alata* needs verification (Gill & Gupta, 1984).

Chromosome number $n=10$ is reported by Daruwalla (1995). *Pseudoconyza viscosa* has shuttled in the past from *Conyza* (Astereae) to *Pseudoconyza* (Astereae) to *Blumea* (Inuleae) and back again to *Pseudoconyza* (Inuleae). Because it shares the

base number $x = 10$ with the genera *Epaltes*, *Laggera*, *Pluchea*, and *Sphaeranthus*, it looks to belong in the Inuleae-Plucheeae (Carr *et al.*, 1999).

Ethnobotany

Numerous traditional uses have been reported for the genus *Blumea*. *Blumea lacera* is used as an antipyretic, stimulant, astringent, anthelmintic, febrifuge, diuretic, and in haemorrhoids (Pandit *et al.*, 1996), bronchitis (Jha & Verma, 1996), as an antimicrobial for healing cuts (Joshi, 1980), in urinary troubles (Singh, 1988), in irritation, as a haemostatic (Kakrani & Saluja, 1994), and as an anti-inflammatory (Pal, 1972). *Blumea lacera* leaves are used in the treatment of dog bites (Singh, 2008).

Ethnobotanical use of *B. mollis* leaf paste over their heads to get a cooling effect by Andhra Pradesh's Bagatas, Jatapus, Khonds, Nuka Doras, and Porjas tribes has been reported (Rao & Henry, 1996). The Koya tribes of Andhra Pradesh used the entire plant, crushed with mud, as a fish poison (Rao & Henry, 1996). Fresh juice from *B. mollis* leaf was used by the tribes of Nasik against conjunctivitis (Patil, 2006). *Blumea mollis* has been used to treat asthma, according to Dinesh and Sharma (2010). Vanila *et al.* (2008) reported the use of the leaves of *B. mollis* against diarrhoea.

Blumea lanceolaria (Roxb.) Druce was used as a leafy vegetable by various communities in Barak Valley, Assam, India, according to Nath and Maiti (2011). *Blumea lanceolaria* leaves are used as an anti-cancer agent, the pressed juice of the leaves is applied to wounds and chronic ulcers, and the leaves infusion is used to treat dysentery (Rai & Lalramnghinglova, 2010).

Rahman (2013) reported the use of *B. lacera* as a fuel and the juice of the leaves as an anthelmintic, febrifuge, astringent, and diuretic. He also mentioned using the herb to treat bleeding piles. Mollik *et al.* (2010) described the ethnomedicinal use of *B. lacera* for gastrointestinal disorders and as an insect repellent in Bangladesh's Bagerhat, Sadar, and Rampal areas. For a long time, kavirajes and folk medicine practitioners in our country have used *B. lacera* and its

relatives in their medicinal systems (Islam *et al.*, 2012). In Nepal, Kumar and Bhagat (2012) reported that the roots and leaves of *B. lacera* are used as antipyretics, and the root decoction of *Blumea hieracifolia* is used to treat gastric problems. Leaf juice is used as an astringent, febrifuge, diuretic, and anti-helminthic, whereas leaf paste, combined with a pinch of common salt, is applied externally to treat eczema and ringworm (Satapathy *et al.*, 2012).

Roots and leaves of *Blumea laciniata* are used as a cardiac tonic; root paste is used to treat snake bites; and leaves are crushed and juice is applied externally on the bitten part (Rai & Lalramnghinglova, 2010). *Blumea laciniata* is used to treat bronchitis, blood diseases, fevers, burning sensations, and mouth ulcers (Rahman, 2013).

The leaves of *Blumea sinuata* are used by the Rakhain traditional healers of Bangladesh's Chittagong Hill Tracts region to treat throat pain and weakness (Hanif *et al.*, 2009).

Singh *et al.* (2002) reported the use of *Blumea bifoliata* wounds as an antiseptic as well as to stop bleeding. The whole plant of *Blumea dregeanoides* is used by tribal people in Purulia district to treat diarrhoea (Dey & De, 2012).

Blumea eriantha leaves were combined with *Lablab purpureus* pods and cooked by Dhodia tribes. It adds flavour to the preparation. Kathudi tribes use *Blumea membranacea* leaves in 'dal' preparation for flavour and taste. *Blumea obliqua* leaves are roasted or cooked with *Lablab purpureus* pods by the Warli tribes. It has a delicious flavour and aroma (Sharma & Singh, 2001).

Throughout Africa and Asia, particularly in South-Eastern Asia, a variety of *Laggera* species are extensively utilised in traditional medicine. According to reports, *Laggera* is a herbal medicine used to treat bacterial infections, bronchitis, leukaemia, inflammation, and phlegm removal (Zhao *et al.*, 1997; Wang *et al.*, 2013). Prevalent use of *L. alata* for various ethnomedical practises in tropical regions of Asia and Africa has been reported (Onayade *et al.*, 1990). According to traditional Chinese medicine, it is reputed to be a key ingredient in an ointment that

is frequently used to treat skin cancers (Onayade *et al.*, 1990; Lee *et al.*, 1974; Ekundayo *et al.*, 1989). In some regions of Nigeria, the plant is consumed as a vegetable. It is sometimes known as "fake tobacco" because of its similar physical resemblance to the tobacco plant. It is said to have narcotic properties and is smoked in some regions of Gabon in place of tobacco. In the Ivory Coast, Gabon, Burkina Faso, and Tanganyika, various formulations of this plant are used to cure fever, rheumatic pain, and intercostal pain (Onayade *et al.*, 1990). In Rwanda, the plant's dried leaves were used to treat trypanosomiasis. It is used traditionally to cure cough in Ethiopia (Geyid *et al.*, 2005). The entire *L. alata* plant was employed as a disinfectant and antivenin in India and Madagascar (Said *et al.*, 2005; Onayade *et al.*, 1990). Traditional West and East African medicine use the leaves of *L. alata* as a remedy for a variety of ailments (Ekundayo *et al.*, 1989). Its delicate leaves produce an essential oil that is reported to have the scent of black currant and has some uses in perfumery (Onayade *et al.*, 1990). It has long been used for therapeutic purposes, and its volatile components can be used as an antiseptic (Hunde & Asfaw, 2015).

The plant is also used to treat a number of conditions that are characterised by inflammation, particularly bronchitis, arthritis, hepatitis, and nephritis (Wu *et al.*, 2006; Guan *et al.*, 2017). Some *Laggers* species, including *L. alata*, are known to be used as analgesics (Onayade *et al.*, 1990). In perfumes, cosmetics, and incense, *Laggers pterodonta* is used as an aromatic substance (Burkill, 1985; Okhale *et al.*, 2010). Chinese *L. pterodonta* herb has been used as medicine for centuries because it is frequently grown locally and treats respiratory virus infection, arthritis, angina, nephritis, sore throat, fever, hepatitis bronchitis, and malaria (Shahwar *et al.*, 2012; Zhao *et al.*, 1997; Guan *et al.*, 2017; Njan-Nloga *et al.*, 2007; Shang *et al.*, 2017). This plant has been used externally to treat scabies, contusions, burns, dangerous snake bites, fractures, and strains (Zhao *et al.*, 1997; Getahun *et al.*, 2019).

Laggers pterodonta leaves are ground into a paste by the local tribes of Arunachal Pradesh to cure swelling and inflammation. Moreover, it is reported to possess antihelminthic qualities (Tag & Das, 2004; Murtem & Chaudhry, 2016).

Using crushed *Laggera crispata* leaves on wounds can help heal them (Rai & Lalramnghinglova, 2010; 2011).

In Nigeria, the *Laggera aurita* leaves are used to treat epilepsy (Malami *et al.*, 2016). The plant's essential oils are used in the treatment of thrombosis, cancer, and atherosclerosis. They also have antispasmodic and diuretic properties (Edris, 2007; Guragi *et al.*, 2018; Magajia & Sani, 2018). The plant is traditionally used to cure bacterial infections, asthma, stomatitis, pain, fever, malaria, and paediatric conditions. In cereal grains, it serves as a preservative (Egharevba *et al.*, 2010). Also, according to reports, it has been used traditionally to cure inflammation, rheumatic pain, dyspepsia, indigestion, constipation, and diarrhoea, as well as speed up the healing of wounds (Diabala *et al.*, 2014). The leaves of *Laggera aurita* are used to stop bleeding (Lal, 2022).

Molecular Studies

A study based on cpDNA (trnL-F and psbA-trnH) and nrDNA (ITS) sequences, as well as morphology, investigated the evolutionary relationships in *Blumea* and its position among related genera. The findings confirmed that *Caesulia*, *Duhaldea*, and *Pentanema* are *Blumea*'s closest relatives, and that the monotypic genera *Blumeopsis* and *Merrittia* are nested within *Blumea*. Two major, well-supported clades were recognised in *Blumea* s.l., as well as a single species, the widespread *Blumea balsamifera*, that could not be placed with certainty relative to the two main clades. The habits, ecology, and distribution of the two main clades differ. The *Blumea densiflora* clade includes evergreen forest shrubs and subshrubs found from continental Asia to New Guinea and Polynesia, whereas the *Blumea lacera* clade is a widespread paleotropical group that includes mostly annual, weedy herbs found in open forests and fields. The interspecific relationship within the genus is still unclear. Including more DNA regions with suitable variability and a broader taxon sampling in this group should allow for more robust conclusions about species interrelationships in *Blumea* s.l. (Pornpongrungrueng *et al.*, 2007).

To reconstruct the evolutionary connection and determine the divergence chronology of *Blumea* DC. in China, Zhang *et al.* (2019) employed nuclear

ribosomal DNA (nrDNA), internal transcribed spacer (ITS), and chloroplast DNA (cpDNA) trnL-F sequences. The results showed that the *Blumea* DC. genus was monophyletic and could be separated into two clades. The two clades were identified as having individuals that differed in habitat, morphology, chromosomal type, and chemical composition. Furthermore, the divergence time of *Blumea* DC. was determined using the two root times of Asteraceae.

The 5S-NTS (non-transcribed spacer) was sequenced in an attempt to improve phylogenetic resolution in clades of the genus *Blumea* beyond what could be achieved with sequence data from plastid regions (trnL-F, psbA-trnH) and ITS. It has been reported to show higher levels of variation than the former regions. The tree produced by 5SNTS is less resolved than that produced by ITS and the plastid regions; however, the latter markers offer better resolution at deeper nodes. 5S-NTS adds very little resolution when paired with ITS and plastid sequences. The findings show that earlier morphology-based sectional classifications of the genus were extremely artificial. *B. hieraciifolia* comes in three variants, each of which belongs to a different clade and should be classified as a separate species (Pornpongrungrueng *et al.*, 2009).

Due to the low polymorphism of molecular markers, taxonomic issues and the phylogeny of the genus *Blumea* have not been resolved by prior research (Pornpongrungrueng *et al.*, 2007; 2009; Abdullah *et al.*, 2021). Hence, after correcting annotations to identify appropriate polymorphic sites, Abdullah *et al.* (2021) de novo assembled the plastomes of the three *Blumea* species (*B. tenella*, *B. oxyodonta*, and *B. balsamifera*) and compared them with 26 other Asteroideae species. They discovered ten highly polymorphic areas with nucleotide diversity greater than 0.02, including ycf1, rps16-trnQ, rpl32-trnL, petN-psbM and ndhF-rpl32, which might be used to produce reliable, genuine, and reasonably priced markers for phylogenetic inference and barcoding in the genus *Blumea*. Oligonucleotide repeats were present in five of these highly polymorphic regions, indicating that repeats can be used as a proxy for identifying polymorphic loci.

Laggera is found to be non-monophyletic by analysing sequence data from the cpDNA gene *ndhF* and finding that the species *Laggera decurrens* is neither included in *Laggera* nor in *Blumea* (Anderberg *et al.*, 2005). According to molecular information, *Blumea* belongs in the Inuleae-Inulinae, whereas *Laggera* is located far from it in the Inuleae-Plucheinae. *Laggera* and *Blumea* appear to have evolved in parallel, which may explain their similarities, as highlighted by previous authors (Pornpongrungrueng *et al.*, 2007). *Laggera* is polyphyletic according to Nylander and Anderberg (2015) since one of its species, *L. decurrens*, is a member of a separate clade within the subtribe, and they suggested it would be better to erect a new genus for *L. decurrens*.

Palynology

Kulkarni (2015) studied pollen grains of the seven species of *Blumea* (viz. *Blumea eriantha*, *B. lacera*, *B. laciniata*, *B. obliqua*, *B. obliqua* var. *aurita*, *B. oxyodonta*, and *B. oxyodonta* var. *prostrata*). Shape, size, symmetry, diameter, ornamentation, exine thickness, number of spines, and spine thickness were all investigated in *Blumea* species. The sculpturing of the exine was found to be highly detailed in the genus *Blumea*, but there were tendencies of simplification and loss of sculpturing in anemophilous taxa, according to the author.

In the genus *Blumea*, pollen grains are mostly prolate-spheroidal, subprolate, or oblate-spheroidal. The colpi are 10-25 μm long and the pores are 2.5-7.5 μm wide. The exine is 1.3–2.5 μm in thickness. The spine length is 1.3-5 μm with 3–4 spine rows between apertures. *Blumea fistulosa* (4-5 μm) and *Blumea laciniata* (3.8–5 μm) have the longest spines. The spines of *B. virens* can reach a length of up to 5 metres. *Blumea laciniata* has a big interspinal area, while *B. lacera* has a very small one, and *B. clarkei* has none. All species have four spine rows between apertures, with the exception of *B. laciniata* and *Anisopappus chinensis*, which have three and five rows, respectively (Pornpongrungrueng & Chataranonthai, 2002).

The pollen morphology of *Laggera alata* was investigated by Meo and Khan (2009). The trizonocolporate pollen grains have spines that are broad at the base and have a short, blunt tip and lacunate to nonlacunate aperture. In equatorial view, they are spheroidal, and in polar view, they are circular to semi-angular. *Laggera alata* of the Plucheeae tribe has a double-layered exine with a prominent pillar-like columella, which sets it apart from Inuleae, whose pollen has a single columellate sexine. So, the unique columella has great systematic value (Meo & Khan, 2009).

The palynology of *Pseudoconyza viscosa* was described by Zahur (1978). Their study reported pollen size as 20(22) 24 μm . They described the grains as subtriangular and subspherical. Their study also reported pointed spines having 4 μm spine length in *Pseudoconyza viscosa* (Meo & Khan, 2009).

Reproductive Biology

The pollen presentation techniques and structural variations of style in the 22 *Blumea* species found in India were examined. With numerous series of female florets on the perimeter and fewer bisexual florets in the centre, the generally gynomonecious capitulum displays a variety of patterns in the shape and behaviour of anthers, styles, and stigmas. As a result of the various pollen presentation processes, inbreeding, outbreeding, or both mechanisms could be at work within a single capitulum. The species have been divided into four categories based on the total number of florets in a capitulum (Prithipalsingh & Dakshini, 1977).

Embryology

Pullaiah (1979) studied the embryology of *Laggera pterodonta*. He found that the anther is tetrasporangiate and the tapetum is of the periplasmodial type. There are pollen tetrads that are isobilateral and tetrahedral. Three-celled mature pollen grains have a thick, spiny exine. The ovary has a single basal ovule and is bicarpellary, syncarpous, and unilocular. Megaspore mother cells are directly produced by the single hypodermal archesporial cell. The Polygonum type determines how the embryosac develops. Cellular endosperm development is the type found in *Laggera pterodonta*. Endosperm development in *Laggera pterodonta*

is of the cellular type. Endosperm has one or two layers that remain until it reaches maturity. The development of an embryo follows the *Senecio* variant of the Asterad type.

Anatomy

Randeria (1960) studied the shape of leaf epidermal cells on both laminar surfaces, the position of stomata, the type and morphology of trichomes, etc. And found that both unicellular and multicellular trichomes were present in *Blumea*. There are three different types of epidermal cell walls present. They are straight, undulate and sinuate. The epidermal cells of the adaxial surface show a greater range of modification. Anisocytic stomata are the most common type. Stomata can be found on the lamina's abaxial and adaxial surfaces or solely on the abaxial surface.

Paul and Devi (2013) studied the foliar anatomical study of *Blumea*. Epidermal cell shape and size, stomata type, and types of trichomes are useful tools for distinguishing the species in the genus. Anomocytic stomata on the lower surface of *Blumea lanceolaria* were found to be accompanied by amphianisocytic stomata. Their work also highlights the petiolar anatomy and floral characteristics of the species. These features can be employed to delimit the species in the genus *Blumea* of the family Asteraceae.

Prasanth *et al.* (2019) investigated the macroscopic and microscopic properties of *Blumea mollis* leaves. Covering trichomes, anomocytic stomata, pigment cells, epidermal cells, and lignified xylem vessels were discovered using TS and powder microscopy. On the epidermis, there are uniseriate hollow trichomes and anomocytic stomata, making these traits essential diagnostic characters.

Chen *et al.* (2016) carried out a microscopic structural comparison between the epidermal trichomes in *Blumea balsamifera* (L.) DC. and *Blumea laciniata* (Roxb.) DC. The most notable difference between the two species is that *B. balsamifera* contains only one type of glandular trichome, whereas *B. laciniata* has two. Short glandular hairs are present in *B. balsamifera*, whereas on the stem of *B. laciniata*, both short and long hairs are present.

A comparative anatomical study of *Laggera alata* and different populations of *Laggera crispata* having various stem wing patterns in Thailand was studied by Sookcharoen and Pornpongrungrueng (2022). They studied six morphological types (Types A, B, C, D, E, and F) of *Laggera crispata*, as well as one morphological type of *L. alata*. They distinguished three groups based on anatomical characteristics. Plants in Group I, which includes *Laggera alata*, have dorsiventral mesophylls, curly multicellular uniseriate non-glandular trichomes, and sessile multicellular multiseriate glandular trichomes. Plants of the *Laggera crispata* having wing types A–D belong to Group II, which is distinguished by its short-stalked multicellular biseriate glandular trichomes. Finally, Group III comprises *Laggera crispata* plants with wing types E and F. It is distinguished from Group II by having straight multicellular uniseriate non-glandular trichomes and short-stalked multicellular biseriate glandular trichomes. However, despite the fact that Group III contains some characters mixed with those of *Laggera alata* and *L. crispata*, Groups II and III share many morphological traits. Before deciding whether Group III should be recognised as a variety under *Laggera crispata* or whether these plants may be a hybrid between *L. alata* and *L. crispata*, more information is needed. Schweingruber *et al.* (2020) studied the stem anatomy of *Laggera alata*.

Phytochemical studies

More than 70 components, including flavonoids, monoterpenes, sesquiterpenes, acetylenic thiophenes, triterpenoids, xanthenes, diterpenes, and essential oils, have been identified from the genus *Blumea* since the 1900s (Kulkarni *et al.*, 1987; Chen *et al.*, 2009). The main constituents of this genus are flavonoids. *B. malcomii* was found to contain five flavones. From *B. lacera*, two trimethoxyflavones were extracted. From *B. balsamifera*, four flavonones were isolated. Thirteen monoterpenes were isolated from the genus *Blumea*. Borneol was isolated from *B. balsamifera*. Nineteen sesquiterpenes, five acetylenic thiophenes, and three triterpenoids were isolated from this genus. Only one xanthene, blumeaxanthene, was isolated from *B. riparia*. Only one diterpene, austroinulin, was isolated from *B. glomerata* (Kulkarni *et al.*, 1987; Chen *et al.*, 2009).

The essential oil of *Blumea lacera* leaves was found to contain thymoquinol dimethyl as its main constituent. Other major compounds identified were p-caryophyllene, α -humulene, and E-pfarnesene (Laakso *et al.*, 1989). Two new glycosides, such as the triterpenoid glycosides 19 α -hydroxyurs-12-ene-24, 28-dioate 3-O- β -D-xylopyranoside and the phenyl glycoside 2-isoprenyl-5-isopropylphenol, 4-O- β -D-xylopyranoside has been isolated from the whole plant of *B. lacera* and their structures elucidated by means of spectral and chemical studies (Agarwal *et al.*, 1995). Ragasa *et al.* (2007) reported the isolation and identification of α -pinene-7 β -O- β -D-2 ϕ ,6 ϕ -diacetylglucopyranoside, 5,4 ϕ -dihydroxy-6,7,3 ϕ -trimethoxy flavone and 3,5,4 ϕ -trihydroxy-6,7,3 ϕ -trimethoxyflavone from the leaves of *B. lacera*.

The essential oil from the leaves of *Blumea mollis* contained 39 compounds, and the major chemical compounds identified were linalool (19.43%), γ -elemene (12.19%), copaene (10.93%), estragole (10.81%), allo-ocimene (10.03%), γ -terpinene (8.28%), and alloaromadendrene (7.44%) (Senthilkumar *et al.*, 2009). Tamilarasi *et al.* (2014) analysed essential oil from the leaves of *B. mollis* and identified bicyclic sesquiterpene and b-caryophyllene as the major compounds, which accounted for 24.54 percent.

Phytochemical analysis of the methanolic extract of *B. virens* revealed the presence of steroids, alkaloids, flavonoids, tannins, diterpenes, triterpenes, and glycosides, whereas the aqueous extract revealed the presence of steroids, alkaloids, flavonoids, diterpenes, and glycosides (Reni *et al.*, 2017). Joshi (2018) reported the chemical constituents of the root essential oil from *Blumea virens*. The major constituents were 2,5-dimethoxy-*p*-cymene (27.6%) and hinesol (20.2%). The other minor constituents were: α -pinene (6.9%), hexadecanoic acid (4.3%), β -muurolol (3.8%), β -muurolene (3.4%), 5-cedranone (2.9%), cubebol (2.7%), and bicyclogermacrene (2.5%). The oil was found to be rich in oxygenated sesquiterpenes (34.3%), followed by phenyl derivatives (29.4%), sesquiterpene hydrocarbons (20.7%), monoterpene hydrocarbons (8.4%), oxygenated long-chain hydrocarbons (4.3%), and oxygenated monoterpenes (0.7%).

Dinde *et al.* (2018) reported various phytochemicals such as caryophyllene oxide (7.63%), tau muurolol (5.79%), armoadendrene oxide (4.00%), oleic acid (3.50%), 1-heptatriacotanol, 1(+)-ascorbic acid, 2, 6- dihexadecanoate from *Blumea laciniata*. Pednekar *et al.* (2013) evaluated the phytochemical constituents of the essential oil of the species *B. eriantha* and found that the main components of the essential oil are Ocim-(4E,6Z)-ene, Caryophyllene (E), Caryophyllene oxide, Carvotanacetone, Pinene, and Eudesmol.

The components of the essential oil of *Laggera alata* are identified, among which are about 45% phenolic ethers, 22% monoterpenes, and 12% sesquiterpenes. 2,5-dimethoxy-p-cymene (44%) and sabinene (16%) made up the majority of the oil. 2-methyl-5-(1-methylethyl)-6-hydroxycyclohex-2-en-1-one (=6-hydroxycarvotanacetone) was another component found. Another component (3%) was found to be 2-methyl-5-(1-methylethyl)-6-hydroxycyclohex-2-en-1-one (=6-hydroxycarvotanacetone); up until this point, no reports of it happening in nature have been made. 4-Hydroxycarvotanacetone-7-O-angelate was another uncommon substance found in small amounts (2%) (Onayade *et al.*, 1990).

Twelve known sesquiterpenes and three new eudesmane sesquiterpenes were extracted from the aerial portion of *Laggera alata*. The three eudesmane sesquiterpenes are 5 β -hydroxyilicic acid, 3 α -hydroxyilicic acid, and 5 α -hydroxyl-4-epi-ilicic acid methyl ester (Zheng *et al.*, 2003a). Two eudesmane-type sesquiterpenes (ETSs), 5 hydroxycostic acid and hydroxyisocostic acid, were isolated from the herb *Laggera alata* and shown to have anti-angiogenic properties (Liang & Chung, 2017). Together with five other sesquiterpene compounds (7-epi-eudesmol, isointermedeol, juniper camphor, and -dihydroagarofuran), two novel eudesmane-type sesquiterpenoids (7-epi-eudesmol and 7-epi-eudesmol) were identified and described from the essential oil of *Laggera alata* in Madagascar (Raharivelomanana *et al.*, 1998).

The whole plants of *Laggera alata* were used to identify ten eudesmane-type sesquiterpene derivatives, including three eudesmane glycosides (alatoside F-H), six cuauhtemone derivatives, and one di-norsesquiterpene (3-oxo-di-nor-eudesma-4-en-

11-oic acid). On the basis of in-depth spectroscopic investigation, acid hydrolysis, and single-crystal X-ray diffraction examination, their structures were clarified (Wang *et al.*, 2013).

Six known chemicals, including four eudesmane glucosides, one megastigmane glucoside, alatosides A–D, and alatoside E, were identified in the BuOH fraction of *Laggera alata*. Chemical and spectroscopic techniques were used in conjunction to determine the structures of the novel compounds (Zheng *et al.*, 2003b).

Laggera pterodonta leaf essential oil was examined using a mixture of chromatographic (GC-RI, CC, pc-GC) and spectroscopic (GC-MS, ¹³C NMR) methods. There are 83 components in total, including 4 major compounds such as 2,5-dimethoxy-*p*-cymene, sabinene, α -humulene, (*E*)- β -caryophyllene and germacrene (Kambiré *et al.*, 2019).

Five chemicals, including three triterpenes and also two steroids, were isolated from the aerial section of *Laggera pterodonta* using bioassay-guided fractionation (Kuljanabhagavad *et al.*, 2009). Hydordistilled essential oil of *Laggera crispata* from the aerial parts was analysed by gas chromatography-Mass Spectrometry. Eighty constituents were identified. Sesquiterpenoids and benzenoid compounds made up the bulk of the oil's composition. Among these, the oil contained significant amounts of 2,5-dimethoxy-*p*-cymene, 10-*epi*-eudesmol, -caryophyllene, and caryophyllene oxide (Verma *et al.*, 2011).

By using column chromatography on silica gel, Sephadex LH-20, and ODS, the ethanol extract of *L. pterodonta* was purified to produce chemicals. By using chemical processes and spectroscopic analyses, the structures of the produced compounds were determined. Nineteen compounds were identified and separated. Of which 3,5-dihydroxy-3',4',6,7-tetramethoxyflavone, 5,6,4'-trihydroxy-3,7-dimethoxyflavone, tamarixetin, patuletin, quercetin-3-O-beta-D-galactopyranoside, patuletin-3-O-beta-D-glucopyranoside, helichryoside, 4,5,7-trihydroxy-6-methoxyflavone-3-O-beta-D-rutinoside, kaempferol-3-O-beta-D-glucopyranoside,

stigmasterol 3-O-beta-D-glucopyranoside, and 2-hydroxy-benzoic acid were firstly isolated from this plant (Liu *et al.*, 2010).

From *Laggera pterodonta*, a fresh eudesmane derivative, 4a, 5a-dihydroxyeudesma-11(13)-en-12-oic acid was isolated. Moreover, six well-known chemicals were isolated from it, including b-amyryn, ilicic acid, costic acid, pterodontriol A, B, and pterodonta acid (Xiao *et al.*, 2003). 23 phytochemicals, comprising 12 sesquiterpenoids, 2 norisoprenoids, 3 alkaloids, 1 lignan, and 5 flavonoids, were isolated and identified as a result of a phytochemical examination of the aerial portions of *Laggera pterodonta* (Xie *et al.*, 2021). Seven novel eudesmane sesquiterpenoides were isolated from the aerial portions of *Laggera pterodonta*. They are 4p, 11-dihydroxyenantioeudesmane-1-one, pterodontriol D, pterodontriol C, 2cr-acetoxycostoate, ent-7 (11)-selinen-4-01, 5a, 11-dihydroxy-3-ene-eudesman-2-one, and 2P-acetoxypseudopterodonic acid (Zhao *et al.*, 1997).

The essential oil of *Laggera aurita* yields 44 chemical compounds, of which benzene, 2-tert-butyl-1,4-dimethoxy (25.24%), caryophyllene (12.25%), and γ -terpinene (8.92%) were the four main constituents. Other isolated chemicals include α -phellandrene, (+)-4-carene, o-cymene, γ -terpinene, β -linalool, 2-carene, linalool, 4-carvomenthenol, p-menthan-8-ol, thymol methyl ether, benzene, 2-tertbutyl-1,4-dimethoxy, caryophyllene, α -caryophyllene, 1,2-benzenediol, O-(4-butylbenzoyl), Cadina-1(10),4-diene, α -bourbonene, tau-muurolol and phthalic acid, and cyclobutyl tridecyl ester (Dantanko & Malann, 2020).

Julde *et al.* (2022) have reported 48 compounds from *Laggera aurita* with 2,5-Dimethoxy-p-cymene, β -Caryophyllene and α -Humulene as the major compounds. Seven phytochemicals, including n-heptacosane and n-dotriacontane as well as laggerol, were found in the *Laggera aurita* specimen from India (Mevy *et al.* 2006).

MATERIALS AND METHODS

Literature Survey

Relevant works of literature useful for the study were collected from libraries in India and abroad (Kew Library and Harvard Library). Biodiversity Heritage Library (<http://www.biodiversitylibrary.org>), Botanicus (<http://www.botanicus.org>), Internet Archive (<http://www.archive.org>) and JSTOR (www.jstor.org), were used for retrieving most of the rare and classical literature. Various libraries attached to institutions including Kerala Forest Research Institute, St. Joseph's College (Autonomous), Devagiri, Kozhikode, BSI Southern Circle Coimbatore, and St. Joseph's College, Trichy were referred. For relevant thesis information, "Shodhganga" was also referred.

Herbaria Reference

During the present study, major herbaria in the country such as MH, CALI, KFRI, TBGT, BSI, BSID, BLAT, AHMA, CAL, DEV and RHT (abbreviations according to Holmgren *et al.*, 1990) were studied. Global Plants on JSTOR (<https://plants.jstor.org/>) were used for locating type sheet information. Online herbaria such as K, P, G, BM, GH, NY, FI, E, U, B, LINN, L, B, M, TUB and C were used for downloading type sheet information. Taxonomic Literature II (<https://www.sil.si.edu/DigitalCollections/tl-2/>) were also used for locating type specimen of particular authors.

Collection and fieldwork

The study was carried out during the period from 2017-2022. Different parts of Peninsular India were explored during the present study. A large number of specimens were collected during extensive field trips conducted to different parts of the study area. Various physiographic regions of Peninsular India are repeatedly explored during the flowering season. 4-5 accessions of complete plants with roots were collected. Based on the guidelines of Vogel (1987) and Forman and Bridson (1989), collected specimens were processed to make herbaria. Using Digital

Camera, photographs of the entire plant, inflorescence, leaf, stem, and root were taken. All the observations were noted in the field book from the field itself. GPS data were saved using the mobile application GPS Essentials. The collected plants with flowers were stored in Polypropylene bottles with formalin for further studies. Achenes collected from flowering plants were also stored in small zip-lock covers. From the lab, the plants collected were microscopically observed using Leica Stereo Microscope (Leica EZ4 HD 75 Stereo Microscope) fitted with a digital camera. Photos were acquired and saved in the lab using the software (Leica Application Suite Version 3.4.0). All the relevant characters and other information were written down in data sheets prepared for each taxon collected.

Herbarium Preparation

Specimens or plant parts of appropriate size were collected from the field and treated for herbarium making. The guidelines proposed by Vogel (1987) and Forman and Bridson (1989) were used for making herbaria. Standard herbarium sheets of 28 x 42 cm were used for mounting dried specimens. The label contains all the relevant information about the plant specimen. All the prepared herbarium sheets were deposited in St. Joseph's College (Autonomous), Devagiri, Kozhikode Herbarium (DEV).

Identification

The specimens collected were identified using different taxonomic literatures. Different floras including various national floras and regional floras and previous revisionary works were utilized for identifying different taxa. Taxonomic keys prepared by different authors for the floras and revisions were greatly utilized for identification. The taxa were identified using the protologue information and also comparing it with the type sheet.

Description

Descriptions were made using combining the data sheet information of all the taxa collected. Botanical Latin (Stearn, 1983), The Kew plant glossary: an

illustrated dictionary of plant terms (Beentje, 2010), Illustrated glossary of Compositae (Roque *et al.*, 2009), Plant identification terminology: an illustrated glossary (Harris & Harris, 1994) were used for standard botanical terms.

Nomenclature and Citations

Citations of all plant names were obtained from the International Plant Name Index (IPNI), World Flora Online (<http://www.worldfloraonline.org>), Plants of the World Online (<http://www.plantsoftheworldonline.org>) and Global Compositae Database (<https://www.compositae.org/aphia.php?p=stats>). The Shenzhen International Code of Nomenclature for Algae, Fungi, and Plants (Turland *et al.*, 2018) was used to make nomenclatural clarifications. For author citation, International Plant Name Index (IPNI) and the guidelines provided by Brummitt and Powell (1992) were used. Herbarium acronyms were used as per Index Herbariorum.

Anatomical studies

A total of 24 taxa were examined using light microscopy (LM). Due to the unavailability of vegetative parts of three specimens (*B. hieraciifolia* var. *hamiltonii*, *B. hieraciifolia* var. *hieraciifolia* and *B. venkataramanii*), the vegetative anatomy of 24 taxa were attempted.

For anatomical investigations, fresh materials as well as samples preserved in FAA were used. The collected materials were cleaned using tap water. The stems and leaves of the collected materials were cut in to suitable dimensions. Freehand sectioning of the material was done. Hand-cut sections of stems and leaves were taken manually using a razor blade. The leaves were cut into delicate sections using a pith. After free-hand sectioning of the materials, it was transferred into safranin or toluidine blue solutions for one minute for staining (Johansen, 1940). The stained sections were washed using normal water. Mounted the sections using a drop of glycerin and examined them under an ordinary research microscope at different

magnifications. The photographs of the transverse sections of both stem and leaves were captured using Leica DFC 290, camera attached with Leica DM 100 trinocular research microscope. Anatomical features were enlisted according to the terminology of Esau (1960) and Metcalfe and Chalk (1979).

SYSTEMATIC TREATMENT

Blumea DC.

Blumea DC., Arch. Bot. (Paris)2: 514. 23 Dec 1833 (nom. Cons.); DC, Prodr. 5: 447. 1836; DC in Wight, Contr. Bot. India. 13. 1834; DC, Prodr. 5: 1836; Bentham & Hooker f., Gen. Pl. 2: 289. 1873; Clarke, Compos. Ind. 66. 1876; Hook, Fl. Brit. India. 3: 260. 1882; Gagnepain in Lecomte, Fl. Indo-Chine. 3: 525. 1924; Gamble, Fl. Madras. 2: 481. 1921; Randeria, *Blumea* 176. 1960; Pornpongrungrueng *et al.*, Kew Bulletin, 71:1, 2016; Trimen, Handb. Fl. Ceylon 3: 18. 1895; Grierson in Dassanayake, Revis. Handb. Fl. Ceylon, 1: 161. 1980. Type: *Blumea balsamifera* (L.) DC. (Typ. Cons.)

Placus Lour., Fl. Cochinch. 2: 496. 1790, nom. rej. Lectotype: *Placus tomentosus* Lour. (= *Blumea axillaris* (Lam.) DC.) designated by Merrill (1935).

Leveillea Vaniot, Bull. Acad. Int. Geogr. Bot., ser.3, 12: 29. 1903, nom. superfl. *Bileveillea Vaniot* Bull. Acad. Int. Geogr. Bot., ser.3, 13: 326. 1904. Type: *Leveillea martini* Vaniot.

Merrittia Merr., Philipp. J. Sci., C5: 396. 1910. Type: *Senecio benguetensis* Elmer (= *Blumea benguetensis* (Elmer) Mattf. (Mattfeld, 1929).

Annual or perennial, herbs or undershrub, mostly aromatic. Roots taproot or fibrous or in rare cases adventitious roots arise from base of stem, small delicate to woody. Stem simple or branched, erect or sometimes scandent or procumbent, 0.5-5 cm, base woody in most cases, terete or furrowed, green or sometimes with purplish tinge or yellowish green, glabrous or pilose or pubescent or villous with long multicellular and capitate glandular hairs, hairs yellowish or white. Leaves alternate, simple, sessile or subsessile or petiolate, with or without appendages on petiole; petiole long; lamina linear lanceolate or ovate or oblong or oblanceolate or runcinate or lyrate lobed or elliptic; margins serrate or serrulate or dentate or denticulate or lacerate; glabrous or sericeous or pilose or lanate or tomentose with or with glandular hairs; apex acute or apiculate or acuminate; base rounded, rarely

semiamplexicaulous or tapering or decurrent or attenuate; upper leaves sessile or subsessile. Inflorescence terminal and or axillary loose or dense panicle or interrupted spiciform panicles or corymbose panicles or solitary, long. Capitula heterogamous, disciform, sessile or pedunculate; peduncle mostly villous or pilose with or without capitate glandular hairs, green or purple or reddish tinged. Phyllaries multiseriate, 3-7 seriate, imbricate or reflexed, single nerved; outer phyllaries linear or oblong or ovate, green or purple tipped, pubescent or villous or pilose or glabrescent; inner phyllaries linear or elliptic oblong with or without ciliate margins, glabrous or pubescent, sometimes scattered capitate glandular hairs. Receptacle naked or epaleaceous, flat or convex or concave, alveolate or areolate or fimbriate, pubescent or pilose or sparsely hairy with two or three hairs in the middle. Florets numerous, multiseriate, central one bisexual or with abortive stamens, marginal ones female. Bisexual floret tubular, corolla generally yellow or purple or pink or white or yellowish white, fully hairy or hairy on lobes only; lobes 5 or rarely 4, triangular to ovate or acute or lanceolate or elliptic lanceolate papillate lobes sometimes with glandular hairs. Stamen 5 rarely 4; filaments white or yellow or pinkish or translucent, inserted on the base of corolla tube, flaccid below, firm and thick above; anther syngenesious, two thecae, introse, apical anther appendages acute or rounded or truncate or emarginated, tailed at base, tails equal to or longer or shorter than thickened portion of filament; ovaries usually narrowly oblong or cylindrical, glabrous or pubescent or pilose or sparsely hairy, with or without glandular hairs; style arms bifid, exerted beyond the corolla at maturity, acute sweeping hairs upto bifurcation in most cases but reach below bifurcation in some species, base swollen or cylindrical, ovary attached to style by a cylindrical structure which is narrower than or equal to ovary and style. Cypselas brown or yellowish or dark brown, terete or ribbed, ribs 5-12, or obscurely 4-angled, oblong or elliptic or linear, pubescent or pilose or sparsely hairy or glabrous. Pappus white, uniseriate, no bristles, white or sometimes reddish when dry, persistent or easily detachable.

Key to all taxa of the genus *Blumea* in Peninsular India

1. Capitula solitary or 2-3 on axillary peduncles on among upper leaves 2
1. Capitula few or numerous in terminal and axillary corymbs or in dense or lax corymbos panicles 4
2. Plants ascending or often prostrate; leaves sessile; narrow towards base, ovate or ovate oblong, upper pairs nearly subopposite; corolla lobes of bisexual florets glabrous or with unicellular hairs in addition to colleters ***B. bifoliata***
2. Plants erect, leaves amplexicaule or semi-amplexicaule, oblong or oblong ovate, alternate, corolla lobes of bisexual florets with multicellular hairs in addition to colleters..... 3
3. Leaves distinctly dentate serrate, large, pubescent ***B. obliqua* var. *obliqua***
3. Leaves entire or very shortly dentate serrate, small, densely velvety on both surface..... ***B. obliqua* var. *arenaria***
4. Plants more or less glabrous ***B. virens***
4. Plants pubescent or more or less hairy 5
5. Bisexual florets completely hairy 6
5. Bisexual florets glabrous or lobes hairy 7
6. Plants densely white-woolly; leaves spiny toothed; capitula in terminal and fasciculate in the axils of the upper leaves ***B. malcolmii***
6. Plants silky but not white-woolly; leaves not spiny toothed; capitula in pedunculate clusters arranged in panicles..... ***B. eriantha***
7. Corolla of bisexual florets pink or purple or whitish..... ***B. axillaris***
7. Corolla of bisexual florets yellow..... 8
8. Plants procumbent or partially ascending..... ***B. oxyodonta***
8. Plants erect..... 9
9. Leaves decurrent..... ***B. venkataramanii***
9. Leaves not decurrent..... 10
10. Receptacle pilose 11
10. Receptacle glabrous or 1-3 long hairs in the middle or sparsely hairy..... 14
11. Capitula arranged as narrow panicles ***B. hirsuta***
11. Capitula in large spreading panicles 12

- 12. Leaves sparsely hairy or nearly glabrous on both surface ***B. lanceolaria***
- 12. Leaves pilose or lanate..... 13
- 13. Capitula arranged as interrupted spiciform panicles, arranged in as compact globose cluster ***B. fistulosa***
- 13. Capitula arranged as terminal large dense or lax panicle ***B. sinuata***
- 14. Pappus easily detachable 15
- 14. Pappus persistent 17
- 15. Plants normally unbranched; stem reddish brown, strigose with long spreading multicellular hairs ***B. barbata***
- 15. Plants more often branched; stem green, velutinous or pilose with long whitish hairs and capitate glandular hairs 16
- 16. Plants glandular villous, leaves not lyrate, corolla of female floret hairy with long multicellular hairs ***B. lacera* var. *lacera***
- 16. Plants densely glandular pubescent, leaves often lyrate, corolla of female florets glabrous..... ***B. lacera* var. *glandulosa***
- 17. Capitula arranged as leafy cluster at the end of branches..... ***B. belangeriana***
- 17. Capitula arranged as loose panicle or capitula in axillary and terminal clusters forming a dense interrupted-spicate inflorescence 18
- 18. Leaves especially lower leaves sublyrate to lyrate lobed 21
- 18. Leaves not lyrate lobed..... 19
- 19. Stem usually branched ***B. hieraciifolia* var. *flexuosa***
- 19. Stem usually unbranched 20
- 20. Capitula in dense terminal spicate panicles ***B. hieraciifolia* var. *hamiltonii***
- 20. Capitula in terminal globose interrupted spicate clusters.. ***B. hieraciifolia* var. *hieraciifolia***
- 21. Stem scabrous, receptacle glabrous ***B. sessiliflora***
- 21. Stem pubescent or villous with long multicellular hairs and capitate glandular hairs, receptacle sparsely hairy or 2 to 3 long hairs in the center 22
- 22. Leaves lanceolate or oblanceolate or some leaves sublyrate, receptacle convex ***B. paniculata* var. *paniculata***
- 22. Leaves (upper or lower leaves) lyrate lobed, receptacle flat 23

23. Stem pubescent with more glandular hairs, upper leaves elliptic lanceolate, margin distantly serrate, lower leaves lyrate lobed
 ***B. paniculata* var. *gardneri***

23. Stem villous with soft spreading multicellular hairs and capitate glandular hairs, upper leaves runcinate or lyrate lobed, margin biserrate or serrulate.....
 ***B. paniculata* var. *jacquemontii***

Blumea axillaris (Lam.) DC., Prodr. 5: 434. 1836; Manikandan & Lakshminarasimhan, Fl. Rajiv Gandhi NP 223. 2013. ***Conyza axillaris*** Lam. Encycl. 2: 84. 1786. **Type:** Commerson *s.n.* (Holotype P!; Isotype P!).

Figs. 1-6

Blumea wightiana DC., Prodr. 5: 436. 1836; Gamble, Fl. Pres. Madras 483. 1921; Cooke, Fl. Pres. Bombay 2:75. 1958; P. F. Fyson, Fl. South Indian Hill Stations 1: 324.1932. ***Conyza wightiana*** Wall., Numer. List, no 3093. 1831. nom. nud. Type: Myanmar, Prome, Wallich Cat. 3093, comp. no. 203 (Lectotype G-DC!, the sheet labelled with 203C, designated by Pornporngrueng *et al.*, 2016; Isolectotypes G-DC! GH, K-W!).

Blumea solidaginoides DC., Prodr. 5: 443. 1836; R.S. Rao & S. Hara, Fl. Srikakulam Dist. 271. 1986; N.P. Singh, Fl. Eastern Karnataka 1: 364. 1988; M. J. Kothari & S. Moorthy, Fl. Raigad Dist. 210. 1993; S. D. Deshp. *et al.*, Fl. Mahabaleshwar & Adjoinings 2: 307. 1995; M R. Almeida, Fl. Maharashtra. 3A. 84, 2001; B. Suryanarayana & A. Sreenivasa Rao, Fl. Nellore dist. 2: 304. 2002; S. R. Yadav & Sardesai, Fl. Kolhapur 241. 2002. **syn. nov. *Gnaphalium solidaginoides*** Poir in J.B.A.M. de Lamarck, Encycl., Suppl.2: 805. 1812. Type: Antilles *s.d.*, *Anonymous s.n.* (Lectotype FI!, designated by Dilsha & Satheesh, 2023; Isolectotypes, G-DC!, P!).

Blumea neilgherrensis Hook. f., Fl. Brit. India 3: 261. 1882; Gamble, Fl. Pres. Madras 483. 1921; P.F. Fyson, Fl. South Indian Hill Stations 1: 323.1932. Type: Nilgherry, Wight 530 (Lectotype E!, designated by Pornporngrueng *et al.*, 2016).

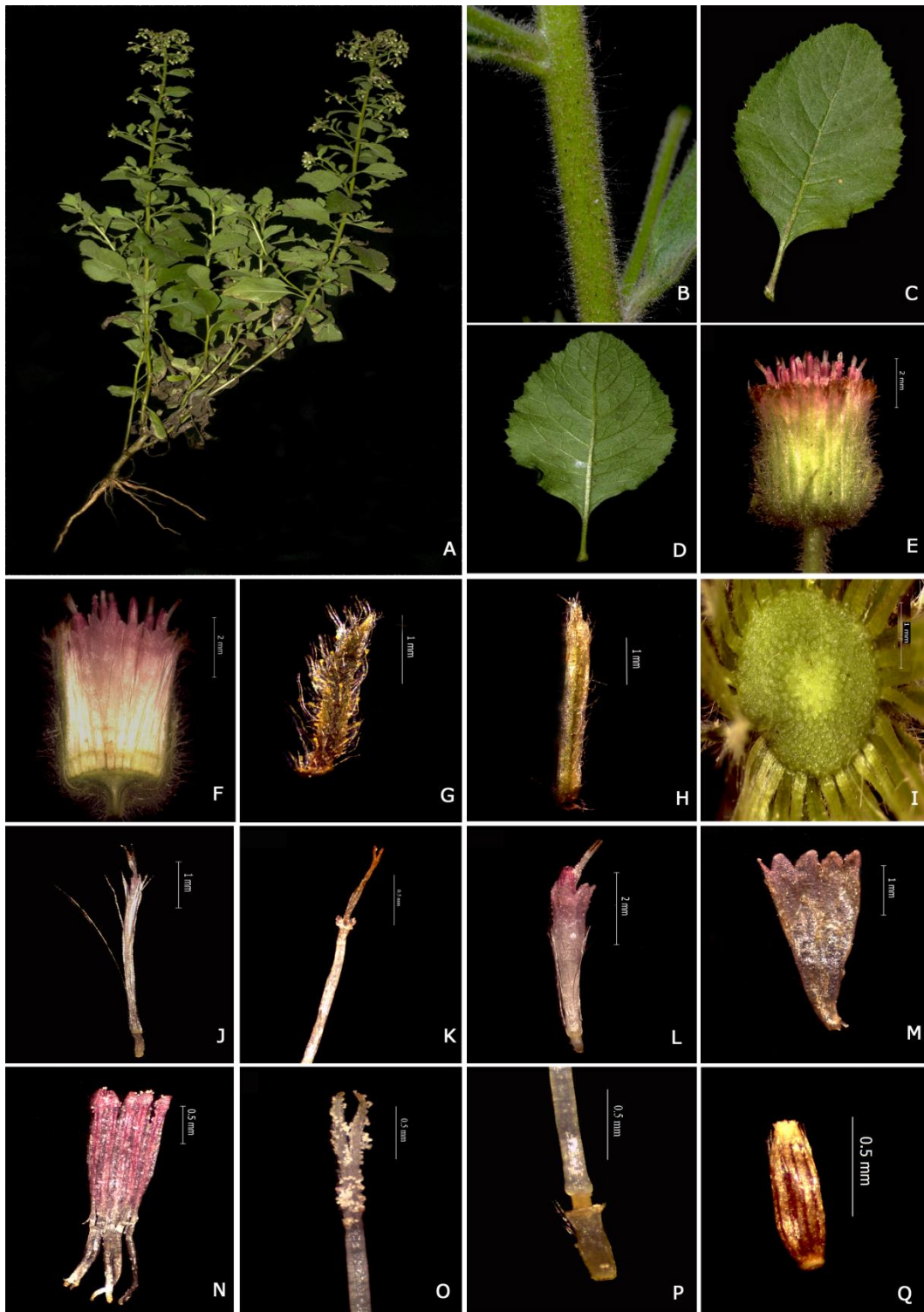


Fig. 1. *Blumea axillaris* (Lam.) DC.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

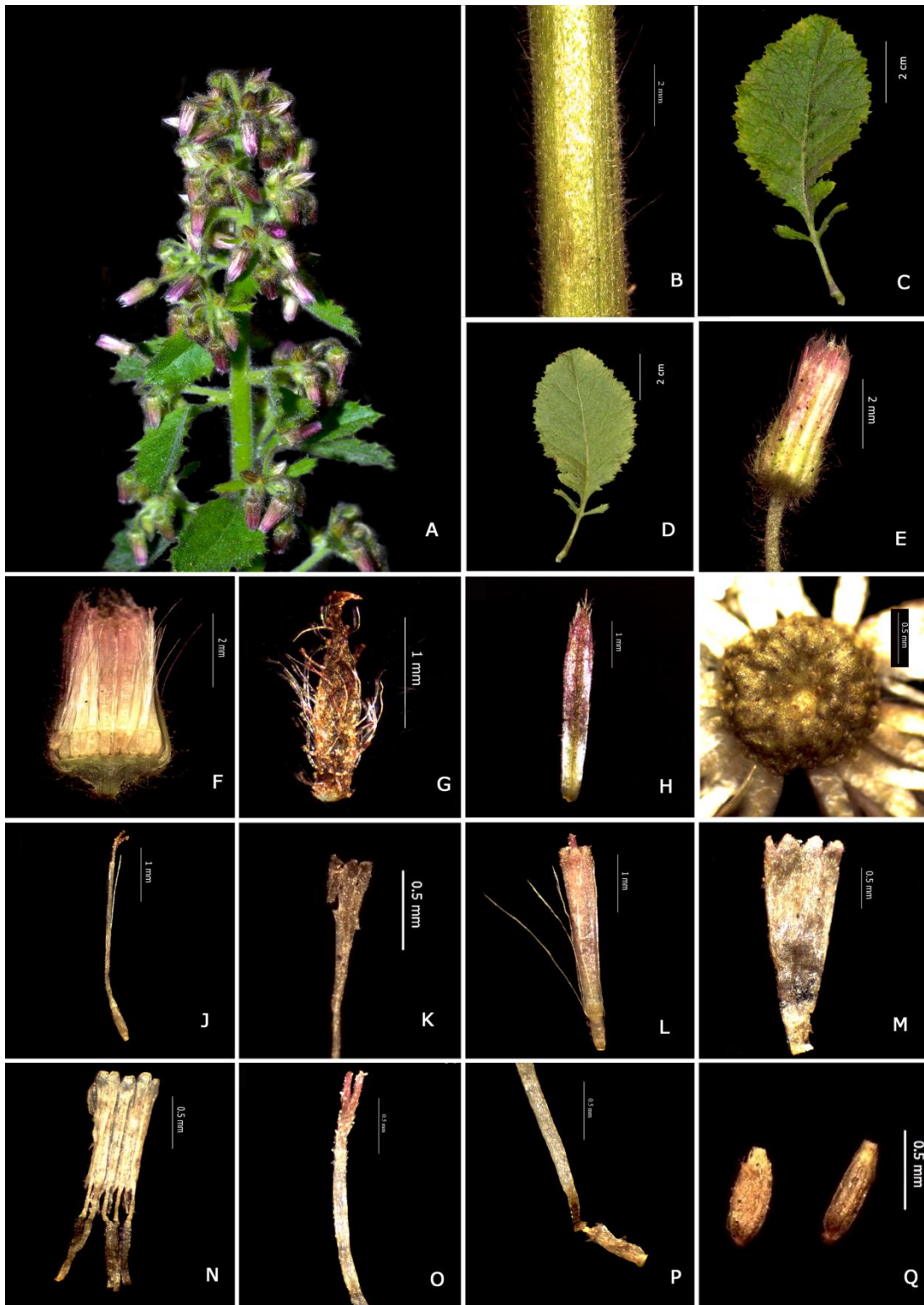


Fig. 2. *Blumea axillaris* (Lam.) DC. variation 1.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

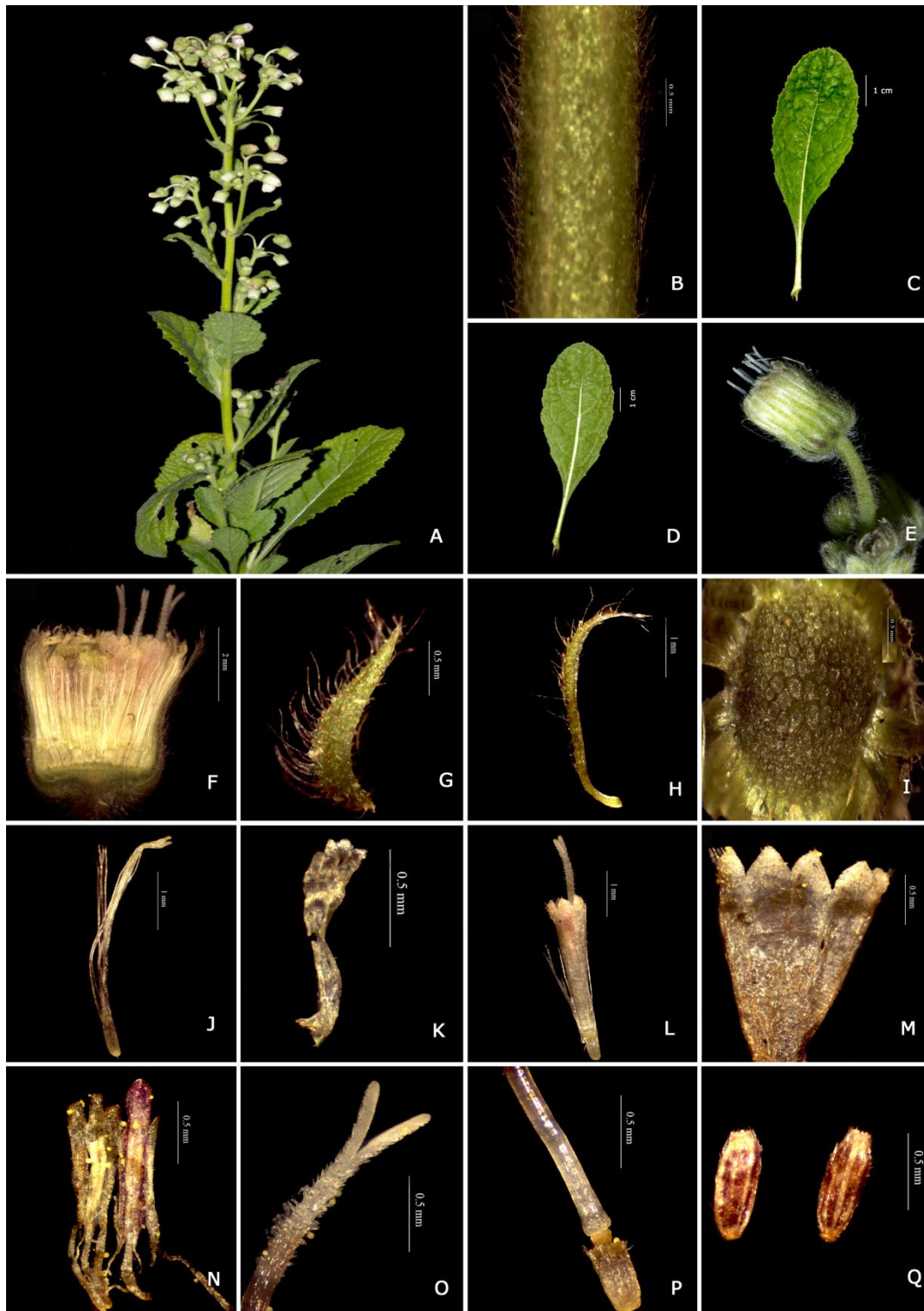


Fig. 3. *Blumea axillaris* (Lam.) DC. variation 2: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

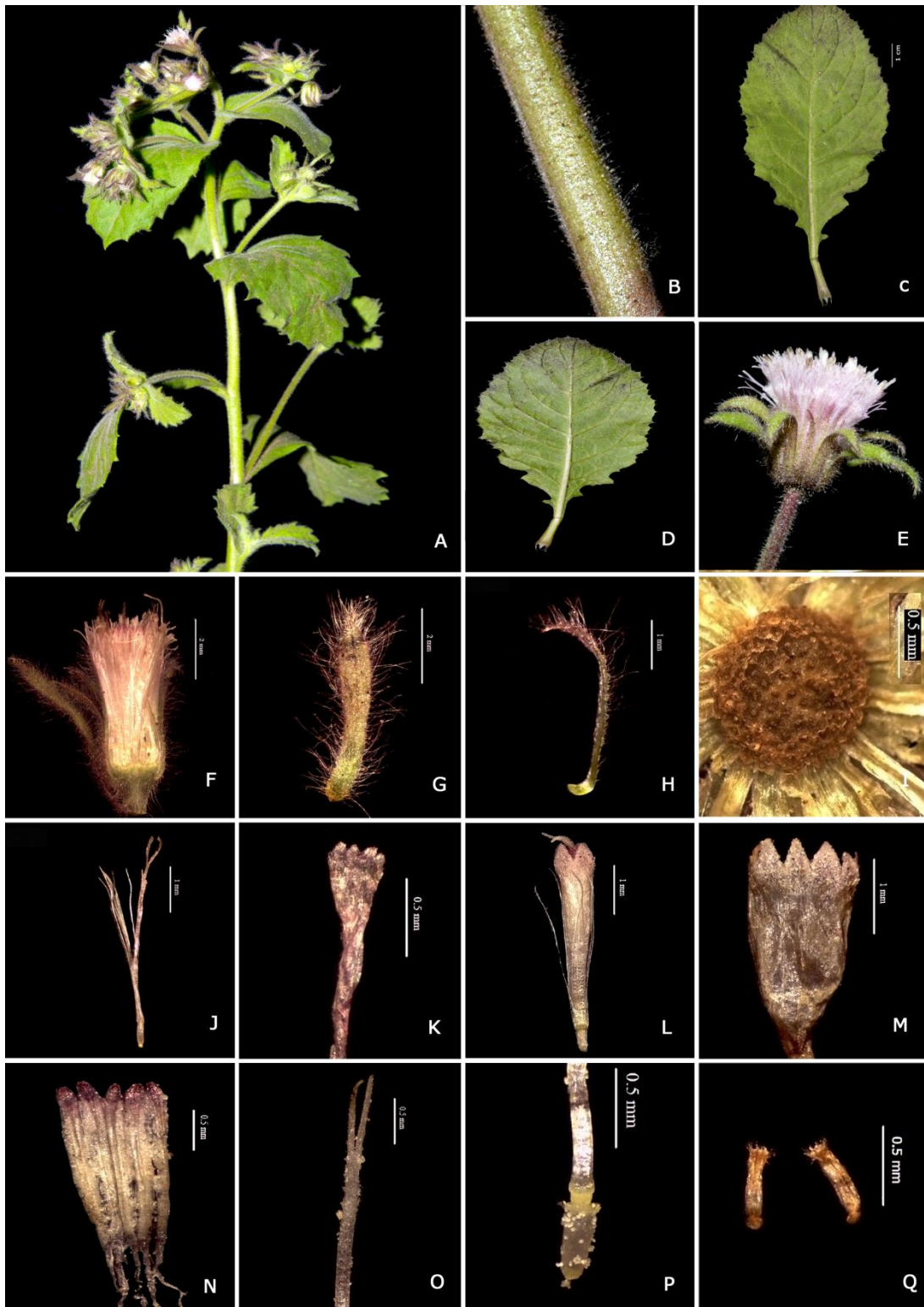


Fig. 4. *Blumea axillaris* (Lam.) DC. variation 3: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

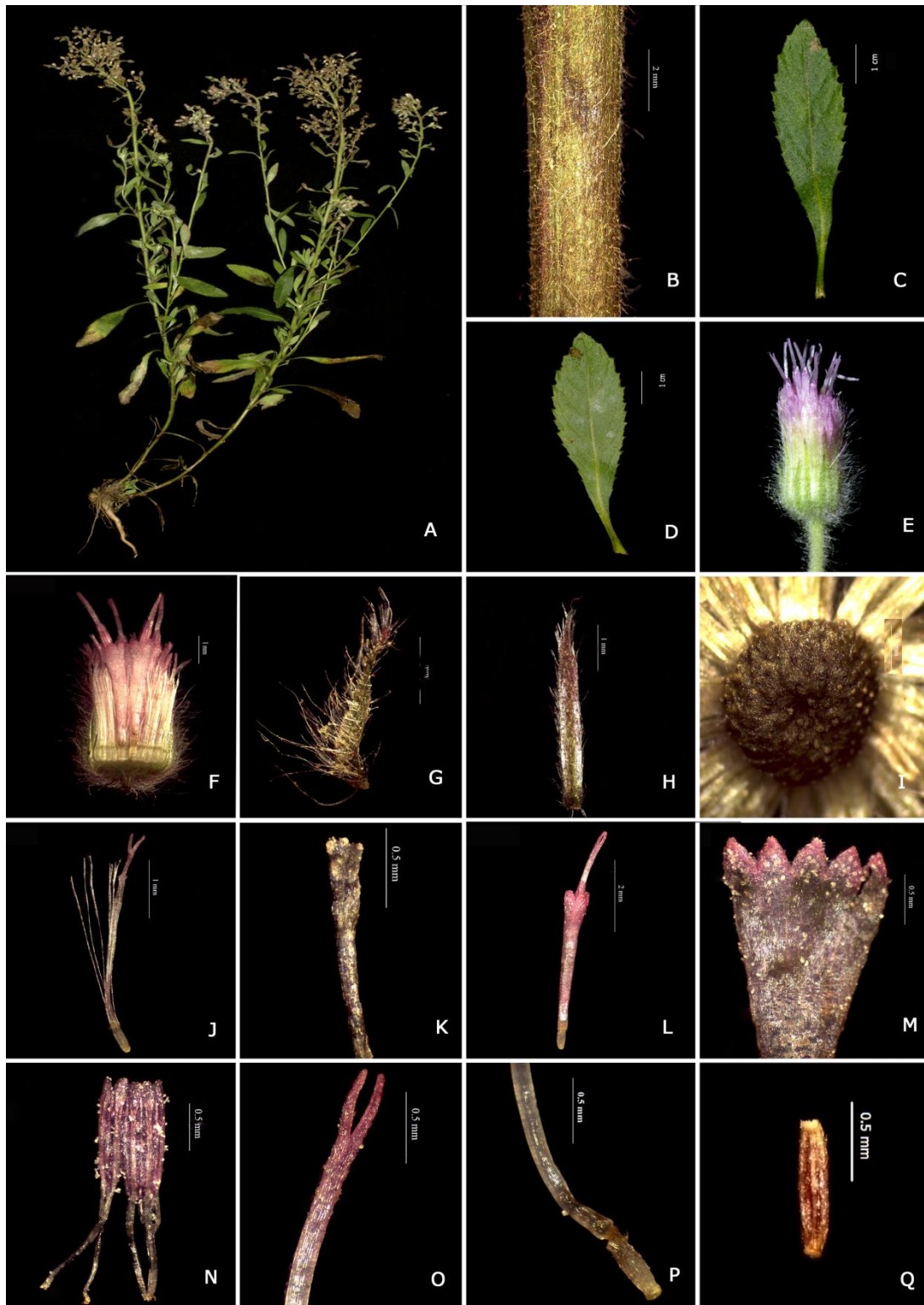


Fig. 5. *Blumea axillaris* (Lam.) DC. variation 4: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 6. Type of *Blumea axillaris* (Lam.) DC. © Muséum national d'Histoire naturelle, France, Paris.

Blumea mollis (D. Don) Merr., Philipp. J. Sci., C5: 395. 1910; Randeria, *Blumea* 10(1): 261. 1960; Saldanha & Nicolson, Fl. Hassan Dist. 605, 1976; Grierson in Dassan. & Fosbery, Revis. Handb. Fl. Ceylon 1:169. 1980; K.M. Matthew, Fl. Tamilnadu Carnatic 3(1):771.1981; M. Chandrabose & N.C. Nair, Fl. Coimbatore 160. 1987; K.K.N. Nair & M.P. Nayar, Fl. Courtallum 2: 331. 1987; Manilal & Sivar., Fl. Calicut 150. 1982; Manilal, Fl. Silent Valley 151. 1988; V. S. Ramach. & V.J. Nair, Fl. Cannanore 244. 1988; Pull. & N. Yesoda, Fl. Anantapur Dist. 135. 1989; Vajr., Fl. Palghat Dist. 249. 1990; K.M. Mathew, Excursion Fl. Central Tamil Nadu 255. 1991; P. Lakshminarasimhan & B.D. Sharma, Fl. Nasik Dist. 261. 1991; M. Mohanan & Henry, Fl. Thiruvanthapuram 256. 1994; S. Kumar in Hajra *et al.*, Fl. India 13: 135. 1995; Pull. & Ali Moulali, Fl. Andhra Pradesh 2: 517. 1997; Sasidh., Fl. Periyar Tiger Reserve 197. 1998; K M Matthew, Fl. Palni hills 2: 668. 1999; Pull. *et al.*, Fl. Guntur Dist. 201. 2000; Mohanan & Sivad., Fl. Agasthyamala 372. 2002; G.V. Subbarao & G.R. Kumari, Fl. Visakhapatnam Dist. 1: 438. 2002; K. Gopalakrishna Bhat, Fl. Udupi 305. 2003; B. K. Manjun., *et al.*, Fl. Devanagare 220. 2004; N. Anilkumar *et al.*, Fl. Pathanamthitta. 279. 2005; S.G. Pradhan *et al.*, Fl. Sanjay Gandhi NP 330, 2005; Pull. *et al.*, Fl. Eastern Ghats 3: 235. 2007; C. N. Sunil & Sivad., Fl. Alappuzha Dist. 378. 2009; Ratheesh Narayanan, Fl. Stud. Wayanad Dist. 410. 2009. *syn. nov.* ***Erigeron molle*** D. Don, Prodr. Fl. Nepal 172. 1825. ***Blumea trichophora*** DC., Prodr. 5: 436. 1836. Type: Nepal, D. Don *s.n.* (Hototype BM!).

Blumea dregeanoides Sch.Bip. ex A. Rich., Tent. Fl. Abyss.1: 392. 1847. Type: Wogera, Schimper 1297 (Lectotype P!, designated by Dilsha & Satheesh, 2023).

Annual Herbs, 50-120 cm; Root fibrous, 3-4 large roots, numerous narrow roots, upto 1 cm wide. Stem erect, terete, simple or branched from base, base woody, pale yellowish green, sparsely hairy with small multicellular hairs, other portion light green pilose with long spreading yellowish multicellular hairs and capitate glandular hairs; internodes 2-5 cm. Leaves alternate, upper and lower leaves different; lower leaves, petiolate; petioles 2-4 cm long; laminae ovate to obovate, 3-7 x 3-6 cm, base attenuate, margins doubly serrate, apex acute or apiculate, thin textured or

membranous, both surfaces pubescent with long spreading yellowish multicellular hairs and capitate glandular hairs, villous to base, both surfaces pale green, veins 7-12 pairs; upper leaves sessile, smaller, passing into bracts, laminae elliptic-lanceolate, 2-4 x 1-4 cm, base attenuate, margins dentate or doubly serrated, apex acute, adaxial surface dark green, abaxial dull green or whitish green. Inflorescence compact spiciform panicles in main axis and terminal narrow loose panicles on axillary branches, upto 30 cm. Capitula campanulate, 5.17 x 3.31 mm, subsessile to pedunculate; peduncle upto 3-10 x 0.712 mm long, green or pale green, villous with long white multicellular hairs intermingled with long capitate glandular hairs, gland tips light yellow; bracteoles linear lanceolate, villous with long multicellular hairs and long capitate glandular hairs. Involucral bracts or phyllaries 4 seriate, persistent; first phyllary, linear lanceolate, 3.44 x 0.477 mm, villous with multicellular hairs and glands, apex acute, pale green; second phyllary linear lanceolate, 3.37 x 0.477 mm, villous with long multicellular hairs and glands, pale green or purple tipped; third phyllary, linear, 5.27 x 0.302 mm, margins scarious or hyaline, pilose with long multicellular hairs not so crowded as the first phyllaries; fourth phyllary, linear, tip fimbriate, long hairs not crowded, 4.78 mm, herbaceous, broad hyaline or scarious margins, pale green at center. Receptacle convex, areolate, glabrous, 3.07 mm wide, epaleaceous. Florets ± 279 no., peripheral female florets, central bisexual florets. Female floret ± 278 no., filiform, corolla tube 2.85-3.98 mm, corolla purple to white, 3-4 lobes, generally glabrous, style arms equal, length of pappus hair is equal to the length of corolla. Bisexual floret ± 19 no., tubular, corolla tube 1.07 mm long, length of pappus hair reach half the length of corolla; corolla pinkish purple at apex, white or yellowish at base, glabrous, five triangular lobes with colleters; anther 1.77 mm, purple or pink, apical appendages truncate to emarginated, base with unbranched tails, tail length greater than the thickened portion of filament or anther collar; filament 1.22 mm, whitish yellow; style bifid, arms equal, 0.649 mm, light pink at apex, whitish to base, sweeping hairs below the bifurcation upto centre, style base swollen, style connected to ovary by a cylindrical structure which is narrower than both ovary and style. Cypselas homomorphic, linear oblong, 0.8 x

0.2-0.3 mm, ribbed, pale yellow, straight or curved, sparsely pubescent. Pappus white, 10-12 in no, 2.64 mm long, caducous.

Flowering & Fruiting: Throughout the year

Distribution: India, Sudan, Afghanistan, Taiwan, Angola, Tanzania, Bangladesh, Thailand, Benin, Togo, Botswana, Zimbabwe, Burkina, Zambia, Cambodia, Yemen, Chad, China, Comoros, Eritrea, Ethiopia, Iran, Jawa, Kenya, Ivory Coast, KwaZulu-Natal, Mozambique, Laos, New Caledonia, Madagascar, Nepal, Mali, New South Wales, Myanmar, Oman, Pakistan, Philippines, Queensland, Senegal, Somalia, Sri Lanka, Uganda, Vietnam and Western Australia. This species has a wide distributional range. It is found widely distributed in all the states of Peninsular India.

Habitat & Ecology: Waste lands, roadsides, forest edges, etc.

Specimens Examined: **Andhra Pradesh**, East Godavari district, Maredumilli to Devarapalli, 500 m, 20/02/1994, *M. Mohanan* 101296 (BSID). Kurool District, Madhavaram RF, 17/05/1983, *T. Pullaiah & R.R.V. Raju* 1332 (CAL). Prakasam district, Veligonda, 28/07/1914, *M.S. Ramaswami* 1355 (CAL); Turumellakona, 28/01/1985, *R.K. Mohan* 0718 (CAL); Korisapadu road, 07/10/1983, *R.K. Mohan* 0214 (CAL). Visakapatanam district, Laxmipuram, 25/02/1985, *N. Rama Rao & R. Asokan Nair* 79419 (BSID). **Goa**, South Goa district, Mollem National Park Area, 02/02/2018, *M.V. Dilsha* 6905 (DEV). **Karnataka**, Hassan district, Yettinahalla, 07/01/1970, *G Saldanha* 15963 (CAL); Magge, 06/02/2021, *M.V. Dilsha* 9113 (DEV). Kanakapura district, Kanakapura-Sangam road, 600 m, 28/01/1978, *C. Saldanha, Maqsood & Bhaskar Ramesh* 36 (CAL). Shivamogga district, Agumbe-Someswar road, 18/05/60, *R.S. Raghavan* 62674 (CAL). South Kanara district, Kollur ghat, 350 m, 08/04/1979, *C. Saldanha, K.R. Keshava Murthy & S.R. Ramesh* 6937 (CAL); Hayagreeva Nagar, Udupi, 25/02/2020, *M.V. Dilsha* 8645 (DEV). **Kerala**, Alappuzha district, Punnamadam vembanad lake side, 16/04/1988, *M.S. Swaminathan* 88215 (CAL); R Block, Vembanad lake, 19/04/1988, *M.S. Swaminathan* 88240 (CAL). Ernakulam district, Near irrigation department, Boothathankett, 14/12/2018, *M.V. Dilsha & V. Drishya* 6955 (DEV). Idukki district,

Mangaladevi, Periyar Tiger Reserve, 02/10/2018, *M.V. Dilsha, P. Soumya & Manu Philip* 6933 (DEV); On the way to Mangala Devi Temple, Periyar Tiger Reserve, 25/12/2020, *M.V. Dilsha* 8677 (DEV). Kannur district, Payyavur, 350m, 21/12/1980, *R. Ansari* 69939 (CAL); Tolpetty RF, 800 m, 08/02/1978, *V.S. Ramachandran* 52381 (CAL). Kasargod district: Pappinisseri, 150 m, 1-6/05/1982, *V.J. Nair* 73924 (CAL); *Ibid.*, 150 m, 16/05/1982, *V.J. Nair* 73927 (CAL). Kollam district, Rest house area Ranni, 350 m, 30/08/1977, *N.C. Nair* 50707 (CAL). Kottayam district, Erumeli, near K.S.R.T.C Bus stand, 18/11/2017, *M.V. Dilsha & V. Drishya* 6902 (DEV); Illikkal Kallu, 09/12/2019, *M.V. Dilsha* 8605 (DEV). Kozhikode district, Wayanad churam, 02/02/88, *C. Ramesan* 41301 (CALI); *Ibid.*, 02/02/1986, *C. Ramesan* 41319 (CALI); Near Kakkayam dam, 30/11/2018, *M.V. Dilsha & V. Drishya* 6952 (DEV); Kakkayam dam area, 30/11/2020, *M.V. Dilsha* 8668 (DEV). Malappuram district, Nilambur, 08/09/81, *A. Babu* 42531(CALI); Tenhipalam, 10/10/78, *Jyothi Nayar* 28320 (CALI); Feroke, 30/03/71, *V.V. Sivarajan* 1041 (CALI); CU Campus, 02/10/73, *s.coll.* 4658 (CALI); *Ibid.*, 10/10/87, *P.S. Ajitha* 13238 (CALI); *Ibid.*, 10/10/87, *K. Mohanan* 10140 (CALI); *Ibid.*, 02/11/03, *M. Amritha* 93624 (CALI); MSP Firing area, 24/11/2018, *M.V. Dilsha* 6946 (DEV); Nilambur roadsides, 11/11/2020, *M.V. Dilsha* 8657 (DEV); Adyanpara waterfalls, 11/11/2020, *M.V. Dilsha* 8660 (DEV). Palakkad District, Silent valley, Anginda, 20/04/83, *K.S. Prasanna Kumar* SV11176 (CALI); Camp shed, Silent Valley, 10/03/82, *K.S. Prasanna Kumar* SV10408 (CALI); Engandiyur, Silent Valley, 04/08/1991, *T.S. Devi* 1099 (CALI!); Damsite area, Silent valley, 05/04/1981, *B.K. Nayar & K. Rajappan* 10367 (CALI); *Ibid.*, 10/05/1981, *B.K. Nayar & K. Rajappan* 10361 (CALI); *Ibid.*, 05/04/1981, *B.K. Nayar & K. Rajappan* K10367 (CALI); Silent Valley, 23/03/2021, *M.V. Dilsha* 9102 (DEV).Thiruvananthapuram District, Athirumala, Agasthyamala, 23/12/88, *N. Mohanan* 8951 (CALI); Attayar, Agasthyamala, 17/05/88, *N. Mohanan* 9862 (CALI); Athirumala, Agasthyamala, 20/12/2018, *M.V. Dilsha, V. Drishya & Manu Philip*, 6972 (DEV); Near Bonaccad tea factory, 21/12/2018, *M.V. Dilsha, V. Drishya & Manu Philip*, 6976 (DEV). Thrissur district, Vazhachal River side, 12/12/2019, *M.V. Dilsha & V. Drishya* 8609 (DEV). Wayanad district, Near

Banasura sagar dam, 05/03/2018, *M.V. Dilsha* 6928 (DEV); *Ibid.*, 29/03/2021, *M.V. Dilsha* 9106 (DEV). **Maharashtra**, Pune district, BSI compound, Pune, 01/02/61, *P.J. Cherian* 68231 (CAL); Cultivated fields near Pavna dam, 25/12/2019, *M.V. Dilsha* 8620 (DEV); Roadsides near Pavna dam, 09/01/2022, *M.V. Dilsha* 9120 (DEV). Satara district, Mahabaleshwar, 10/01/2022, *M.V. Dilsha* 9124 (DEV). **Puducherry UT**, Karaikal, 11/04/2022, *M.V. Dilsha* 9133 (DEV). **Tamil Nadu**, Courtallum district, Shady areas around five falls and Mari falls, 10/09/1976, *K.K.N. Nair* 5289 (CALI); At five falls in shady areas, 01/01/1974, *K.K.N. Nair* 5322 (CALI). Dharmapuri district, Hogenakkal, along the river, 08/07/2000, *P. Venu* 11602 (BSID). Tirunelveli district, Kannikatty, 21/02/1913, *D. Hooper & M.S. Ramaswami* 39415 (CAL). **Telangana**, Adilabad district, Along streamlet, Gandhiguda, 23/03/1988, *T. Ravisankar* 86525 (BSID); Ratnapur, 22/01/1987, *T. Ravisankar* 85114 (BSID); Way to Pathadanthanpalli, 17/04/1985, *P.V. Sreekumar & T. Ravisankar* 79574 (BSID). Khammam district, Gowraram, 20/02/1983, *P.V. Sreekumar & N. Rama Rao* 76952 (BSID); On the way to Wyra from Khammam district, 28/12/1996, *R. Rajan* 108059 (BSID). Mahabubnagar district, Mallaetheertham, 650 m, 31/03/1997, *S.R. Srinivasan* 109089 (BSID); Erlooro Mahabunagar, 450 m, 17/02/1996, *S.R. Srinivasan* 104518 (BSID); Malladatheertham, 850 m, 31/03/1997, *S.R. Srinivasan* 108982 (BSID); Karkalpaadu beat, Amangal RF, 500 m, 19/02/1996, *S.R. Srinivasan* 104552 (BSID). Warangal district, Narasingapur, 250 -300 m, 01/04/1999, *R.K. Premanath* 110865 (BSID).

Conservation status: Least Concern.

Notes: This species is extremely variable with respect to shape of lamina, characters of inflorescence, capitula, phyllaries and indumentum as evidenced from the synonymy cited. The observed ecological variants and the variations collected from different localities are represented in Figures.

Blumea barbata DC., Contr.Bot. India (Wight) 14. 1834; Hook.f., Fl. Brit. India 3: 262. 1882; Vajr., Fl. Palghat Dist. 249. 1990; Subram., Fl. Thenmala Div. 190. 1995; Fl. Pres. Madras 483. 1921; Randeria, *Blumea* 10(1) 267. 1960; Saldanha &

Nicolson, Fl. Hassan Dist. 604, 1976; Grierson in Dassan. & Fosbery, Revis. Handb. Fl. Ceylon 1:171. 1980; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2: 136. 1984; V.S. Ramach. & V.J. Nair, Fl. Cannanore 243. 1988; Fyson, Fl. Nilgiri Pulney Hill-tops 1:225. 1915; M. Mohanan & Henry, Fl. Thiruvanthapuram 255. 1994; S. Kumar in Hajra *et al.* Fl. India 13: 119. 1995; Sasidh., Fl. Parambikulam WLS 167. 2002; K. Gopalakrishna Bhat, Fl. Udupi 303. 2003; N. Anilkumar *et al.*, Fl. Pathanamthitta. 278. 2005; Sunil & Sivad., Fl. Alappuzha Dist. 377. 2009. *Conyza barbata* Wall., Numer. List, no 3099. 1831. nom. nud. *Placus barbatus* Kuntze, Revis. Gen. Pl. 1: 357. 1891. Type: Peninsular India, Wight 1426 (Lectotype K!, designated by Randeria (1960); Isolectotypes NY!, E!, P!).

Figs. 7, 8

Annual herb, 5-70 cm; Tap root with numerous small rootlets, upto 1 cm thickness, sometimes adventitious roots from base of stem. Stem erect, woody at base, normally unbranched (become branched when damaged) but sometimes branches arise from base, striated at edges, base green or reddish brown (2/4), green at apex, strigose long spreading multicellular hairs, hairs sparsely or glabrous at base; internodes 1-3 cm. Leaves alternate, sessile, laminae elliptic-oblong or oblanceolate oblong, 1-8 cm long, base cuneate, margins sparingly or distantly serrate, apex acute, strigose on upper surface with multicellular hairs, lower surface velutinous woolly with white long multicellular hairs, thick, bright or fluorescent green on both surfaces, whitish green. Inflorescence terminal and axillary corymbose panicle, capitula clustered in leaflets, upto 40 cm. Capitula narrowly campanulate, 6.48 x 2.95 mm, pedunculate; peduncle 5.20 mm long, dark brown or green, pilose with long multicellular and capitate glandular hairs, tip of glandular hairs yellowish to orange red or purple; bracteoles linear lanceolate, villous with long white multicellular hairs, pilose with long multicellular hairs but no glandular hairs. Involucral bracts 7 seriate, phyllaries slightly larger than female florets but it is slightly shorter than bisexual florets, herbaceous, reflexed at maturity, purplish at the margins except the inner, pubescent with multicellular hairs and long capitate glandular hairs; first phyllary pubescent but not crowded, long multicellular hairs

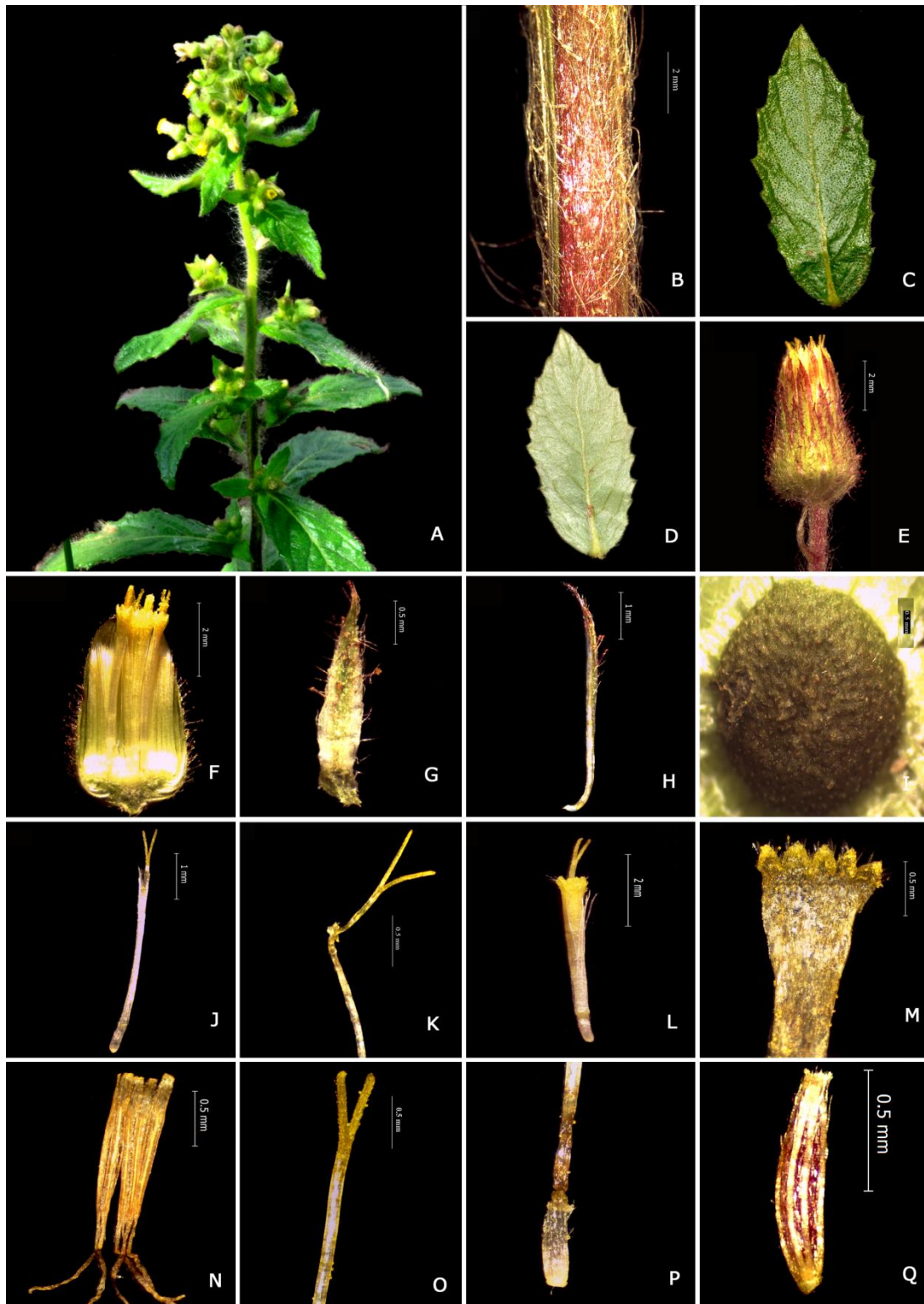


Fig. 7. *Blumea barbata* DC.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 8. Type of *Blumea barbata* DC. © The Board of Trustees of the Royal Botanic Gardens, Kew.

and capitate glandular hairs, 1.67 mm long, purple tip, lanceolate, entire surface with multicellular hairs and capitate glandular hairs; second phyllary same as first, only difference in length, 2.48 mm long, entire surface with multicellular hairs and capitate glandular hairs; third phyllary oblanceolate, 2.62 mm long, purple at upper margins, capitate glands at upper part; fourth phyllary 3.13 mm long, purple at upper margins, capitate glands at upper part; fifth phyllary like third and fourth but purple upper margins spread to other areas (upper more or less completely purple), 4.471 mm; sixth phyllary 5.36 mm long, only margins purple, less hairy; seventh phyllary glabrous, ciliate tip. Receptacle flat or slightly convex, foveolate, glabrous, 1-3.27 mm, epaleaceous. Florets ± 222 no., peripheral female florets, central bisexual florets. Female floret ± 210 no., filiform, corolla tube 4.87 mm long, corolla light yellow at $1/4^{\text{th}}$, other pale yellow or hyaline, corolla lobes 3, glabrous, style lobes equal length, length of pappus hair reach upto the size of corolla. Bisexual floret ± 12 no., tubular, corolla tube 4-5.5 mm, pappus length not reach upto the starting of corolla lobe; corolla yellow, 5 lanceolate lobes with unicellular hairs and glandular hairs, papillate, 0.180 mm. Stamen 5, 2.325 mm long, syngenesious; anther 1.38 mm, yellow, apical appendage 0.126-0.206 mm, truncate, different length, base with unbranched tails, tail length shorter than the thickened portion of filament (anther collar), 0.174 mm; filament 0.945 mm, pale yellow to whitish; style bifid, arms equal, 0.670 mm, dark yellow on arms and pale yellow to base, sweeping hairs present on style arms upto bifurcation, style base not swollen, style connected to ovary by a cylindrical structure which is same thickness as style. Cypselas homomorphic, linear oblong, 0.909 x 0.200 mm, ribbed, reddish brown with yellowish ribs, tapering at ends, pubescent at apex and sparsely hairy in other, tapering at ends; pappus white, 11-15 no., 3.35 mm long, caducous.

Flowering and Fruiting: November-January.

Distribution: India, Sri Lanka and Vietnam. In India, the species is restricted to South India, mostly distributed in Kerala.

Habitat & Ecology: Growing in evergreen forests at cool places and also in grasslands and forest edges and in rocky crevices.

Specimens Examined: **Karnataka**, Dakshina Kannada District, 21/11/1900, *C.A. Barber* 2510 (MH). **Kerala**, Alappuzha District, Chathiyara, *s.d.*, *C.N. Sunil* 1844 (CALI). Idukki District, Pallivasal, 02-01-84, *C. Ramesan* 38724 (CALI); Thekkdy, *s.d.*, *C. Ramesan* 42207 (CALI). Ernakulam district, Roadside, Boothathankett, 14/12/2018, *M.V. Dilsha & V. Drishya* 6957 (DEV); Neriamangalam, 15/12/2018, *M.V. Dilsha & V. Drishya* 6959 (DEV). Kannur District, Madayipara near SN School, 03-11-2012, *C. Pramod* 290384 (CALI); Kannothe RF, 240 m, 25/02/1979, *s.coll.* 61901(MH). Kottayam District, Pulluparai to Peruvanthanam, 525 m, 22/01/1965, *K. Vivekananthan* 22962 (MH). Kottayam district, Udumpara, Pampa range, 18/11/2017, *M.V. Dilsha & V. Drishya* 6901 (DEV); Illikkal Kallu, 09/12/2019, *M.V. Dilsha* 8601 (DEV). Kozhikode District, Kottooli, 12-04-1998, *C. Ramesan*, 41358 (CALI); Kakkayam, 30/11/2018, *M.V. Dilsha & V. Drishya* 6949 (DEV); *Ibid.*, 30/11/2020, *M.V. Dilsha* 8667 (DEV); Ambalappara grassland, Kakkayam, 30/11/2018, *M.V. Dilsha & V. Drishya* 6951 (DEV). Malappuram District, CU Campus, 01/04/89, *Beena T. Cheriyan* 2812 (CALI); *Ibid.*, 12/11/03, *s.coll.*, 94505 (CALI); Kodikuthimala, 24/11/2018, *M.V. Dilsha* 6942 (DEV); *Ibid.*, 27/11/2020, *M.V. Dilsha* 8663 (DEV); *Ibid.*, 29/11/2021, *M.V. Dilsha* 9107 (DEV). Palakkad District, Dhoni, 01-02-1991, *Meera Nair* 2095 (CALI); Aruvampara grassy slopes, 850 m, 08/12/1980, *N.C. Nair* 69182 (CAL); Pothundy to Kaikaty, 650 m, 19/11/1973, *E. Vajravelu* 44678 (MH); Aruvampara grassy slopes, 850m, 08/12/1980, *N.C. Nair*, 69182 (MH). Thiruvananthapuram District, Kottur RF, ±175 m, 21/02/1979, *M Mohanan* 59340 (CAL, MH); Athirumala, Agasthyamala, 20/12/2018, *M.V. Dilsha, V. Drishya & Manu Philip*, 6971 (DEV); Attayar, Agasthyamala, 21/12/2018, *M.V. Dilsha, V. Drishya & Manu Philip*, 6974 (DEV); Ponmudi, 21/12/2019, *M.V. Dilsha* 8613 (DEV); Wayanad District, Vaithiri, 14-11-87, *K. Mohanan* 10224 (CALI); *Ibid.*, 14-11-88, *P.S. Ajitha* 13324 (CALI); Way to Soochipara, 11/02/97, *Vidya* 61974 (CALI); *Ibid.*, 11/12/97, *K.B. Bindu* 62040 (CALI); Pookode, 11/12/97, *K. Sinitha* 59429 (CALI). **Tamil Nadu**, Nilgiri district, Needle view point, Ooty, 24/02/2018, *M.V. Dilsha, V. Drishya & P. Soumya* 6920 (DEV).

Conservation status: Least Concern.

Notes: Different ecological variants were observed in this species. The observed members differ in capitula size and shape, color of phyllaries, leaf and inflorescence characters. *B. barbata* show overlapping characters with *B. belangeriana* but both can be segregated based on the arrangement of capitula.

Blumea belangeriana DC., Prodr. 5: 444. 1836; Hook.f., Fl. Brit. India 3: 266. 1882; Gamble, Fl. Pres. Madras 686. 1921; Cooke, Fl. Pres. Bombay 2:78. 1958; Randeria, Blumea 10(1): 277. 1960; Saldanha & Nicolson, Fl. Hassan Dist. 604. 1976; Ansari, Fl. Kasaragod Div. 208. 1985; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2:136. 1984; Manilal, Fl. Silent Valley 151. 1988; Vajr., Fl. Palghat Dist. 249. 1990; Keshava Murthy & Yoganarasimhan, Fl. Coorg 240. 1990; M.J. Kothari & S. Moorthy, Fl. Raigad Dist. 212. 1993; M. Mohanan & Henry, Fl. Thiruvanthapuram 255. 1994; S. Kumar in Hajra *et al.* Fl. India 13:119. 1995; Sasidh. & Sivar., Fl. Pl. Thrissur Forest 246. 1996; Sivar. & P. Mathew, Fl. Nilambur 362. 1997; Sasidh., Fl. Periyar Tiger Reserve 195. 1998; M. R. Almeida, Fl. Maharashtra. 3A: 77. 2001; Sasidh., Fl. Parambikulam WLS 167. 2002; S.R. Yadav & Sardesai, Fl. Kolhapur 241. 2002; S.D. Deshp. *et al.*, Fl. Mahabaleshwar & Adjoinings 2: 303. 1995; K. Gopalakrishna Bhat, Fl. Udupi 303, 2003; S.G. Pradhan *et al.*, Fl. Sanjay Gandhi NP 328, 2005; Ratheesh Narayanan, Fl. Stud. Wayanad Dist. 408. 2009. *Placus belangerianus* Kuntze, Revis. Gen. Pl. 1: 356. 1891. **Type:** Malabar coast, India, Belanger *s.n.* (G-DC!).

Figs. 9, 10

Blumea metziana Sch. Bip. ex Hook.f., Fl. Brit. India 3: 266. 1882. **Type:** Concan, Canara and Malabar (P!, FI).

Annual erect herbs, 5-120 cm. Taproot with three long thick rootlets, up to 20 cm long, small narrow rootlets present. Stem erect, terete, branched from base, base woody, green or reddish brown, glabrous or sparsely hairy, long strigose or pilose multicellular hairs, upto 1 cm wide; internodes 3-6 cm. Leaves alternate, lower and upper leaves different, margins serrate dentate with sharp teeth, lanate with

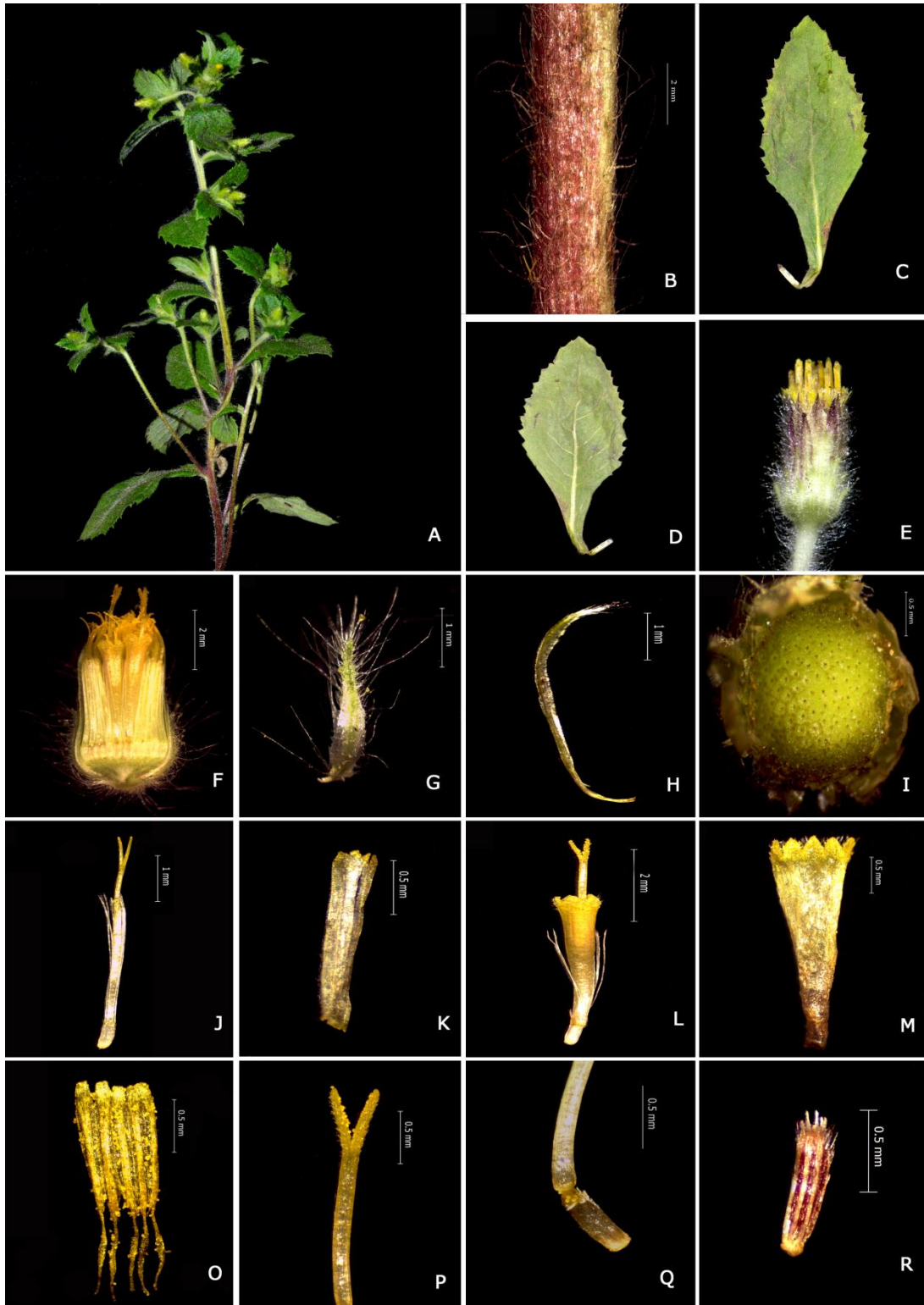


Fig. 9. *Blumea belangeriana* DC.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 10. Type of *Blumea belangeriana* DC. © Conservatoire et Jardin botaniques de la Ville de Genève.

multicellular hairs, below silky villous or white woolly, adaxial bright green, abaxial whitish green; lower leaves petiolate, 1-3 cm, petioles tapered; laminae ovate-elliptic, lamina somewhat extended to the petiole, margins serrated with pointed tips, 5-7 x 1.5-3 cm, apex acute; upper leaves subsessile or sessile, laminae ovate-elliptic, apex acuminate. Inflorescence as leafy clusters at the tip of branches. Capitula cylindrical or campanulate, 5.69 x 3.19 mm, pedunculate, peduncle 2.20 mm, green, woolly villous with long white multicellular hairs. Involucral bracts or phyllaries 5 seriate, persistent, purple tipped in some capitulas, others green, reflexed at maturity, large white multicellular hairs at the apex of each phyllaries; first phyllary 2.38 mm, long white multicellular hairs along the surface, capitate glandular hairs present, lanceolate, acute; second phyllary 2.59 mm, large multicellular hairs at the tip and small hairs and capitate glandular hairs at entire surface, lanceolate, acute; third phyllary 3.61 mm, large multicellular hairs at the tip, capitate glandular hairs and short multicellular nonglandular hairs upto the middle portion, base glabrous, lanceolate, acute; fourth phyllary 4.16 mm, large multicellular hairs at the tip, capitate glandular hairs and non glandular hairs upto the middle portion, base glabrous, linear; fifth phyllary 4.932 mm, linear, small hairs at the tip only. Receptacle, flat, alveolate, glabrous, 1.98 mm wide, epaleaceous. Florets ± 155 no., peripheral female florets, central bisexual florets. Female floret ± 147 no., filiform, corolla tube 4.55 mm, light yellow at the upper portions, hyaline at lower, 4 lobed, glabrous, pappus 9-11 no., pappus slightly longer than corolla. Bisexual floret ± 8 no., tubular, corolla tube 3.77 mm, pappus hair slightly longer than center of corolla; corolla yellow, 5 ovate triangular papillate lobes with unicellular hairs and glandular hairs. Stamen 5, syngenesious; anther 1.28 mm, yellow, anther apical appendages of different length, truncate or retuse, base with unbranched tails, tails greater than the thickened portion of filament, 0.110-0.162 mm; filament 0.819 mm, pale yellow to whitish yellow to translucent to base. Style bifid, arms equal, 0.610 mm, yellow, sweeping hairs upto the bifurcation, style base slightly swollen, attached to ovary by a cylindrical structure which is narrower than both style and ovary, ovary pale yellowish white, pappus 8 or 9. Cypsela homomorphic, linear oblong, 0.780 x 0.190 mm, ribbed, 11 ribs, light brown, curved or straight, tapering to apex, hairy at apex, sparsely hairy to base. Pappus white, 9-11 nos, 2.85 mm long, caducous.

Flowering & fruiting: November-March.

Distribution: Kerala, Tamil Nadu, Karnataka & Maharashtra (Endemic to Peninsular India).

Habitat & Ecology: In rocky crevices and also found in roadsides, forest edges and shady places along stream beds.

Specimens Examined: **Karnataka**, Chikkamagaluru District, Charmadi, 03/03/1963, *R.K. Arora* 2944 (CAL); *Ibid.*, 22/02/1962, *R.K. Arora* 662 (CAL). Dakshina kannada district, Shiradi ghat, 26/02/2020, *M.V. Dilsha* 8650 (DEV); *Ibid.*, 22/02/2021, *M.V. Dilsha* 8694 (DEV). Hassan district, Panorama point, Shiradi Ghat, 18/02/1972, *T.P. Ramamoorthy & K.N. Gandhi*, HFP 2646 (CAL); Shiradi, 15/12/1918, *s.coll.* 15607 (MH); Bisle Ghat, 30/11/1927, *S.R. Raja* 18241 (MH). Kodagu district, Coorg, 21/02/63, *A.S. Rao* 85846 (BSI). Mysuru district, Mysore, 02/1908, *A. Meebold* 8442 (CAL). Shivamoga District, Doddaguda-Agumbe, 09/02/1961, *R. Sundara Raghavan* 69511 (BSI); Ghatibagh, Agumbe, 14/05/1962, *R. Sundara Raghavan* 80538 (BSI). Udupi district, Someswar, 14/02/40, *S. Raja* 6387 (MH). Uttara Kannada district, Castle rock Western ghats, *s.d.*, *L.J. Sedgwick* 3392 (CAL); Jog falls, 16/01/50, *J. Fernandez* JF762 (BLAT); Siddapur roadside, 05/05/56, *G.S. Puri* 1995 (BSI); Kolegar, 14 km from Murdeshwar, 16/02/1962, *R.S. Raghavan* 79531 (BSI). **Kerala**, Kannur district, Panathady RF, ±350 m, 28/01/1979, *V.S. Ramachandran* 59287 (CAL, MH); Panathur, 350 m 28/01/1879, *V.J. Nair* 59943 (CAL); Kuthuparamba, 18/09/1913, *s.coll.* 9209 (MH); Taliparamba, 10/03/1915, *s.coll.* 11856 (MH); Taliparamba, 16/12/1931, *s.coll.* 22 (MH); Taliparamba farm, 17/02/1913, *C.A. Barber* 8772 (MH). Kollam district, Quilon, *s.d.*, *Lawson s.n.* (MH). Kozhikode district, Wayanad churam, 02-02-1988, *C. Ramesan* 41316 (CALI); *Ibid.*, 02-02-1988, *C. Ramesan* 41317 (CALI). Malappuram district, Mancheri, 31/01/84, *A. Babu* 37625 (CAL). Palakkad district, Damsite, 04/12/1981, *T. Sabu* SV10026 (CAL, CALI); Mukkali, 650m, 08/11/1976, *E. Vajravelu* 48887 (CAL); Walayar-Malabar, 900 m, 06/01/1911, *C.E.C. Fischer* 2438 (CAL); Silent valley dam site, 1050 m, 18/01/1980, *P. Bhargavan* 6556 (MH); Mukkali & Thenkam, 550 m, 08/11/1976, *E. Vajravelu* 4887 (MH); Panthenthode, 825 m, 18/12/1969, *E. Vajravelu* 33129 (MH);

Attappady, 15/12/2020, *M.V. Dilsha* 8676 (DEV). Thiruvananthapuram district, Kallar, ±350 m, 22/11/1979, *M. Mohanan* 65158 (CAL, MH); Veli, 30 m, 03/12/1977, *M. Mohanan* 52700 (MH). **Maharashtra**, Ahmednagar district, Harishchandragad ghat, 18/04/68, *K.V. Billore* 116021 (BSI). Buldhana district, Botha forest, 20/02/84, *S.R. Yadav* 5867 (SUK). Mumbai Suburban District, National park Borivali, 23/04/1952, *Randeria* 259 (BLAT); *Ibid.*, 09/01/1954, *Randeria* AR585 (BLAT); *Ibid.*, 31/01/1953, *Randeria* AR523 (BLAT); *Ibid.*, 28/11/1952, *Randeria* AR492 (BLAT); Central dairy & along Borivali, 27/03/1958, *S.C. Tavakari* 983 (BLAT); *Ibid.*, 15/01/1956, *P.S. Herbert* 1312 (BLAT); *Ibid.*, 09/01/1954, *A.J. Randeria* 585 (BLAT); *Ibid.*, Tumnipada, 12/02/85, *B.D. Sharma* 167419 (BSI); *Ibid.*, Melund beat, 09/02/85, *B.D. Sharma* 168975 (BSI). Pune district, Khandala, 30/12/1942, *s.coll.* 1453 (BLAT); *Ibid.*, 16/02/46, *s.coll.* 8665 (BLAT); *Ibid.*, 10/05/1917, *H. Santapau* 20405 (BLAT); *Ibid.*, 03/1917, *H. Santapau* 20449 (BLAT); *Ibid.*, 30/12/1942, *H. Santapau* 1452 (BLAT); Reversing station, Khandala, 03/1916, *s.coll.* 20919 (BLAT); *Ibid.*, St X Ravine, 16/04/56, *H. Santapau* 20369 (BLAT); *Ibid.*, St X Ravine, 16/04/56, *H. Santapau* 20365 (BLAT); *Ibid.*, 07/03/62, *RS Rao* 69729 (BSI); *Ibid.*, 07/03/62, *Seshagiri Rao Rolla* 69729 (BSI); Kandala-Bهران's plateau, 21/04/1942, *H. Santapau* 276 (BLAT); On the way from khandala over bridge, 07/03/62, *Seshagiri Rao Rolla* 77667 (BSI); On way to monkey hill, 09/03/62, *Seshagiri Rao Rolla* 78921 (BSI); Khandala near shingaroba temple, 21/03/1956, *S.K. Jain* 12 (BSI); Ambavne, 04/02/91, *B. Venkata Reddi* 95972 (BSI); Rajgad, Pune, 10/02/54, *V.D. Vartak* T601 (BLAT);. Raigad district, waterpipe-jummapatti railway line, 20/12/1958, *N.A. Irani* NI2699 (BLAT); Matheran neral road side, 31/01/1959, *N.A. Irani* NI2837 (BLAT); Matheran water pipe, 13/12/1958, *N.A. Irani* NI2659 (BLAT!); *Ibid.*, 13/12/1958, *N.A. Irani* NI2660 (BLAT); Matheran neral, 24/12/1958, *N.A. Irani* NI2755 (BLAT); Neral to Jummapatti, 14/01/1959, *N.A. Irani* NI2807 (BLAT); Matheran, Konkan, 26/03/1918, *H. Santapau* 20935 (BLAT); *Ibid.*, 21/01/62, *Usha Nanela* 578 (BLAT); *Ibid.*, 19/01/62, *G.L. Shah* 10510 (BLAT); Mahad ghat, 28/04/57, *G.S. Puri* 16716 (BSI); Matheran-Neral Road, 02/02/1957, *G.S. Puri* 14109 (BSI); *Ibid.*, 02/02/1957, *G.S. Puri* 14109 (BSI). Ratnagiri District: Kerude jungle, 12/04/70, *B.S.*

Kulkarni 120080 (BSI); Kumkharli ghat, 09/04/1978, *M.P. Nayar* 153020 (BSI). Satara district, 10 miles from mahabaleswar on pratapgarh road, 09/05/61, *Seshagiri Rao Rolla* 71731 (BSI); Mahabaleswar, 06/04/56, *G.S. Puri* 280 (BSI). Thane district, Sidhgad slope, 12/04/68, *K.V. Billore* 113887 (CAL); Talegaon hill, 19/01/12, *K.V. Billore* 113690 (CAL); Parsik hill, 09/12/44, *H. Santapau* 5553 (BLAT); Mumbra, 10/12/1953, *K.V. Shenoy* 1627 (BLAT); *Ibid.*, 07/11/1953, *K.V. Shenoy* 1160 (BLAT); *Ibid.*, 05/02/55, *P.V. Bole* 1321 (BLAT); *Ibid.*, 10/12/1953, *K.V. Shenoy* 1633 (BLAT); *Ibid.*, 28/08/1954, *K.V. Shenoy* 4201 (BLAT); Thana, bordi range, 11/01/68, *K.V. Billore* 113461 (BSI); Thana, Sadrya ghat slope, 17/04/68, *K.V. Billore* 113967 (BSI); Tungar hill, Mandvi range, 19/01/68, *K.V. Billore* 113690 (BSI).

Conservation status: Least concern.

Notes: This species is distinguished from others by arrangement of capitula as leafy cluster at the end of branches and reduced number of female florets.

Blumea bifoliata (L) DC., Contr. Bot. India (Wight)14. 1834; Hook. f., Fl. Brit. India 3: 261. 1882; Gamble, Fl. Pres. Madras 482. 1921; Cooke, Fl. Pres. Bombay 2:75. 1958; Randeria, *Blumea* 10(1): 288. 1960; Grierson in Dassan. & Fosbery, Revis. Handb. Fl. Ceylon 1:176. 1980; K.M. Matthew, Fl. Tamilnadu Carnatic 3(1):769.1981; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2:136. 1984; S. Kumar in Hajra *et al.*, Fl. India 13.120. 1995; Pull. & Ali Moulali, Fl. Andhra Pradesh 2: 515. 1997; Pull. *et al.*, Fl. Guntur Dist. 200. 2000; M.R. Almeida, Fl. Maharashtra 3A: 77. 2001; G.V. Subbarao & G.R. Kumari, Fl. Visakhapatnam Dist., 1: 437. 2002; Pull. *et al.*, Fl. Eastern Ghats 3: 227. 2007; M. Chandrabose & N.C. Nair, Fl. Coimbatore 160. 1987; K.M. Mathew, Excursion Fl. Central Tamil Nadu 255. 1991. *Conyza bifoliata* L., Sp. Pl. 2: 862. 1753. *Conyza bracteolata* Rottler ex DC. Prodr. 5: 434. 1836. Type: "*Eupatoria Conyzoides*, integro Jacobaeae folio molli & incano" Plukenet, Phytographia: t. 177, f. 1. 1692 (Lectotype designated by Srivastava & Shukla in Jarvis & Turland (1998)).

Figs. 11, 12

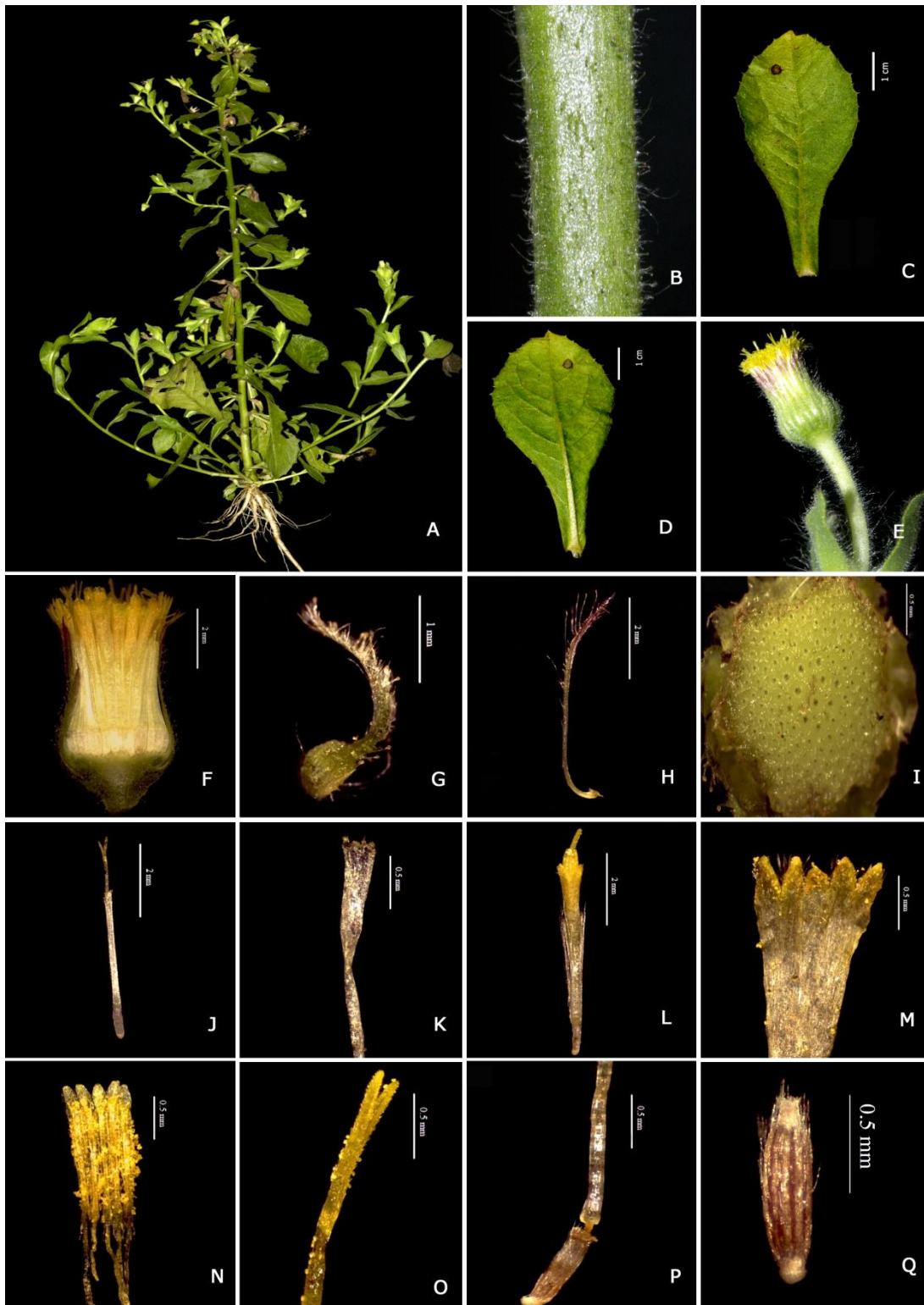


Fig. 11. *Blumea bifoliata* DC.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypselas.



Fig. 12. Type of *Blumea bifoliata* (L) DC. "*Eupatoria Conyzoides*, integro Jacobaeae folio molli & incano" Plukenet, *Phytographia*: t. 177, f. 1. 1692.

Conyza foliolosa Wight in Wall., Numer. List, no 3092. 1831. nom. nud. non *Conyza foliolosa* Willd. Sp. Pl., 3(3): 1919.1803. Type: Wallich Cat. 3092, comp. no. 202 (Holotype K-W!).

Conyza amplexicaulis Wall. Numer. List, no 3104. 1831. nom. nud. non. *Conyza amplexicaulis* Lam., Encycl. [J. Lamarck & al.] 2(1): 84 1786. *Blumea oligocephala* DC. in Wight. Contr. Bot. India 13. 1834; DC. Prodr. 434. 1836. Type: India, Madras, Wight in Wallich Cat. 3104, comp. no. 214 (Holotype G-DC!; Isotype K-W!).

Blumea subracemosa (Miq) Boerl., Handl. Fl. Ned. Ind. 2(1): 238. 1891. *Conyza subracemosa* Miq., Fl. Ned. Ind. 2 (1): 41. 1856. Type: Java, Ungaran, Horsfield T (Holotype U!; Isotype K!).

Annual herbs, 5-40 cm. Taproots, with 3-4 rootlets, upto 1 cm thick, numerous small rootlets, white. Stem erect or procumbent, terete, simple or branched from base, simple in short forms, branched in large ones, villous with multicellular hairs and capitate glandular hairs on both surfaces, base reddish brown or green, glabrous or scarcely hairy, upto 2 cm thick, others villous with multicellular hairs and capitate glandular hairs, short forms more villous woolly than others; internodes 2-4 cm, green. Leaves alternate, simple, lower and upper leaves different; lower leaves petiolate, laminae extended to petiole, spatulate to oblanceolate, 0.7-6 x 3 cm, margin serrate to dentate, apex acute or apiculate, thick, both surfaces pubescent with hairs and capitate glandular hairs, both surfaces bright green; upper leaves or branch leaves subopposite or opposite especially inflorescence leaves, sessile, laminae elliptic or obelliptic, 5-11 x 2-4 cm, margins distantly serrate to entire, apex acute, upper or branch leaves and leaves of short forms with long white spreading multicellular hairs and short capitate glandular hairs, both surfaces fluorescent green. Inflorescence both terminal and axillary, solitary at the ends of subopposite or opposite leaves. Capitula hourglass shaped or campanulate, 6.74 x 2.86 mm, mostly long pedunculate, short pedunculate ones in leaf axils; peduncle upto 1 cm, green, villous with long multicellular hairs and comparatively short capitate glandular hairs, gland tips yellow; bracteoles linear lanceolate, villous. Involucral bracts 5

seriate, persistent, capitula with both red tipped phyllaries and fully green colored phyllaries, hyaline or scarious margins and centre portion green, inner phyllaries equal in length to florets; first phyllary 2.32 mm long, linear lanceolate, pilose with long multicellular hairs and capitate glandular hairs present; second phyllary 3.02 mm long, linear lanceolate, pilose with long multicellular hairs and capitate glandular hairs; third phyllary 3.28 mm long, white portion in the margins is more compared to first and second, centre light green, pilose with long sparsely multicellular hairs, short multicellular hairs and capitate glandular hairs present; fourth phyllary tip reddish purple, pubescent with very long multicellular hairs from centre to tip, fimbriate at tip, 5.921 mm long, linear; fifth phyllary 5.73 mm long, linear, fimbriate at tip, tapering, very narrow green line at centre, others white. Receptacle flat or slightly convex, areolate, glabrous, 2.43 mm wide, epaleaceous. Florets ± 197 no., peripheral female florets, central bisexual florets. Female floret ± 188 no., filiform, corolla tube 4.732 mm long, corolla pale yellowish, 3 to 4 lobed, sparsely hairy on lobes, style arms bifid, unequal, pappus hair reach upto the tip of corolla. Bisexual floret ± 9 no., tubular, corolla tube 4.55 mm long; corolla from centre to tip yellow, lobes dark yellow, other portion whitish yellow, 5 pappillate linear lanceolate lobes with long multicellular and glandular hairs at the lobes, 0.370 mm long, pappus hair reach upto the centre of corolla. Stamen 5, syngenesious; anther 1.42 mm, yellow, apical appendages of almost same length, obtuse to truncate, base with unbranched tails, tail length 0.218 mm, not upto the thickened portion of filament or anther collar; filament 1.28 mm, pale. Style bifid, style arms equal, 0.709 mm long, sweeping hairs reach below the bifurcation, base slightly swollen, attached to ovary by a cylindrical structure which is very narrower than style; ovary 0.998 mm, hairy. Cypselas homomorphic, oblong, 0.918 x 0.278 mm ribbed, 9 ribs, dark brown with pale yellow ribs, straight or curved, pubescent all over the surface, ribbed, 9 ribs. Pappus white, 9-11 ribs, 3.02 mm long, uniseriate, caducous.

Flowering and Fruiting: November-June.

Distribution: India, Jawa, Myanmar, Pakistan and Sri Lanka. In Peninsular India, the species is known from Andhra Pradesh, Gujarat, Maharashtra, Tamil Nadu and Puducherry UT.

Habitat & Ecology: Moist or dry fields.

Specimens examined: **Andhra Pradesh**, Chittoor district, Chandragiri, North Arcot, 26/02/1914, *s.coll.* 10078 (MH). East Godavari district, Samal Kota, 07/01/1917, *s.coll.* 14017 (MH). Guntur district, Cultivated fields near Undavalli caves, 18/01/2020, *M.V. Dilsha* 8635 (DEV). Krishna district, SN Collapalem, 10/03/85, *P. Venkanna* 5548 (MH). Khammam district, Perandapally forest, 250 m, 19/02/1994, *s.coll.* 99000 (MH). Visakapatanam district, Araku towards Jolaput, 950 m, 19/05/1964, *G.V. Subbarao* 19682 (MH). Nandyak district Nandyal, 27/02/1957, *S.K. Wagh* 52499 (BLAT). **Gujarat**, Bharuch district, Broach, 05/01/1955, *G.L. Shah* 1541 (BLAT); *Ibid.*, 05/01/1955, *G.L. Shah* 1542 (BLAT); *Ibid.*, 18/03/1955, *G.L. Shah* 1899 (BLAT); Broach on way to maharubha, 19/03/1955, *G.L. Shah* 1903; Broach main railway line, 28/12/56, *G.L. Shah* 8334 (BLAT); Broach mail railwayline, 28/12/56, *G.L. Shah* 8333 (BLAT); Sama roadsides, 04/11/79, *s.coll.* SNP602 (BARO). **Maharashtra**, Nagpur district: Nagpur, college premise, 03/03/63, *J.A. Paradkar* 37 (BSI). **Puducherry UT**, Karaikal, 11/04/2022, *M.V. Dilsha* 9134 (DEV). **Tamil Nadu**, Coimbatore district, Coimbatore, 1300 m, 01/10/1905, *C.E.C. Fischer* 480 (CAL); Kolathur, 17/01/1906, *C.E.C. Fischer* 845 (CAL); Coimbatore, distillery road, 467m, 07/06/1964, *M. Chandrabose* 28462 (MH). Chennai district, Adyar, *s.d.*, *G Bidie* 4066 (MH); Layola, 03/ 56, *J. Pallithanam* SJ 1329 (RHT). Chengalpattu district, Karikili water fall refuge, 120 m, 27/10/1976, *A.N. Henry* 47082 (CAL, MH); Kanchipuram, Thendarai-Mamallapuram, 10m, 24/02/1999, *K.M.M. & K.T. Augustine* RHT60485 (RHT); Kanchipuram palar bed near Mamandur, 25 m, 04/01/2001, *K.M. Mathew* 72045 (RHT). Cuddalore district, Annamalai Nagar, 1 m, 31/01/1958, *K.M. Sebastine* 5231 (CAL); Bhuvanagiri to Kurinjipadi, 20 m, 12/02/1979, *K. Ramamurthy* 60106 (CAL); Chavadi, South arcot, 04/02/1931, *s.coll.* 5035 (MH); Bhuvanagiri to Kurinjipadi, 20 m, 12/02/1979, *K. Ramamurthy* 60106 (MH); Annamalai nagar, 31/01/1958, *K. M. Sebastine* 5231 (MH); Chidambaram taluk,

Killai, 06/04/1978, *K.M. Mathew* RHT12827 (RHT). Dharmapuri district, Nagamarai, *K. Narayanaswami* 19082 (MH); Morappur, 16/02/1915, *s.coll.* 11632 (MH). Dindigul district, Sirumalai, 18/07/60, *J. Pallithanam* 6470 (RHT). Madurai district, Elamanur, 13/02/1969, *K.M. Mathew* 9988 (RHT); Elamanur, 13/02/1969, *K.M. Mathew* 9992 (RHT). Namakkal district, Namakkal, 100 m, 10/12/1978, *K.M. Mathew* RHT19974 (RHT). Pudukkottai district, Viralimalai, 130 m, 22/01/1985, *C. Arulappan*, 313 (MH). Ramanathapuram district, On the way to Mandapasalai, 75 m, 15/11/89, *V. Balasubramaniam*, 2242 (CAL, MH); Perunazhi, 75 m, 22/02/88, *V. Balasubramaniam*, 1624 (MH); Muthukulathur, 75 m, 21/02/88, *V. Balasubramaniam* 1595 (MH). Salem district, Attur taluk, 800 m, 29/06/1970, *K. Venugopal* 14475 (RHT). Tanjavur district, Mayavaram, 04/11/1989, *S. Ragupathy s.n.* (CAL). Tiruchirappalli district, Uppiliapuram, 300 m, 30/10/1958, *K.M. Sebastine* 7074 (CAL, MH); Kondayampettai, 06/08/1969, *K.M. Mathew* 9967 (RHT); Kondayampettai, 06/02/1969, *K.M. Mathew* 9987(RHT); Edamalaipatty, Puthur, 15/01/1970, *s.coll.* 10924(RHT); Sengalpatty, 720m, 28/07/1970, *K.M. Mathew* 11780 (RHT!); Srirangam, Oosipalam, 70 m, 01/12/1975, *K.M. Mathew* RHT154 (RHT); Trichy taluk, 65m, 05/02/1977, *K.M. Mathew* 6614 (RHT); Lalgudi, 65 m, 04/04/1977, *K.M. Mathew* 7108 (RHT); Lalgudi, 65 m, 17/02/1978, *Perianayagam & Diravian* 11958 (RHT); Srirangam, Thiruvalar solai, 21/02/1978, *s.coll.* 12034 (RHT); Kallakudi, 01/07/1986, *KM Mathew & SJ Britto* 29596 (RHT); Mullaikudi road, 65m, 03/03/1984, *K.M. Mathew & S.J. Britto* 29611 (RHT). Tiruvannamalai district, Tiruvannamalai, Javadi hills, 900 m, 07/12/2002, *K.M. Mathew* 74221 (RHT). Vellore district, Kuppam, 30/04/1914, *s.coll.* 10313 (MH); Vellore, vellingiri hills, Kottur, 900m, 08/09/1999, *K.M.M. & K.T. Augustine* 61001 (RHT); *Ibid.*, Ranipet, 150 m, 28/03/2000, *K.M. Mathew* 71530 (RHT). Thiruvallur district, Thiruvallur, Kattuppalli island, 06/01/2001, *K.M. Mathew* 72141(RHT); *s.l.* 06/03/1899, *C.A. Barber* 211 (MH).

Conservation status: Least Concern.

Notes: This species is quite similar to *B. obliqua* and covers about the same geographical range. Separating the two from herbarium materials is extremely challenging. The upper leaves of *B. bifoliata* are subopposite.

Blumea hirsuta (Less.) M. R. Almeida, Fl. Maharashtra 3A: 79. 2001. ***Pluchea hirsuta*** Less. Linnaea 6(1): 150. 1831. ***Blumea lessingii*** Merr. Enum. Philipp. Fl. Pl. 3: 603. 1923. nom. superfl. ***Blumea hirsuta*** (Less.) King-Jones Englera 23: 120. 2001. nom. superfl. Type: Philippines, Luzon, De Chamisso *s.n.* (Holotype B, probably lost; Isotype P!). **Figs. 13, 14**

Blumea malabarica Hook.f., Fl. Brit. India 3: 267. 1882; Cooke, Fl. Pres. Bombay 2:79. 1958; Fl. Pres. Madras 484. 1921. Type: India, Bababoodan Hills, Law *s.n.* (Lectotype K!, designated by Pornporngrueng *et al.*, 2016).

Blumea clarkei Hook. f., Fl. Brit. India 3: 267. 1882; Randeria, Blumea 10: 252. 1960; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2: 136. 1984; V. S. Ramach. & V.J. Nair, Fl. Cannanore 243. 1988; S. Kumar in Hajra *et al.*, Fl. India 13: 121. 1995; Ratheesh Narayanan, Fl. Stud. Wayanad Dist. 409. 2009. Type: India, Sikkim, Himalaya, Clarke 27269 A (Lectotype K!, designated by Pornporngrueng *et al.*, 2016).

Blumea elongata Prodr. 5: 445 1836. ***Conyza elongata*** Wall., Numer. List, no 3078. 1831. nom. nud. Type: Malaysia, Penang, Wallich Cat. 3078 comp. no. 188 (Holotype G-DC!).

Blumea hongkongensis Vaniot Bull. Acad. Int. Géogr. Bot. 12(158): 22. 1902. Type: China, Hong Kong, R. P. Bodinier 372 (Holotype P!; Isotypes E!).

Perennial herbs, 150 cm. Tap root upto 15 x 0.5 cm wide, small narrow rootlets arise from it, adventitious roots arise where the stem touches the soil. Stem erect, somewhat terete, base woody, reddish brown, pilose, upto 2 cm, generally unbranched, if branched it is from base, base reddish brown, pilose, middle and apex green, pubescent at middle and velutinous at apex with yellowish long multicellular hairs; internodes 3-7 cm. Leaves alternate, simple, upper leaves sessile, lower leaves shortly petiolate; petiole upto 3 cm; laminae oblong lanceolate to oblong linear, 11 x 3 cm, base cuneate, margins distantly dentate or serrate with mucronate teeth, apex acute to apiculate, thick, adaxial pilose and abaxial generally velutinous, upper surface dark green, lower surface whitish green. Inflorescence arranged in terminal

or axillary narrow panicles, upto 50 cm. Capitula slightly hourglass shaped, 10.32 x 5.47 mm, shortly pedunculate; peduncle 5.91 mm long, green, woolly villous with white multicellular hairs; bracteoles linear lanceolate, villous. Involucral bracts 6 seriate, phyllaries same length or shorter than florets, green or purplish tipped; first phyllary linear lanceolate, dorsal surface crowded with long hairs and short capitate glandular hairs; second phyllary 4.623 mm long, hairiness like first phyllary; third phyllary 4.693 mm long; fourth phyllary 6.447 mm long; fifth phyllary 7.554 mm long; sixth phyllary 7.95 mm long, tip fimbriate, hairs not so crowded as the other ones but small hairs present. Receptacle convex, alveolate, densely pilose or villous with long multicellular hairs, 2.53 mm wide, epaleaceous. Florets ± 363 no., peripheral female florets, central bisexual florets. Female floret ± 339 no, filiform, corolla tube 8.97 mm long, pale yellow, lobes 3, glandular, style bifid, equal or unequal, pappus longer than corolla. Bisexual floret ± 24 nos, tubular, corolla tube 5.09 mm long, pappus hair reach upto the corolla lobe; corolla pale yellow, lobes 5, ovate, 0.308 mm, glandular hairs and sparsely long white multicellular hairs. Stamen 5, syngenesious, 3.50 mm; anther 1.59 mm long, yellow, apical appendages of almost same length, obtuse, 0.154 mm, base with unbranched tails, tails equal to or longer than the thickened portion of filament, ± 0.404 mm; filament 1.83 mm long, pale yellow to whitish. Style bifid, arms equal, 0.719 mm long, sweeping hairs reach below bifurcation, style base not swollen, attached to ovary by a ridged structure which is narrower than both ovary and style. Cypselas homomorphic, linear oblong, 0.988 x 0.151 mm, ribbed, light brown, pubescent. Pappus white, 15-17no, uniseriate, 7.62 mm, persistent.

Flowering and fruiting: January-April.

Distribution: The species is distributed in Borneo, China, Andaman Is., Cambodia, India, Laos, Jawa, Malaya, Nepal, Myanmar, Vietnam, Philippines, Sumatera, Sulawesi and Thailand. In Peninsular India, the species is reported from Karnataka, Kerala, Maharashtra, and Tamil Nadu.

Habitat & Ecology: Edges of evergreen forests, or shaded places in forests.

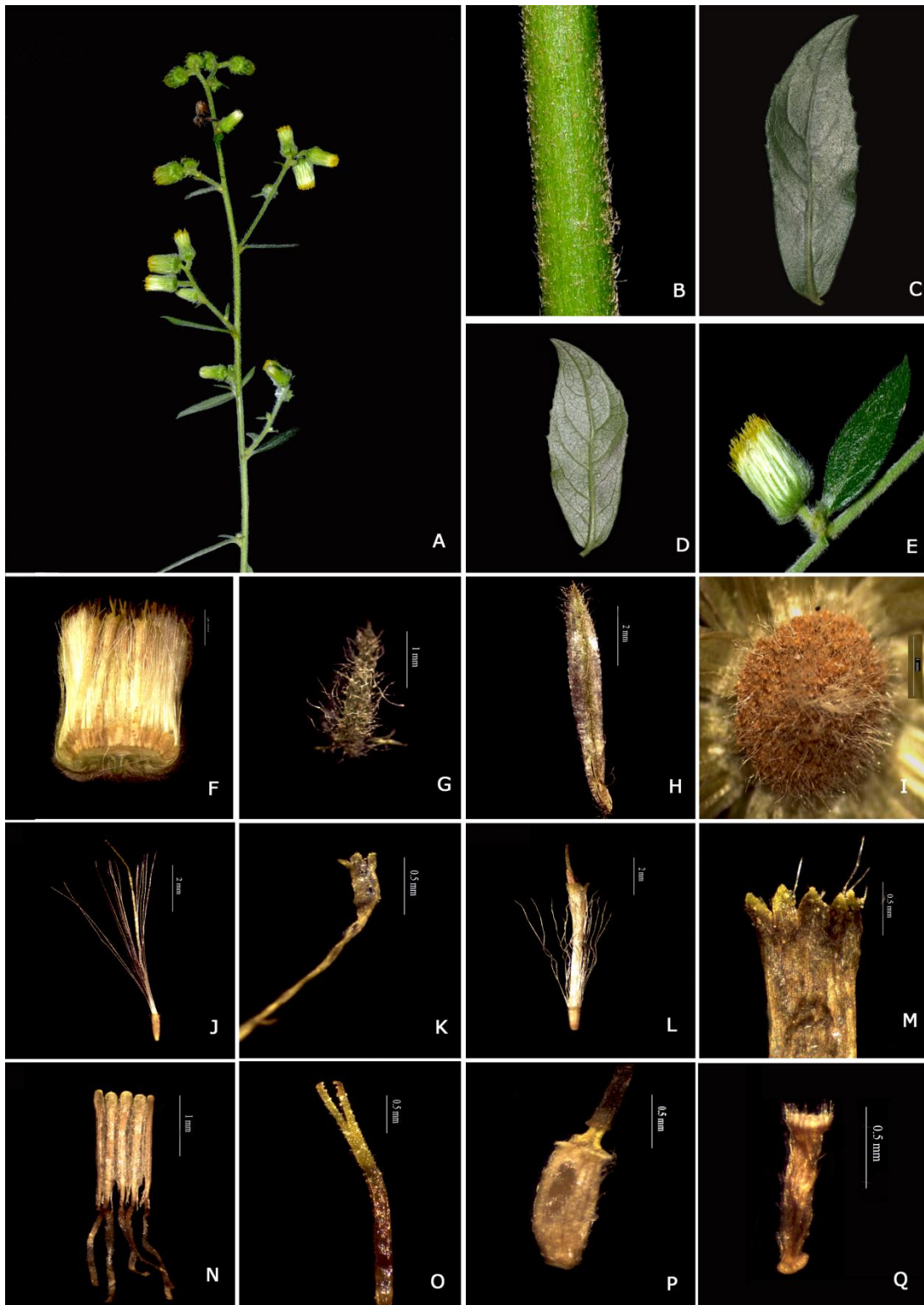


Fig. 13. *Blumea hirsuta* (Less) Almeida.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

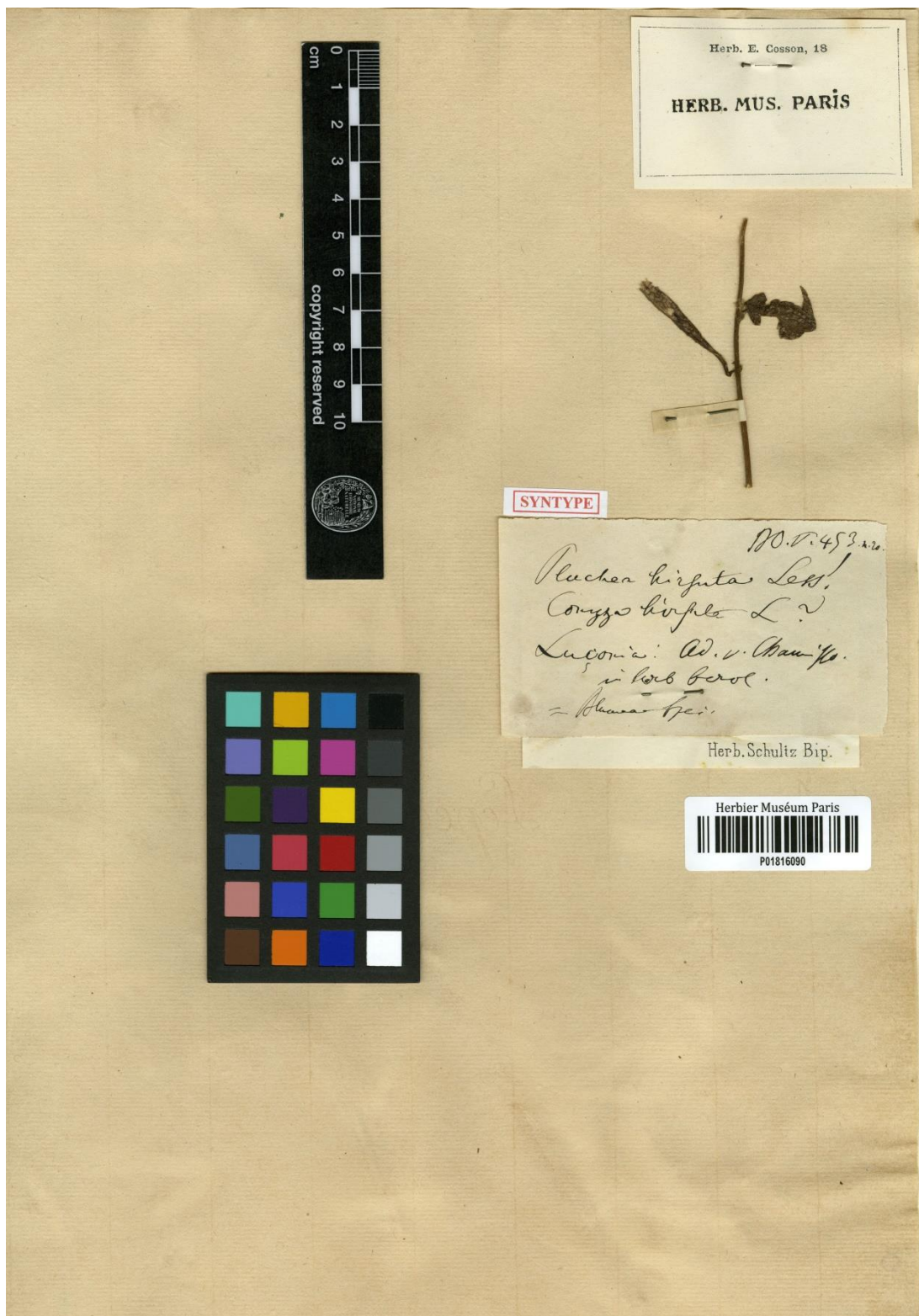


Fig. 14. Type of *Blumea hirsuta* (Less.) M. R. Almeida © Muséum national d'Histoire naturelle, France, Paris.

Specimens Examined: **Karnataka**, Kodagu district, Coorg, 26/11/58, *R.K. Arora*, 45919 (BSI). Mysore district, Karigalgudda near Yedur, 13/02/1963, *R. Sundara Raghavan* 86099 (BSI); Halli, 3500 m, 02/1908, *A. Meebold* 8336 (CAL). **Kerala**, Idukki district, Vazhukkapara to Mlappara, 900 m, 06/02/1981, *N.C. Nair* 69886 (CAL, MH); Okkarai-Thekkady, 850 m, 17/03/1973, *B.D. Sharma* 43905 (MH). Kannur district, Brahmagiri, 05/03/1979, 1000 m, *V.S. Ramachandran* 62135, (CAL, MH). Kozhikode district, Kuppadi-S. Batheri, 900 m, 06/02/1964, *J.L. Ellis* 18531 (MH); Kakkayam, 13/03/2021, *M.V. Dilsha* 8698 (DEV). Palghat district, Way to Poochipara-SVRF, 1100 m, 13/12/1980, *N.C. Nair* 69619 (CAL, MH); Silent Valley, 23/03/2021, *M.V. Dilsha* 8700 (DEV). Wayanad district, Brahmagiri, *s.d.*, *C. Ramesan* 41373 (CALI); Near Pookkode lake, 05/03/2018, *M.V. Dilsha* 6923 (DEV); *Ibid.*, 29/03/2021, *M.V. Dilsha* 9105 (DEV). **Maharashtra**, Mumbai City district, Bombay, Sissi, 20/02/1894, *s.coll., s.n.* (BLAT). **Tamil Nadu**, Nilgiri district, Kariashola-Devala road, 1250 m, 23/01/1961, *B.V. Shetty* 12011 (CAL, MH). Tenkasi District, Thekkumalai-Courtallum, 833 m, 21/03/1958, *K. Subramanyam* 5617 (MH). Tirunelveli district, Kannikatti-Tinnevely, 19/03/1917, *s.coll.* 14655 (MH).

Conservation status: Rare.

Notes: This species is distinguished from others by its narrow paniculate inflorescence, size of capitula and pilose or pubescent receptacle with long white multicellular hairs.

Blumea eriantha DC., Contr. Bot. India (Wight) 15. 1834; Hook. f., Fl. Brit. India 3: 266. 1882; Gamble, Fl. Pres. Madras 482. 1921; Cooke, Fl. Pres. Bombay 2:78. 1958; Randeria, *Blumea* 10(1): 279. 1960; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2:136. 1984; N.P. Singh, Fl. Eastern Karnataka 1: 364. 1988; P. Lakshminarasimhan & B.D. Sharma, Fl. Nasik Dist. 260. 1991; M.J. Kothari & S. Moorthy, Fl. Raigad Dist. 212. 1993; S. Karthikeyan & Anand Kumar, Fl. Yavatmal Dist. 135. 1993; S.D. Deshp. *et al.*, Fl. Mahabaleshwar & Adjoinings 2: 304. 1995; S. Kumar in Hajra *et al.* Fl. India 13: 122. 1995; Pull. & Ali Moulali, Fl. Andhra Pradesh 2: 515. 1997; Sasidh., Fl. Periyar Tiger Reserve 196. 1998; Pull. *et al.*, Fl.

Guntur dist. 200. 2000; M R. Almeida, Fl. Maharashtra. 3A: 78. 2001; S.R. Yadav & Sardesai, Fl. Kolhapur 241. 2002; S.G. Pradhan *et al.*, Fl. Sanjay Gandhi NP 328, 2005; Pull. *et al.*, Fl. Eastern Ghats 3: 228. 2007; Manikandan & Lakshminarasimhan, Fl. Rajiv Gandhi NP 223. 2013. Type: Peninsula India Orientalis, Wight 1435 (Lectotype P!, designated by Randeria, Isolectotypes E!, K!).

Figs. 15, 16

Annual herbs, erect, strongly aromatic, 15-50 cm. Taproot with 3-4 main roots, upto 12 x 0.5 cm, globose woolly buds present in rootlets. Stem erect, terete, branched from base, upper especially inflorescence branches often dichotomously branched, base reddish brown, woody, upto 1 cm thick, globose woolly buds clustered at base, sparsely hairy, others green, villous with long yellowish multicellular hairs and capitate glandular hairs, capitate glandular hairs distantly distributed at lower and middle portions; internodes 1-4 cm. Leaves alternate, simple, lower and upper leaves different, main stem leaves larger than the ones in branches; lower leaves shortly petiolate; petioles 1-2 cm; laminae elliptic obovate, 18 x 6 cm, base cuneate, margin biserrate or dentate with pointed apices, apex acute, thin textured, both surface woolly villous with long multicellular and short capitate glandular hairs, adaxial bright green, abaxial pale green, young leaves leathery white, leaf veins pinnate, craspedodromous, secondary vein spacing uniform; upper leaves subsessile to sessile, smaller, margins serrate dentate with pointed ends, apex acute, young silky villous. Inflorescence terminal or axillary, cymosely paniculate, upto 35 cm long. Capitula campanulate, 6.46 x 6.19 mm, pedunculate; peduncles terete, upto 15.79 mm long, reddish brown or green or reddish patches in green, villous or lanate with yellowish long multicellular hairs and capitate glandular hairs, gland tips yellowish. Involucral bracts 5 seriate, acute to linear, persistent; first phyllary linear acute, 2.41 mm long, pilose with long multicellular hairs, capitate glandular hairs scarcely distributed; second phyllary linear lanceolate, 2.90 mm long, long multicellular hairs and capitate glandular hairs present at the dorsal surface; third phyllary 3.199 mm long, dorsal surface with long multicellular hairs and capitate glandular hairs; fourth phyllary 3.851 mm long, yellow, long multicellular hairs and short capitate

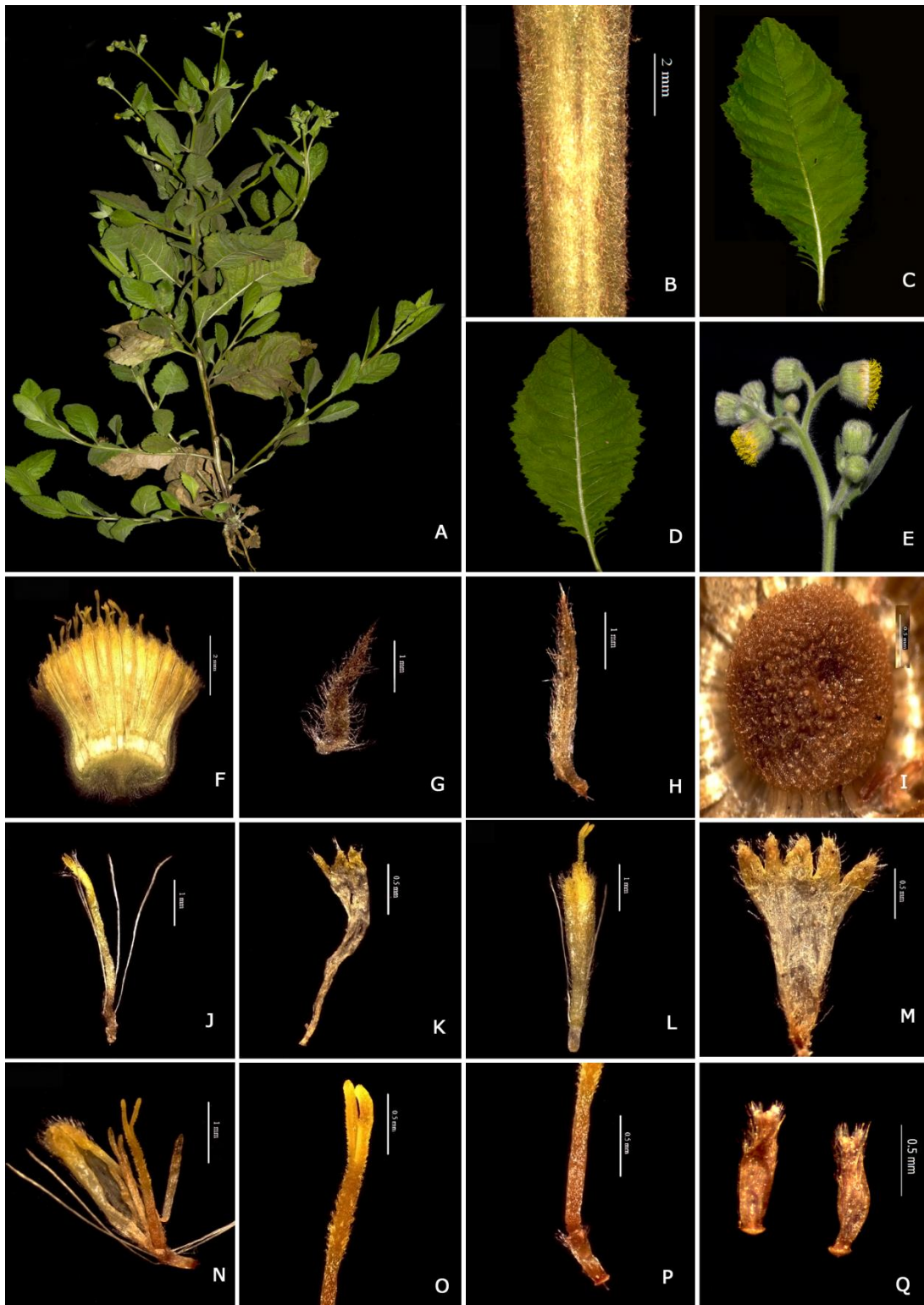


Fig. 15. *Blumea eriantha* DC.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

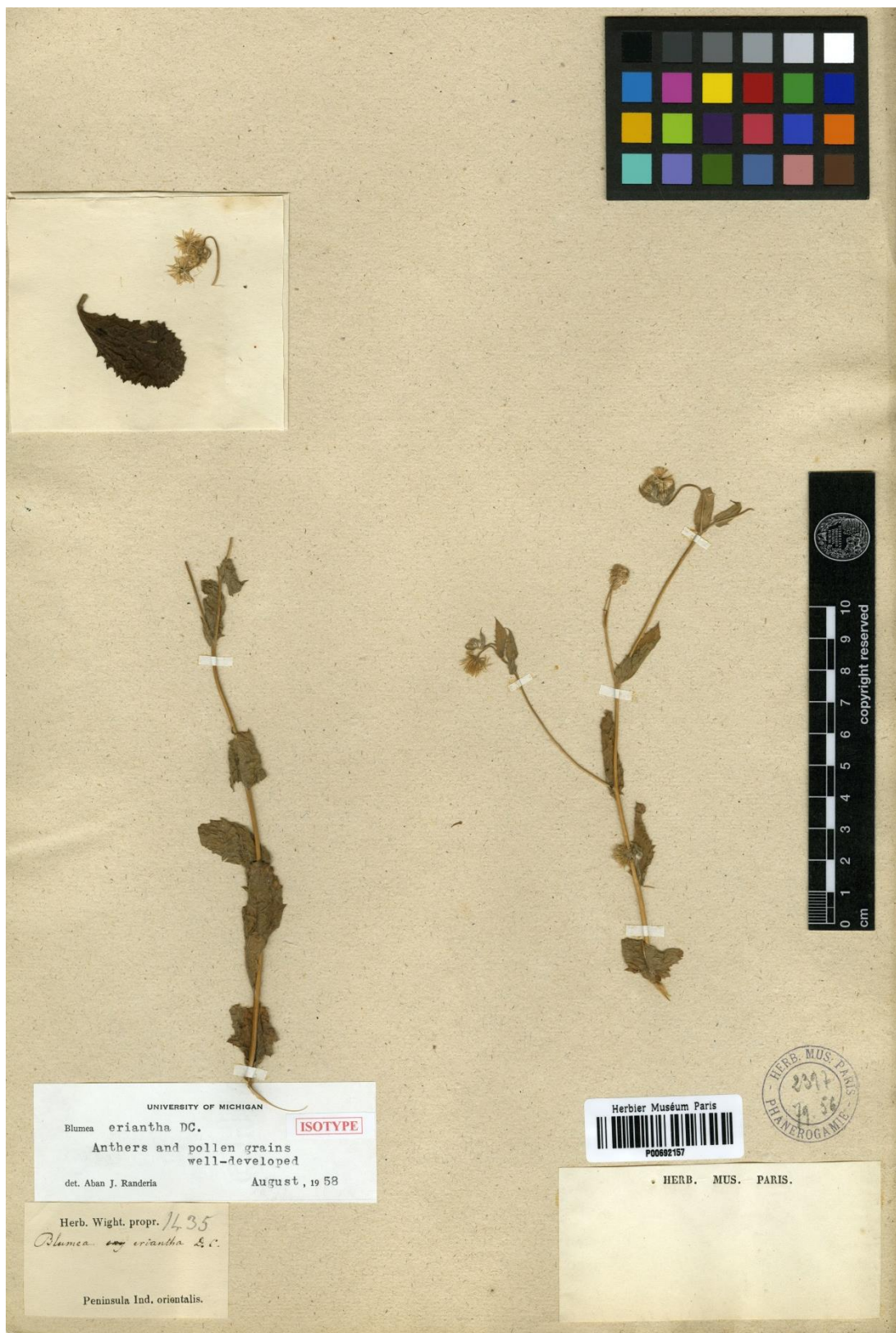


Fig. 16. Type of *Blumea eriantha* DC. © Muséum national d'Histoire naturelle, France, Paris.

glandular hairs, capitate glandular hairs absent or scarce at the base; fifth phyllary 4.163 mm long, long white multicellular hairs and short capitate glandular hairs, capitate glandular hairs scarce at base. Receptacle convex, fimbriate, glabrous, 2.45 mm wide, epaleaceous. Floret ± 555 no., peripheral female florets, central bisexual or with staminodes or sterile anthers. Female floret ± 202 no., filiform, corolla tube 3.23 mm, pale yellow, 3 lobes, triangular, yellow hairy with long multicellular hairs, style bifid, arms equal, 1.03 mm long, pappus length longer than corolla tube. Bisexual floret ± 53 no., tubular, corolla tube 3.35 mm long, pappus hair equal or slightly longer than corolla; corolla yellow, pubescent on entire surface with long multicellular hairs and glandular hairs, 5 lobes, ovate lanceolate, deeply lobed, 0.506 mm, dark yellow. Stamen mostly aborted or as staminodes or fertile 5, syngenesious; anthers shrunk and abortive or fertile, 1.79 mm, yellow, anther apical appendages of same length, obtuse, 0.522 mm, base with unbranched tails; filament pale yellow to whitish. Style bifid, arms equal, 0.679 mm long, arms dark yellow, other pale yellow, sweeping hairs in lobes and below bifurcation upto centre, but hairs present in arms small and not so prominent, style base slightly swollen, attached to ovary by a cylindrical structure same thickness as style. Cypselas homomorphic, oblong to elliptic oblong, 0.723 x 0.162 mm, light brown, straight or curved, pubescent, minutely angled or ribbed, few hairs on the ribs. Pappus white, 7-11, uniseriate, setaceous with hairs, easily detachable or caducous, 3.09 mm.

Flowering & Fruiting: October-March.

Distribution: Andhra Pradesh, Maharashtra, Goa, Karnataka & Gujarat, Endemic to India.

Habitat & Ecology: Roadsides, forest edges and open forests, seen as clumps in all these areas.

Specimens Examined: Andhra Pradesh, Nandyal district, Velgode, 636 m, 20/02/2002, *B. Sadasivaiah & B. Raviprasad Rao* 34045 (BSID); Velugodu, 15/02/1957, *S.K. Wagh* 4813 (BLAT); *Ibid.*, 15/02/1957, *S.K. Wagh* 4814 (BLAT); *Ibid.*, 15/02/1957, *S.K. Wagh* 4815 (BLAT). Warangal district, Pakhal, 300 m,

26/02/1963, *A.N. Henry* 15938 (CAL). **Goa**, North Goa district, Nagargaon, 05/10/64, *RS Raghavan* 103266 (BSI); South Goa district, Collem along the railway line, 02/02/2018, *M.V. Dilsha* 6911 (DEV). **Gujarat**, Bharuch district, Broach river bed, 18/03/56, *G.L. Shah* 7007 (BLAT); *Ibid.*, 18/03/56, *G.L. Shah* 7006 (BLAT); Broach along Seveshwar road, 18/03/1955, *G.L. Shah* 1917 (BLAT); Broach meter gauge railway line, 17/03/56, *G.L. Shah* 6955 (BLAT); Broach meter gauge railway line, 17/03/56, *G.L. Shah* 6972 (BLAT). Dang district, Waghai, east of rest house, Dangs forest, 13/03/54, *Santapau* 18454 (BLAT); Waghai, east of rest house, Dangs forest, 13/03/54, *H. Santapau* 18453 (BLAT); Unai along railway line eastwards Dangs, 04/11/53, *H. Santapau* 17331 (BLAT); *Ibid.*, 04/11/53, *H. Santapau* 17330 (BLAT); *Ibid.*, 04/11/53, *H. Santapau* 17332 (BLAT); Waghai dangs, 13/03/54, *H. Santapau* 18449 (BLAT); *Ibid.*, 13/03/54, *H. Santapau* 18452 (BLAT). Surat district, Surat, 02/05/1957, *S.K. Jain* 17202 (BSI); Surat near Sapti bridge, 02/05/1957, *S.K. Jain* 17202(BSI). Vadodara district, Baroda-Kandi bans road, 10/04/1955, *G.L. Shah* 3010 (BLAT); Baroda college campus, 25/03/1955, *G.L. Shah* 1996 (BLAT); Baroda, Kandi Bang road, 24/03/1955, *s.coll.* 1966 (BLAT). **Karnataka**, Golpally RF, 14/02/1975, *N.P. Singh* 129594 (BSI). **Maharashtra**, Ahmednagar district, Ratanwadi, 03/10/70, *B.M. Wadhwa* 128109 (BSI). Chandrapur district, Palgaon, *s.d.*, *M.M. Sardesai* 519 (SUK). Jalgaon district, Yawal, 15/03/1957, *S.D. Mahajan* 13198 (BSI). Kolhapur district, Near Kolhapur, 06/05/1904, *R.K. Bhide* 21761 (BLAT); Amba ghat, Kolhapur, 11/02/2018, *M.V. Dilsha* 6916 (DEV). Nashik district, Ghat top near Igatpuri, 05/06/1968, *K.V. Billore* 116168 (CAL); Igatpuri, 23/03/1984, *P.L. Narasimhan* 16634 (BSI); *Ibid.*, 27/12/58, *G.L. Shah* 10091 (BLAT); *Ibid.*, 26/12/58, *G.L. Shah* 10069 (BLAT); *Ibid.*, 27/12/1958, *Y.A. Merchant* 815 (BLAT); *Ibid.*, 26/12/1958, *Y.A. Merchant* 799 (BLAT!); Trimbak, 03/02/1983, *P.L. Narasimhan* 165309 (BSI); Pratapgad, 12/02/1983, *P.L. Narasimhan* 165435 (BSI); Anjaneri hill, 20/03/1984, *P.L. Narasimhan* 166322 (BSI). Mumbai City district, Malabar hill, Bombay, 30/03/1883, *C.B. Clarke* 33340, (CAL); Bombay, 11/1916, *E. Blatter* 14445 (BLAT); Railway line, Bombay, 12/1924, *R.D. Aclaud* 588 (BLAT). Mumbai Suburban district, Malad, 20/02/1955, *G.L. Shah* 1677 (BLAT); Malad-Kandivali,

04/12/56, *G.L. Shah* 8158 (BLAT); Malad-Ghodbunder road, 03/12/1954, *G.L. Shah* 1141, (BLAT); Malad on way to hills, 03/12/57, *G.L. Shah* 9557 (BLAT!); National park borivali, 26/03/1952, *s.coll.* 246 (BLAT); *Ibid.*, 26/11/1952, *A.J. Randeria* 491 (BLAT); *Ibid.*, 15/03/1952, *A.J. Randeria* 232 (BLAT); *Ibid.*, 09/02/1952, *A.J. Randeria* 182 (BLAT); *Ibid.*, 09/01/1954, *A.J. Randeria* 593 (BLAT); Central dairy along Borivali road, 27/03/1958, *S.C. Tavakari* 984 (BLAT). Palghar district, Jhanjroli-Palghar, 05/04/59, *P.S. Tour* 51766 (BSI). Pune district, Khandala, 26/11/45, *H. Santapau* 8098 (BLAT); *Ibid.*, 16/04/56, *H. Santapau* 20362 (BLAT); *Ibid.*, 23/10/1942, *H. Santapau* 1200 (BLAT); *Ibid.*, 16/04/56, *H. Santapau* 20382 (BLAT); *Ibid.*, 31/10/44, *H. Santapau* 5432 (BLAT); Khandala, St. X Ravine, 16/04/56, *H. Santapau* 20362 (BLAT); *Ibid.*, 16/04/56, *H. Santapau* 20363 (BLAT); Khandala plains, 26/01/51, *H. Santapau* 12129 (BLAT); Khandala, along Tatas pipes, 16/04/56, *H. Santapau* 20402 (BLAT); Khandala along Tatas pipes, 16/04/56, *H. Santapau* 20399 (BLAT); *Ibid.*, 16/04/56, *H. Santapau* 20397 (BLAT); *Ibid.*, 16/04/56, *H. Santapau* 20402 (BLAT); *Ibid.*, 16/04/56, *H. Santapau* 20400 (BLAT); Khandala, St X Ravine, 16/04/56, *H. Santapau* 20393 (BLAT); *Ibid.*, 16/04/56, *H. Santapau* 20395 (BLAT); *Ibid.*, 16/04/56, *H. Santapau* 20373 (BLAT); Khandala plains behind hotel, 26/01/51, *H. Santapau* 12125 (BLAT!); Cultivated fields near Pune, 29/01/1965, *B. Venkata Reddy* 95745 (CAL); Khandala, echo point, 19/03/44, *H. Santapau* 3865 (BLAT); Khandala Behravi's plot, 27/01/51, *H. Santapau* 12175 (BLAT); Khandala, 13/03/44, *H. Santapau* 3704 (BLAT); Khandala, railway line, 02/06/46, *H. Santapau* 9099 (BLAT); Khandala, monkey hill, 14/04/46, *H. Santapau* 8817 (BLAT); Khandala reversing station, 05/1908, *Blatter* 20453 (BLAT); Kuna hill, Lonavla, 06/05/56, *S.K. Jain* 946 (BSI); Bhovargiri (Khed taluka), 18/04/61, *K.P. Janardhanan* 69638 (BSI); Ambavne, 19/03/1963, *Seshagiri Rao Rolla* 87419 (BSI); Thulajadevi caves, miles west of Junnar, 29/03/1964, *K. Hemadri* 98103 (BSI); Bhimashankar, 3500 ft, 10/03/56, *V.D. Vartak* 3541 (AHMA); *Ibid.*, 3500 ft, 10/03/56, *V.D. Vartak* 3542 (AHMA); Choura hill, Bhimasankar, 07/04/62, *K.P. Janardhanan* 76608A (BSI); Bhorgiri (Khed taluka), 18/04/61, *K.P. Janardhanan* 69638 (BSI); *Ibid.*, 22/02/61, *K.P. Janardhanan* 69122 (BSI); Foot of shinga hill (khed taluk), 27/11/61, *K.P. Janardhanan* 75875 (BSI); Foot of Kandeswar hill

(Khed taluk), 25/01/61, *K.P. Janardhanan* 66475 (BSI); Bhorgiri along the river bed, 24/12/60, *K.P. Janardhanan* 70080 (BSI); Bhorgiri, 22/02/61, *K.P. Janardhanan* 69122 (BSI); Bhadalwadi, 07/01/1965, *M.Y. Ansari* 104778, (BSI); Bhor near Nira river, 24/04/56, *S.K. Jain* 580 (BSI); Cultivated fields near PWD rest house, Paud, 19/03/1963, *Seshagiri Rao Rolla* 87202 (BSI); Inglun-Shivadi Khurd-Junnar, 13/01/1965, *K. Hemadri s.n.* (BSI); Inglun, Junnar, 19/01/1966, *K. Hemadri* 108155 (BSI); Fields at the foot of Shiva hill (Khed taluk), 12/12/61, *K. Janardhanan* 76535 (BSI); Khandala near shingaroba temple, 21/03/1956, *S.K. Jain* 10 (BSI); Bhivadekhurd, Junnar, 20/01/1966, *K. Hemadri* 108179 (BSI); *Ibid.*, 20/01/1966, *K. Hemadri* 259 (BSI!); Pusandhar hills, Pune, 28/12/44, *H. Santapau* 5717 (BLAT); Sinhagad, 3000 ft, 01/04/57, *V.D. Vartak* 8294 (AHMA); Cultivated fields near Pavna dam, 25/12/2019, *M.V. Dilsha* 8617 (DEV); *Ibid.*, 09/01/2022, *M.V. Dilsha* 9121 (DEV); Cultivated fields near Karla caves, 26/12/2019, *M.V. Dilsha* 8623 (DEV); *Ibid.*, 09/01/2022, *M.V. Dilsha* 9123 (DEV); Vadgaon, 08/01/2022, *M.V. Dilsha* 9118 (DEV). Raigad district, Cultivated fields, Kharghar, 28/12/2019, *M.V. Dilsha* 8629 (DEV). Satara district, Mahabaleswar, 4500 ft, *s.d.*, *L.J. Sedgwick & T.R.D. Bell* 4582 (CAL); Kas plateau, *s.d.*, *M.M. Lekhak* 319 (SUK); Mahabaleswar, 24/12/1957, *Y.A. Merchant* 493 (BLAT); *Ibid.*, 12/03/60, *H. Santapau* 23401 (BLAT). Thane district, Sidgad hill slope, 12/04/1968, *K.V. Billore* 113874 (CAL); Thana range, Deevdhani hill, near Mandi range, 18/01/1968, *K.V. Billore* 113641 (CAL); Palghar range, 15/01/1968, *K.V. Billore*, 113562 (CAL); Near Sukatanda village, 27/10/1967, *K.V. Billore* 113070 (CAL); Thana, near Dakhanba, Warhale range, 15/10/1967, *K.V. Billore* 111883 (CAL); Kalu river near Baprai, 07/06/67, *s.coll.* 110827 (BSI); Thana, Along vaitarna river, 28/10/67, *K.V. Billore* 113272 (BSI); Thana, Jeevdhani hill, 18/01/68, *K.V. Billore* 113641 (BSI); Thana, Sadruja ghat, Totkaveda range, 17/04/68, *K.V. Billore* 113962 (BSI); Thana, near sukatamba village, Sawa range, 27/10/67, *K.V. Billore* 113070 (BSI); Thana, 08/12/45, *H Santapau* 8156 (BLAT); Badlapur near Kalyan, 27/02/54, *Santapau* 18085 (BLAT); Shivansai, 05/12/1960, *N.Y. Das* 2868 (BLAT); *Ibid.*, 05/12/1960, *N.Y. Das* 2807 (BLAT); *Ibid.*, 05/12/1960, *NY Das* 2808 (BLAT). Ganeshpuri, 13/04/83, *K.C. Koshy* 1683 (TBGT); Kalwa, 23/11/1957, *S.C. Tavakari* 226

(BLAT); Belapur, 28/12/2019, *M.V. Dilsha* 8627 (DEV). Ratnagiri district, Palgadh, 05/04/59, *P.S. Terir* 51766 (BSI); Khed, 10/1922, *R.D. Aclaud* 566 (BLAT). Raigad district, Matheran lake view, 28/01/57, *G.S. Puri* 9805 (BSI); Matheran to Neral, 06/12/1958, *N.A. Irani* NI2611 (BLAT); Matheran neral, 31/01/1959, *N.A. Irani* NI2841 (BLAT); Matheran water pipe, 13/12/1958, *N.A. Irani* NI2658 (BLAT); Neral-Jumma patti, 14/01/1959, *N.A. Irani* NI2805 (BLAT); Neral to water pipe, 17/11/1958, *N.A. Irani* NI2449, (BLAT); Waterpipe-jumma patti, 20/12/1958, *N.A. Irani* NI2698 (BLAT); Karjat, 20/11/53, *H. Santapau* 17426 (BLAT). Sindhudurg district, Junabazar, Sawantwadi, 01/01/1978, *S.M. Almeida* 1422 (BLAT).

Conservation status: Least Concern.

Notes: This species have affinities with *B. oxyodonta* and *B. malcolmii*. In contrast to *B. oxyodonta*, the corollas of *B. eriantha* are densely hairy on the outside, both on lobes and corolla tubes. *B. malcolmii* is more woolly and dichotomously branched. The anthers are not abortive in *B. malcolmii*.

Blumea fistulosa Kurz., J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 46(2): 187. 1877; Randeria, *Blumea* 10(1): 256. 1960; S. Kumar in Hajra *et al.*, Fl. India 13: 124. 1995; S.D. Deshp. *et al.*, Fl. Mahabaleshwar & Adjoinings 2: 304. 1995; Pull. & Ali Moulali, Fl. Andhra Pradesh 2: 515. 1997; K.M. Matthew, Fl. Palni hills 2: 667. 1999; M. R. Almeida, Fl. Maharashtra. 3A: 78, 2001; G.V. Subbarao & G.R. Kumari, Fl. Visakhapatnam Dist., 1: 438. 2002; Pull. *et al.*, Fl. Eastern Ghats 3: 231. 2007. *Conyza fistulosa* Roxb. Fl. Ind. 3: 429. 1832. Type: Roxburgh Flora Indica drawing no. 428 (K!), Lectotype designated by Pornporngrueng *et al.*, 2016).

Figs. 17, 18

Blumea glomerata DC. Contr. Bot. India 15. 1834; Gamble, Fl. Pres. Madras 483. 1921; Cooke, Fl. Pres. Bombay 2:76. 1958; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2: 136. 1984. *Conyza glomerata* Wall. Numer. List, no 3055. 1831. nom. nud. Type: Myanmar, Prome, Wight Cat. 1434 (Lectotype K!, designated by Dilsha & Satheesh, 2021)

Blumea leptoclada DC. Prodr.5: 443. 1836. ***Conyza glomerata*** var. C Wall. Numer. List, no 3055 C. 1831. nom. nud. Type: Nepal, Wallich Cat. 3055 comp. no. 165C (Holotype G-DC!; Isotypes K-W! sheet C, E!, GH drawing and fragment).

Blumea purpurea DC. Prodr. 5: 443. 1836. ***Conyza purpurea*** Buch. -Ham. in Wall. Numer. List, no 3076. 1831. nom. nud. Type: India, Rajamahal hills, Wallich Cat. 3076, comp. no. 186 (Holotype G-DC!; Isotype K-W!).

Blumea racemosa DC. Prodr. 5: 442. 1836. ***Conyza racemosa*** Wall. Numer. List, no 3002. 1831. nom. nud. Type: Nepal, Naokate, Wallich Cat. 3002, comp. no. 112 (Holotype G-DC!; Isotypes BM!, E!, K-W!).

Blumea spinellosa DC. Prodr. 5: 443. 1836. ***Conyza sericea*** Wall., Numer. List, no 3021. 1831. nom. nud. Type: Myanmar, Prome, Wallich Cat. 3021, comp. no. 131 (Holotype G-DC!; Isotypes GH, K-W!).

Blumea amethystina Hance, J. Bot. 6: 173. 1868. Type: China, Guangdong, T. Sampson 12815 (Holotype K!; Isotype GH!).

Blumea nodiflora Hook.f., Fl. Brit. India 3: 262. 1882. Type: Myanmar, Tenasserim, Griffith *s.n.* (Lectotype K!, designated by Pornporngrueng *et al.*, 2016).

Annual erect herbs, upto 1 m tall. Fibrous roots, thin delicate roots, upto 15 cm. Stem simple or branched, erect, ridged or grooved, base woody, reddish brown, glabrous or sparsely hairy at base, others green, 0.943 mm thick, velutinous or villous with long yellowish multicellular hairs and capitate glandular hairs, tip of capitate glandular hair yellow; internodes 2-4 cm. Leaves alternate, simple, lower and upper leaves different; lower leaves petiolate or subsessile; petiol upto 5 cm long; laminae lanceolate or ovate lanceolate, sinuate toothed, 7 x 3.5 cm, base prolonged tapering, margins serrate dentate with pointed or mucronate toothed, apex acute to attenuate, upper surface bright green, sparsely hairy or hairs distantly placed, lower surface pale green, pilose or tomentose or sometimes woolly with long multicellular hairs; upper leaves sessile, elliptic lanceolate, 4 x 1.5 cm. Inflorescence terminal and axillary interrupted spiciform panicles, arranged in compact globose cluster, 10-30 cm. Capitula campanulate, 5.86 x 3.2 mm, sessile or subsessile;

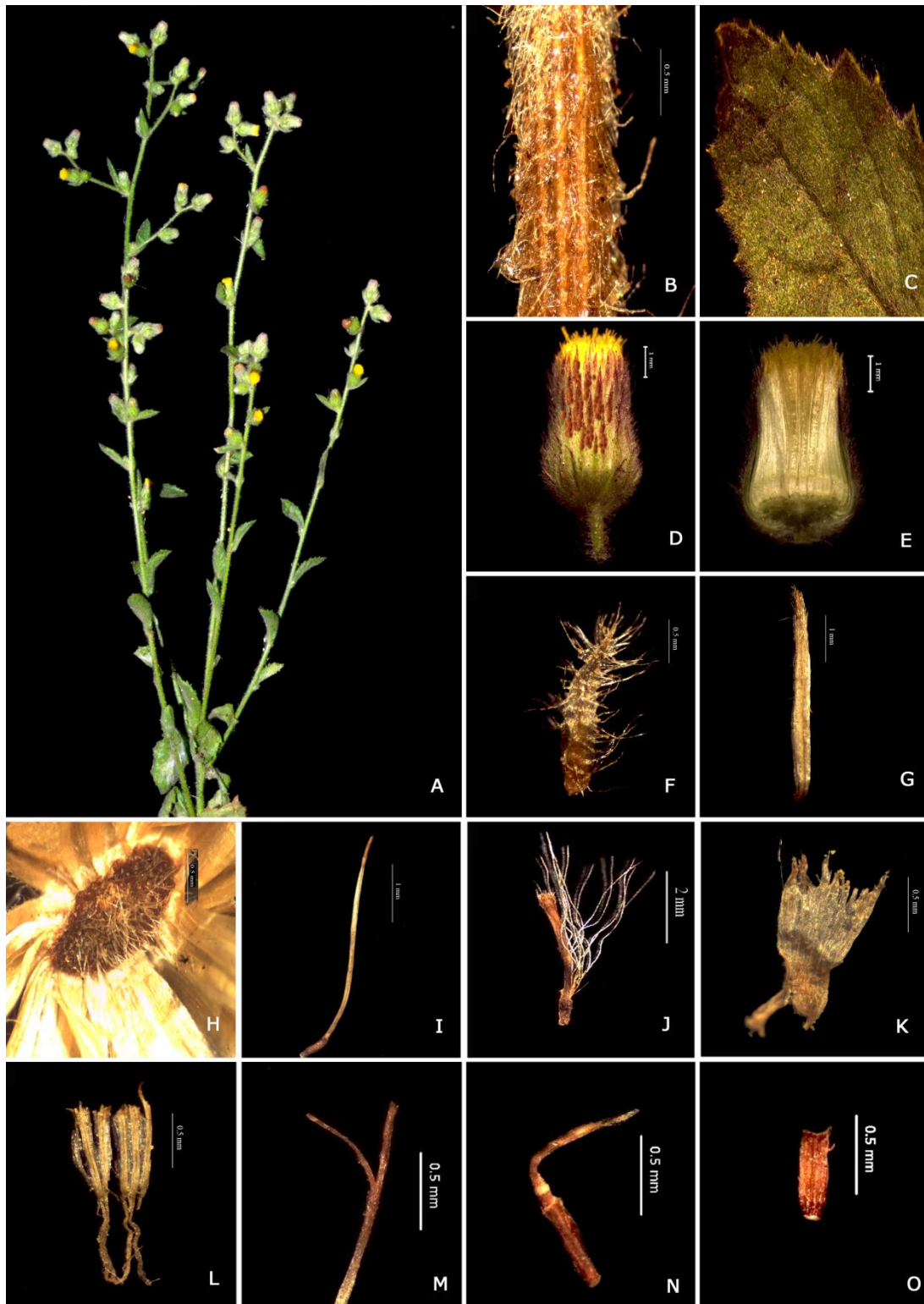


Fig. 17. *Blumea fistulosa* Kurz. A. Habit; B. Stem; C. Leaf adaxial side; D. Capitula; E. LS of capitula; F. Outer phyllary; G. Inner phyllary; H. Receptacle; I. Female floret; J. Bisexual floret; K. Bisexual floret corolla; L. Stamens; M. Bisexual floret style; N. Bisexual floret ovary attached to style; O. Cypsela.



Fig. 18. Type of *Blumea fistulosa* Kurz. © The Board of Trustees of the Royal Botanic Gardens, Kew.

peduncles 0-0.5 mm long, green or purple, villous or woolly with long multicellular hairs and capitate glandular hairs. Involucral bracts 5 seriate, persistent, reddish purple or reddish purple at least at margins or upper portion, slightly longer than florets; first phyllary 1.982 x 0.344 mm, ovate lanceolate, apex acute, villous with long multicellular hairs and comparatively short capitate glandular hairs; second phyllary 2.36 x 0.681 mm, elliptic lanceolate or oblong, basal portion glabrous or scarcely hairy, margin ciliate; third phyllary 3.26 x 0.753 mm, elliptic lanceolate, tip ciliate, others scarcely hairy, capitate glandular hairs rare, scarious margins; fourth phyllary 4.117 x 0.625 mm, tip ciliate, elliptic lanceolate, scarious margins; fifth phyllary linear lanceolate, 4.61 x 0.340 mm, tip ciliate, glabrous or scarcely hairy. Receptacle flat, alveolate, densely pilose or villous with long white multicellular hairs, 1.89 mm, epaleaceous. Florets ± 239 no., peripheral female florets, central bisexual florets. Female floret ± 223 no, filiform, corolla tube 2.91 mm long, yellow, 3 lobes, glabrous or rarely glandular hairs on lobes, style bifid, arms equal, pappus longer than floret. Bisexual floret ± 16 no, tubular, corolla tube 1 mm, pappus reach upto the starting of corolla lobe; corolla yellow, whitish to base, 5 lobes, narrowly triangular or linear lanceolate, 0.364 mm, unicellular and glandular hairs present, corolla tube glabrous. Stamen 5, yellow, syngenesious; anther 1.09 mm, yellow, apical appendages of same length, rounded or obtuse, 0.106 mm, base with unbranched tails, tail length shorter or equal to the thickened portion of filament or anther collar; filament 0.894 mm, pale yellow or translucent to base. Style bifid, arms equal, 0.445 mm, yellow, others pale yellow or whitish or translucent, base slightly swollen, attached to ovary by a cylindrical structure narrower than both ovary and style. Cypselas homomorphic, linear oblong, 0.507 x 0.117 mm, ribbed, 6-10 ribs, brown, straight, hairy. Pappus white, uniseriate, 12-15 no, caducous or easily detachable, 3.02 mm long.

Flowering & Fruiting: January-April.

Distribution: India, Bangladesh, China, Cambodia, Laos, Nepal, Myanmar, Philippines, Vietnam, and Thailand. In Peninsular India, the species is reported in the states of Andhra Pradesh, Tamil Nadu, and Maharashtra.

Habitat & Ecology: Open grasslands, forest edges, disturbed places in forests, dry evergreen forests.

Specimens Examined: Andhra Pradesh: East Godavari district, Maredumilli to Devarapalli, 500 m 20/02/1994, *M. Mohanan* 101299 (BSID, MH); *Ibid.*, 500 m, 20/02/1994, *M. Mohanan* 101302 (BSID); *Ibid.*, 500 m, 20/02/1994, *M. Mohanan* 101298 (BSID, MH). Visakapatnam district, Mettur, 625 m, 20/12/1967, *G.V. Subbarao* 29560 (MH). **Tamil Nadu,** Kodaikanal district, Kodaikanal, Palamalai-Iruttaru, 1200 m, 13/01/1987, *K.M. Mathew* 63956 (RHT); *Ibid.*, 24/02/2022, *M.V. Dilsha* 9129 (DEV); Palani hills, Palamalai cattle track to Iruttara, 1250 m, 13/01/1987, *K.M. Mathew* 48329 (RHT).

Conservation status: Least Concern.

Notes: The species is easily identified by its spiciform inflorescence that is interrupted and its involucre bracts, which are either bright or dark purple in colour.

Blumea hieraciifolia (D. Don) DC. in Wight, Contr. 15. 1834; Wight, Icon. Pl. Ind. Orient. 3(2): t.1099. 1846; Hook. f., Fl. Brit. India 3: 263. 1882; Gamble, Fl. Pres. Madras 483. 1921; Randeria, *Blumea* 10(1): 246. 1960; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2:136. 1984; S. Kumar in Hajra *et al.*, Fl. India 13: 125. 1995; M R. Almeida, Fl. Maharashtra. 3A: 78. 2001. *Erigeron hieraciifolium* D. Don, Prodr. Fl. Nep. 272, 1825. *Conyza hieraciifolia* Spreng., Syst. Veg., 3: 514. 1826. A. P. de Candolle, Prodr. 5. 442. 1836 in syn. *Placus hieraciifolius* (Spreng.) Kuntze. Revis. Gen. Pl. 1: 357. 1891. Type: Nepal, Hamilton *s.n.* (Holotype BM).

Fig. 19

Conyza communis Wall. Numer. List, no. 3018. 1831.nom. nud. Type: Wallich Cat. 3018. comp. no. 128 (Holotype G-DC!; Isotypes K-W!, E!).

Blumea cernua DC. Prodr. 5: 436. 1836. *Conyza nutans* Buch. -Ham. in Wall. Numer. List, no. 3080. 1831.nom. nud. Type: India, Wallich Cat. 3080, comp. no. 190 (Holotype G-DC!; Isotype K-W!).



Fig. 19. *Blumea hieraciifolia* (D.Don) DC. A. Habit; B. Capitula; C. Peduncle; D. L.S of Capitula; E. Outer phyllary; F. Inner phyllary; G. Receptacle; H. Female floret; I. Bisexual floret; J. Bisexual floret corolla; K. Bisexual floret corolla showing hairs; L. Stamens; M. bisexual floret style, N. Bisexual floret ovary attached to style; O. Cypsela.

Blumea barbata DC. var. *sericans* Kurz, Jour. Asiatic Soc. 2: 188. 1877. *Blumea sericans* (Kurz) Hook. f., Fl. Brit. India 3: 262. 1882. Type: Bangladesh, Chittagong, Clarke 19783 (Lectotype K!, designated by Pornporngrueng *et al.*, 2016).

Annual herbs, 10-120 cm. Taproots. Stem erect, generally unbranched, terete, densely silky villous to lanate (particularly in younger shoots) with long multicellular hairs, absence of capitate glandular hairs, reddish purple to green. Leaves alternate, upper and lower leaves different; lower leaves petiolate, often larger than upper, usually crowded at base, petioles 0.3-3.5 cm long, laminae lanceolate or elliptic, 2-8 x 0.5-2 cm, base attenuate, margins serrate dentate with pointed ends, apex acute, densely sericeous to lanate adaxially, silky villous abaxially; upper leaves sessile, few, elliptic to obovate, both surfaces densely villous with long multicellular hairs. Inflorescence terminal and or axillary, large globose or dense interrupted spicate inflorescence. Capitula campanulate, sessile, 6.97 x 5.93 mm, heterogamous. Involucral bracts 5 seriate, purple tipped, longer than florets; outer phyllary oblong lanceolate, woolly with long multicellular hairs and capitate glandular hairs, purple tipped, 3.87 x 1.21 mm; inner phyllary linear lanceolate to linear, pilose with long multicellular hairs, tip ciliate, absence of capitate glandular hairs, 1.72 x 0.230 mm. Receptacle slightly convex, alveolate, glabrous, 2.20 mm wide, epaleaceous. Floret numerous, peripheral female florets, central bisexual florets. Female floret filiform, corolla tube 3.66 mm long, pappus slightly longer than floret, 3 lobed, glabrous, style bifid, arms equal. Bisexual floret tubular, corolla tube 3.14 mm long, pappus length upto the size of corolla; corolla yellow, corolla tube glabrous, 5 lobes, 0.307 mm, lanceolate, sparsely multicellular hairs and glandular hairs in lobes. Stamen 5, syngenesious; anther 1.56 mm, yellow, apical appendages almost of same length, acuminate, base with unbranched tails, tail length equal to or longer than the thickened portion of filament, filament white. Style bifid, arms equal, 0.283 mm long. Cypselas homomorphic, 0.963 x 0.188 mm, oblong, ribbed, straight, sparsely pubescent. Pappus white, uniseriate, 10-13 no, 3.07 mm long, persistent

Flowering & Fruiting: September-May.

Distribution: India, Bangladesh, China, Cambodia, Jawa, Philippines, Nepal, Laos, Myanmar, New Guinea, Sri Lanka, Vietnam, Thailand, and Taiwan. In Peninsular India, the species is reported from Karnataka and Tamil Nadu.

Habitat & Ecology: Grasslands in dry evergreen forests.

Specimens Examined: **Karnataka**, Mysore district, Devagiri betta, 17/04/1962, A.S. Rao 80024 (CAL). **Tamil Nadu**, Coimbatore district, Konalar, 1825 m, 19/02/1980, M. Chandrabose 65860 (MH). Dindigul district, After pulneys, 6400 m, 10/09/1911, C.E.C. Fischer 2961 (CAL). Nilgiris district, Pykara river banks, Pykara, 1975 m, 21/05/1971, J.L. Ellis 38496 (MH).

Conservation status: Data Deficient (DD).

Notes: Study of this species is based on herbarium materials only as we couldn't trace it from its reported localities. The plants are usually unbranched and leaves are mostly radical and a few cauline. This species is most variable and two other varieties are recognised.

Blumea hieraciifolia var. *hamiltonii* (DC) Clarke, Comp. Ind. 82. 1876; Randeria, *Blumea* 10(1): 249. 1960; S. Kumar in Hajra *et al.*, Fl. India 13.126. 1995; K.M. Matthew, Fl. Palni Hills 2: 667. 1999. *Gnaphalium hamiltonii* Wall., Numer. List, no. 3099. 1831. nom.nud. *Blumea hamiltonii* DC. Prod. 5: 439. 1836. *Conyza necessaria* Buch. -Ham. ex DC. Prodr. 5: 439. 1836. in syn. Type: India, Wallich 2938 (Lectotype K!, designated by Dilsha & Satheesh, 2021).

Figs. 20, 21

Blumea cavaleriei H. Lév. & Vaniot, Repert. Spec. Nov. Regni Veg. 7: 22. 1909. Type: China, Yunnan, Chevalier 3302 (Holotype P, not seen; Isotypes E!, K).

Annual herbs, 3- 30 cm. Root fibrous, upto 7 cm. Stem erect, simple or branched from base, green, 138 mm wide, grooved or furrowed, tomentose with long multicellular hairs, absence of capitate glandular hairs, axis densely silky villous;

internodes 2-6 cm. Leaves alternate, simple, sessile; lower leaves 4 x 2 cm, laminae oblanceolate to lanceolate or spatulate, base attenuate or cuneate, margin irregularly serrate dentate, apex acute, upper surface glabrescent, dark green, lower velutinous with glandular and non-glandular hairs, whitish; upper leaves usually few, linear to elliptic, densely silky villous. Inflorescence terminal or in upper axils, globose compact and or axillary with 2-3 capitula. Capitula campanulate, 6 x 5.93 mm, sessile, heterogamous. Involucral bracts 5 seriate; outer phyllaries lanceolate or oblanceolate, 3.08 x 0.654 mm, tip ciliated, woolly; inner phyllaries linear lanceolate-linear, 5.68 x 0.386 mm, tip ciliated, glabrous or sparsely hairy. Receptacle flat, alveolate, glabrous, 2.30 mm, epaleaceous. Florets \pm 103 no., peripheral female florets, central bisexual florets. Female floret \pm 91no, filiform, corolla tube 3.55 mm long, yellow, 3 lobed, glabrous, style bifid, arms equal, pappus length not reach upto the size of corolla. Bisexual floret \pm 12 no., tubular, corolla tube 2.88 mm long, pappus length not reach upto the starting of corolla, pappus persistent; corolla yellow, corolla tube glabrous, 5 lobes, 0.219 mm, oblong lanceolate, papillate, small unicellular hairs and glandular hairs sparsely distributed. Stamen 5, syngenesious; anther 1.46 mm, yellow, anther apical appendages of almost same length, acuminate, 0.161 mm, base with unbranched tails, tails longer than the thickened portion of filament or anther collar. Style bifid, arms equal, 0.361 mm, style arms and small portion below the bifurcation pappillate, style base not swollen, style connected to ovary by a cylindrical structure which is slightly narrower than both style and ovary. Cypselas homomorphic, oblong, 0.842 x 0.263 mm, ribbed, 8-10 ribs, slightly curved, pubescent, hairs unicellular. Pappus white, uniseriate, 8-10 no, 3.02 mm, persistent.

Flowering & Fruiting: March-June.

Distribution: India, China, Cambodia, Laos, Sumatra, Myanmar, Vietnam, Taiwan, and Thailand. In Peninsular India, this taxon is known only from the state of Tamil Nadu.

Habitat & Ecology: Occurring in grassland, in shaded places at altitudes up to 1,100 m.



Fig. 20. *Blumea hieraciifolia* var. *hamiltonii* (DC) Clarke.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Bisexual floret; L. Bisexual floret corolla; M. Stamens; N. Carpel O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsel.



Fig. 21. Type of *Blumea hieraciifolia* var. *hamiltonii* (DC) Clarke © The Board of Trustees of the Royal Botanic Gardens, Kew.

Specimens Examined: **Tamil Nadu**, Dindigul district, Palamalai-Machur path, 1150 m, 10/05/1986, *K.M. Mathew & N. Rajendran* 44922 (RHT); Perumalai jeep road to peak, 1900 m, 16/06/1980, *K.M. Mathew* 45582 (RHT); Kodaikanal, Palamalai slopes, 1300 m, 14/08/1980, *K.M. Mathew & M. Charles* 46180 (RHT); Kodaikanal, Palni hills, Palamalai, 1300 m, 15/08/1986, *K.M. Mathew & Charles* 46204 (RHT); Kodai to Kakkal Pulneys, 17/07/1920, *s.coll.* 16503 (MH). Nilgiris district, Pykara, 29/03/1917, *s.coll.* 15263 (MH). Tirupattur district, Vellore, Yelagiri hills, 1100 m, 24/06/2002, *K.M. Mathew* 73898 (RHT);

Conservation status: Data Deficient (DD).

Notes: De Candolle (1836) described this species. Wallich's specimens were used by De Candolle to describe this species. The type material was identified by Randeria (1960) in revisionary studies as Wallich 3938/48 from Kew. In Kew, there are four sheets of Wallich 2938 with various barcodes. However, Randeria did not specify which specimen may be used as a type. Randeria's determinavit label is available in two sheets. Randeria's typification can thus be considered effective first phase lectotypification (ICN Art. 7.11). The specimen K000978436 is chosen as the lectotype based on its accurate state of preservation and close match to the protologue.

Blumea hieraciifolia* var. *flexuosa (C.B. Clarke) Randeria, *Blumea* 10(1): 249 (1960); Grierson in Dassan. & Fosbery, *Revis. Handb. Fl. Ceylon* 1:164. 1980; Yogan *et al.*, *Fl. Chikmagalur Dist.* 184. 1981; B.D. Sharma *et al.*, *Fl. Karnataka Analysis* 2: 136. 1984; Manilal, *Fl. Silent Valley* 151. 1988; S. Kumar in Hajra *et al.*, *Fl. India* 13:126. 1995; Sasidh., *Fl. Aralam WLS* 211. 2013. ***Blumea flexuosa*** C. B. Clarke, *Compos. Ind.* 86. 1876.; Gamble, *Fl. Pres. Madras* 484. 1921. ***Placus flexuosus*** (C.B. Clarke) Kuntze in *Revis. Gen. Pl.* 1: 357. 1891. **Type:** Ceylon, Thwaites C.P. 19 (Holotype PDA; Isotypes BM!, GH!, K!, P!).

Figs. 22, 23

Perennial herbs, upto 2 m tall. Root fibrous, 16 x 0.5 cm, 2 or 3 main roots, narrow rootlets arise from it. Stem erect, somewhat flexuose or decumbent, branched from base, woody, terete or with narrow striations, base woody, reddish brown, upto 1 cm thick, sparsely hairy, others green, villous hirsute, woolly at apex and inflorescence branches, absence of glandular hairs, long whitish or pale yellowish hairs of 1.09 mm long; internodes 4-10 cm. Leaves alternate, upper and lower leaves different; lower leaves petiolate; petiol upto 3 cm; laminae oblanceolate, 15 x 5.3 cm, base cuneate, margin irregularly serrate dentate, teeth black, apex acute or acuminate, texture thick, both surfaces pubescent with long white multicellular hairs, adaxial fluorescent green, abaxial whitish green; upper leaves subsessile to sessile, laminae elliptic lanceolate, apex acuminate, margin irregularly serrate dentate or biserrate. Inflorescence both terminal and axillary, capitula arranged in clusters of 3-10 in panicles, upto 30 cm. Capitula cylindrical to campanulate, 10.29 x 6.06 mm, pedunculate; peduncle upto 6.81 mm long, whitish green, densely woolly with long white multicellular hairs. Involucral bracts 6 seriate, straw coloured, longer than florets, reflexed at maturity, scarious or hyaline margins; first phyllary linear, villous with long multicellular pilose hairs, 3.88 x 0.294 mm; second phyllary 4.32 x 0.781 mm, villous but hairs not long as first; third phyllary 5.36 x 1.01 mm, linear lanceolate, villous; fourth phyllary 6.57 x 0.941 mm, linear lanceolate; fifth phyllary 8.45 x 0.841 mm, tip ciliate, linear lanceolate, very short hairs placed distantly; sixth phyllary 9.72 x 0.945 mm, ciliate tip, almost glabrous. Receptacle convex, fimbriate, glabrous, 2.95 mm wide, epaleaceous. Florets ± 300 no., peripheral female florets, central bisexual florets. Female floret ± 274 no., filiform, corolla tube 7.987 mm long, corolla pale yellow, lobes 3, small unicellular hairs in lobes, style bifid, arms equal or unequal, pappus longer than corolla tube. Bisexual floret ± 26 no., tubular, corolla tube 6.20 mm long, pappus hairs upto the starting of corolla lobe, persistent; corolla yellow, pale yellow to base, 5 lobes, 0.588 mm long, papillate, linear lanceolate, short unicellular hairs at lobes. Stamen 5, syngenesious; anther 2.28mm long, yellow, apical appendages of same length, truncate, base with unbranched tails, tail 0.247 mm, tail length not upto the thickened portion of filament or anther collar; 2.69 mm long, yellowish white. Style bifid, arms equal,

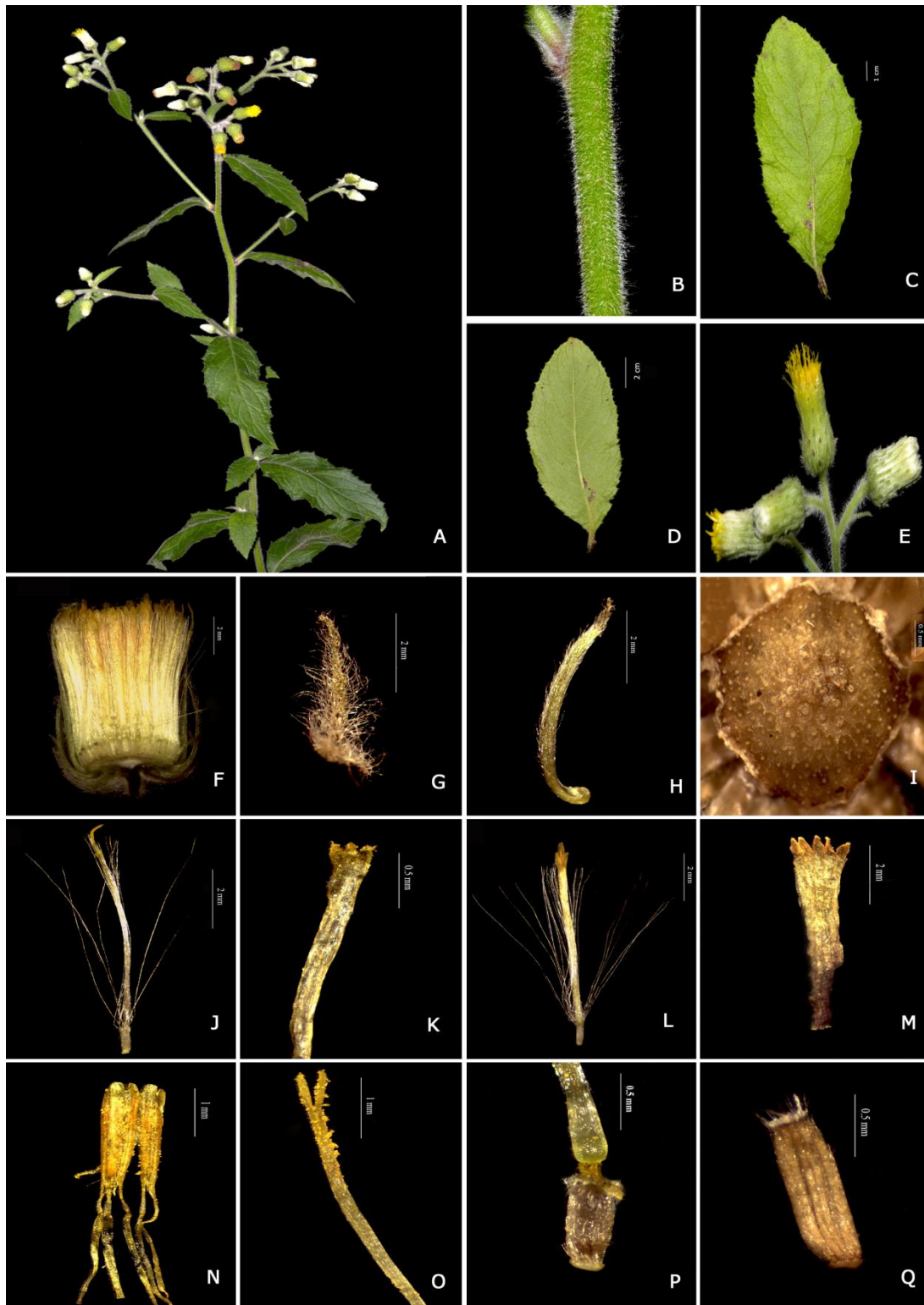


Fig. 22. *Blumea hieraciifolia* var. *flexuosa* (C.B.Clarke) Randeria: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

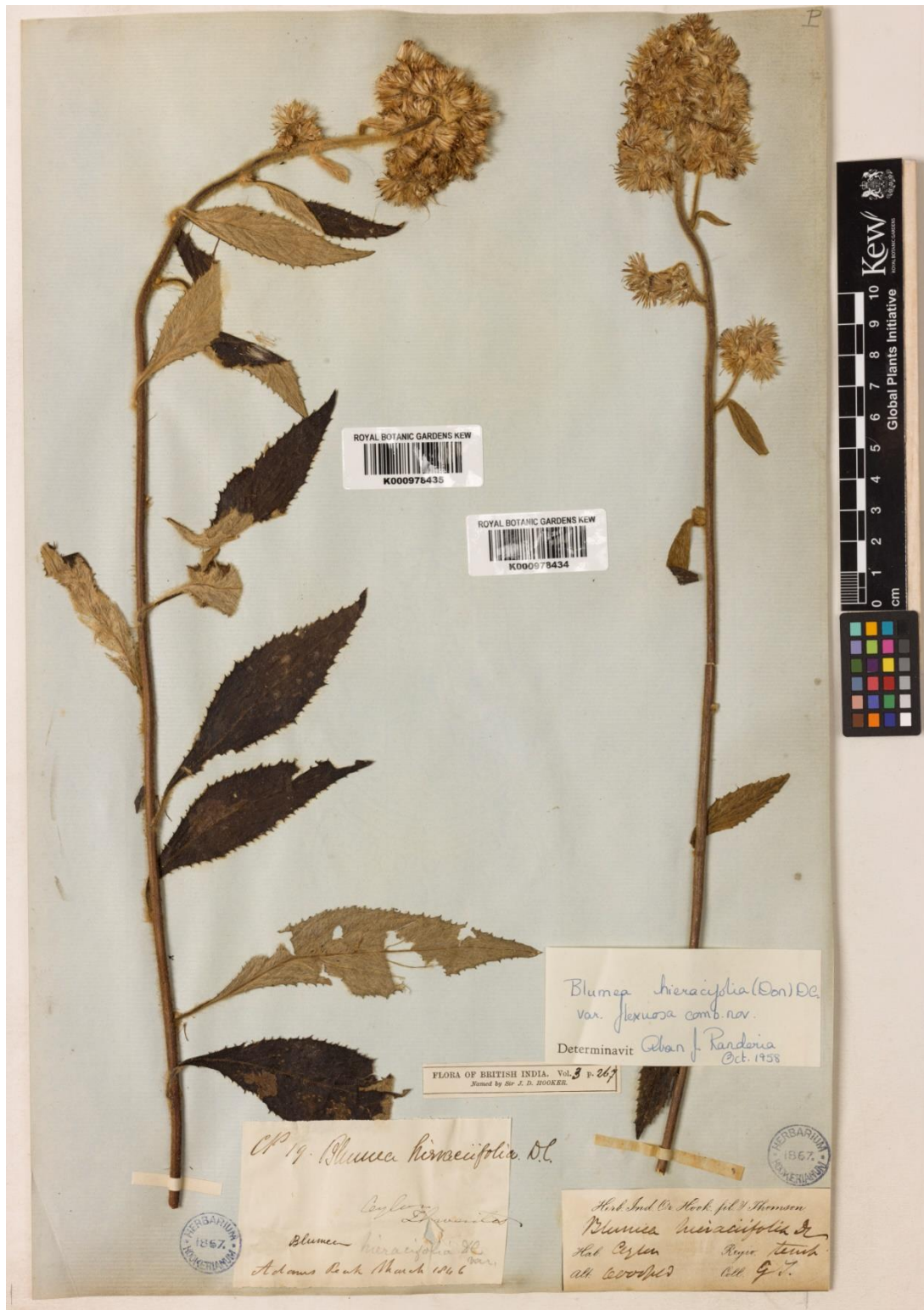


Fig. 23. Type of *Blumea hieraciifolia* var. *flexuosa* (C.B.Clarke) Randeria © The Board of Trustees of the Royal Botanic Gardens, Kew.

1.03 mm, dark yellow arms, small sweeping hairs present on lobes and below bifurcation, base slightly swollen, style connected to ovary by a cylindrical structure which is narrower than both style and ovary. Cypselas homomorphic, oblong, 1.28 x 0.325 mm light yellow, 1.28 x 0.325 mm, oblong, ribbed, 10 ribs, straight, hairy or pubescent. Pappus white, uniseriate, 13-19 no, 6.15 mm long, persistent.

Flowering & Fruiting: February-April.

Distribution: India and Sri Lanka. In Peninsular India, this taxon is distributed in the states of Karnataka, Kerala, and Tamil Nadu.

Habitat & Ecology: Fairly common in grasslands of dry evergreen forests and forest edges.

Specimens Examined: **Karnataka**, Chikkamagaluru district, Varagathirthum RF, Kudremukh, 1400 m, 24/02/1984, *E. Vajravelu* 77837 (MH). **Kerala**, Palakkad district, Damsite, 10/03/82, *K.S. Prasanna Kumar* SV10404 (CALI); Way to valiyaparathode, 850 m, 20/01/1980, *P. Bhargavan* 65638 (MH); Between Madrithode & Walghat, 1100 m, 11/12/1980, *N.C. Nair & P. Bhargavan*, 69537 (MH); Silent Valley, 23/03/2021, *M.V. Dilsha* 9101 (DEV). **Tamil Nadu**, Nilgiri District, Kuzhivayal RF, 850 m, 26/02/1973, *E. Vajravelu* 43741 (MH).

Conservation status: Rare.

Notes: This taxon is related to *B. hirsuta* in several aspects. But it differs from it in its glabrous receptacle and leaf characters.

Blumea lacera (Burm. f.) DC., Wight, Contr. Bot. India 14. 1834; Hook. f., Fl. Brit. India 3: 263. 1882; Gamble, Fl. Pres. Madras 483. 1921; Cooke, Fl. Pres. Bombay 2:76. 1958; Randeria, Blumea 10(1): 264.1960; Saldanha & Nicolson, Fl. Hassan Dist. 604, 1976; Grierson in Dassan. & Fosbery, Revis. Handb. Fl. Ceylon 1:170. 1980; K.M. Matthew, Fl. Tamilnadu Carnatic 3(1):770.1981; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2:136. 1984; Ansari, Fl. Kasaragod Div. 209. 1985; N.P. Singh, Fl. Eastern Karnataka 1: 364. 1988; Keshava Murthy & Yoganarasimhan, Fl. Coorg 241. 1990; M.J. Kothari & S. Moorthy, Fl. Raigad Dist. 211. 1993; S. Karthikeyan

& Anand Kumar, Fl. Yavatmal Dist. 136. 1993; S. Kumar in Hajra *et al.*, Fl. India 13: 128. 1995; S.D. Deshp. *et al.*, Fl. Mahabaleshwar & Adjoinings 2: 305. 1995; Pull. & Ali Moulali, Fl. Andhra Pradesh 2: 515. 1997; M R. Almeida, Fl. Maharashtra. 3A: 79. 2001; S.R. Yadav & Sardesai, Fl. Kolhapur 241. 2002; K. Gopalakrishna Bhat, Fl. Udipi 303. 2003; S.G. Pradhan *et al.*, Fl. Sanjay Gandhi NP 329. 2005; Pull. *et al.*, Fl. Eastern Ghats 3: 231. 2007; Manikandan & Lakshminarasimhan, Fl. Rajiv Gandhi NP 223. 2013. *Conyza lacera* Burm. f., Fl. Ind. t. 59. 1768. Type: Indonesia, Java, Burm. f. *s.n.* (Holotype G!).

Figs. 24, 25

Blumea cuneifolia DC. Prodr. 5: 441. 1836. *Conyza cuneifolia* Wall. Numer. List, no 3101. 1831. nom. nud. Type: India, Wallich Cat. 3101, comp. no. 211 (Holotype G-DC!; Isotype K-W!).

Blumea viscosula DC. Prodr. 5: 441. 1836. *Conyza viscosula* Wall. ex Miq. Fl. Ned. Ind. 2: 44. 1856. *Blumea viscosula* DC. var. *hispidula* DC. Prodr. 5: 441. 1836. Type: Taong-Dong, Wallich Cat. 3081 comp. no. 191 (Holotype G-DC!; Isotype K!).

Blumea heyneana DC. in Wight, Contr. Bot. India 15. 1834. *Conyza heyneana* Wall. Numer. List, no 3089. 1831. nom. nud. Type: Wallich Cat. 3089, comp. no. 199 (Holotype G-DC!; Isotypes GH! fragment and drawing, K-W!).

Blumea lactucaefolia DC. Prodr. 5: 435. 1836. *Conyza lactucaefolia* Wall. ex Miq. Fl. Ned. Ind. 2: 48. 1856. Type: Myanmar, Wallich Cat. 3088, comp. no. 198 (Holotype G-DC!; Isotype K-W!).

Blumea subcapitata DC. Prodr. 5: 435. 1836. *Conyza subcapitata* Wall. Numer. List, no 3056. 1831. nom. nud. Type: Nepal, Wallich Cat. 3056, comp. no. 166 (Holotype G-DC!; Isotypes BM!, G!, K-W!, NY!, P!).

Blumea holosericea DC. Prodr. 5: 442. 1836. *Conyza holosericea* Wall. Numer. List, no 3103. 1831. nom. nud. *Blumea hieraciifolia* var. *holosericea* (DC.) Benth. Fl. Hongk. 178. 1861. Type: Myanmar, Prome, Wallich Cat. 3103, comp. no. 213 (Holotype G-DC!; Isotype K-W!).



Fig. 24. *Blumea lacera* (Burm.f.) DC.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 25. Type of *Blumea lacera* (Burm. f.) DC. © Conservatoire et Jardin botaniques de la Ville de Genève.

Annual herbs, 35-40 cm. Taproot with two main roots, 10-15 x 0.1-0.5 cm. Stem erect, terete, branched, branches almost arise from the base of stem, base woody, pale yellowish green, sparsely hairy, upto 1 cm wide; others green, terete, pilose with long multicellular hairs and short capitate glandular hairs, tip of glandular hairs yellow; internodes 3-6 cm. Leaves simple, alternate, upper and lower leaves different; lower leaves petiolate, petiol 3.5 cm, laminae oblanceolate, 6.5 x 3 cm, base attenuate, margin serrulate or serrate dentate with unequal serrations, apex obtuse, thin textured, upper surface bright green, long pilose multicellular hairs and short capitate glandular hairs or glabrate, lower whitish green, pilose with long multicellular hairs and short capitate glandular hairs; upper leaves sessile, laminae elliptic or oblanceolate or ovate, 3-1.5 cm, base cuneate, margins serrate dentate, apex acute. Inflorescence terminal to all branches, loose panicle, 30 cm. Capitula slightly hourglass to campanulate, 5.03 x 3.22 mm, pedunculate, peduncles pilose with long white multicellular hairs and short capitate glandular hairs, green, pilose or villous with long multicellular hairs and short capitate glandular hairs; bracteoles linear lanceolate, pubescent. Involucral scales 5 seriate, persistent; first phyllary pilose with long spreading multicellular hairs and short capitate glandular hairs, pale green, linear lanceolate, 2.804 mm long; second phyllary linear lanceolate, pilose with long multicellular hairs and short capitate glandular hairs, 2.907 mm; third phyllary 4.105 mm, linear lanceolate, pilose with long multicellular hairs and short glandular hairs; fourth phyllary 4.804 mm, scarious margins, comparatively less hairs than others; fifth phyllary linear, tip ciliated, glabrous, 4.42 mm. Receptacle convex, scrobiculate, glabrous, 4.78 mm wide, epaleaceous. Floret 153 no., peripheral female florets, central bisexual florets. Female floret ± 123 no., filiform, corolla tube 4 mm, pale yellow, 3 lobed with long hairs at the lobes, pappus same length or slightly longer than corolla, style bifid, arms equal. Bisexual floret ± 30 no., tubular, corolla tube 4.12 mm, pappus reach above corolla, pappus easily detachable; corolla yellow, 5 lobes, papillate, lanceolate lobes with unicellular hairs and glandular hairs, light yellow at lobes, whitish others. Stamen 5, syngenesious; anther 1.35 mm long, yellow, anther appendages of same length, truncate, base with unbranched tails, tails same length as the thickened portion of filament or anther collar; filament 1.11 mm long, whitish yellow. Style bifid, arms equal, 0.759 mm, yellow, others translucent, sweeping hairs present on lobes upto the bifurcation, base not swollen, attached to ovary by a cylindrical structure which is narrower than

ovary and style. Cypselas homomorphic, oblong, 0.739 x 0.224 mm, ribbed but ribs not prominent, light brown, straight, sparsely hairy. Pappus white, 3.52 mm long, uniseriate, caducous or easily detachable.

Flowering & Fruiting: January-April.

Distribution: Andaman Is., Bangladesh, Borneo, Cambodia, China South-Central, China Southeast, East Himalaya, Hainan, India, Jawa, Laos, Lesser Sunda Is., Malaya, Myanmar, Nansei-shoto, Nepal, New Caledonia, New Guinea, New South Wales, Nicobar Is., Northern Territory, Oman, Pakistan, Philippines, Queensland, Sri Lanka, Sulawesi, Sumatera, Taiwan, Thailand, Vietnam. In Peninsular India, this species is found in the states of Karnataka and Maharashtra.

Habitat & Ecology: Edges of forests, roadsides, in open places.

Specimens Examined: Karnataka, Shivamoga district, Agumbe, 22/02/2021, M.V. Dilsha 8697 (DEV). Udupi district, Hayagreeva Nagar, Udupi, 25/02/2020, M.V. Dilsha 8646 (DEV).

Notes: *B. lacera* is the most common and unquestionably the most varied species in the genus, along with *B. axillaris*. Its vegetative organs, which include the lobing of the leaves, the proportion of pubescence, and the degree of compactness and laxity of the panicles, display a high degree of variation. Based on these changes, at least 10 different types have been identified in the literature. Since the differences between them do not seem to be sufficient to identify these subspecific categories, Randeria (1960) viewed the complex as a single entity. It has also been noted that *Blumea lacera* hybridises with other species.

Blumea lacera var. *glandulosa* Hook.f., Fl. Brit. India 3: 263. 1882; Gamble, Fl. Pres. Madras 483. 1921; Cooke, Fl. Pres. Bombay 2:76. 1958; M. R. Almeida, Fl. Maharashtra. 3A: 80. 2001. *Blumea glandulosa* DC., Contr. Bot. India 14. 1834; DC., Prodr. 5. 442. 1836. Type: India, Negapatam, Wight *s.n.* (Holotype K!).

Figs. 26, 27

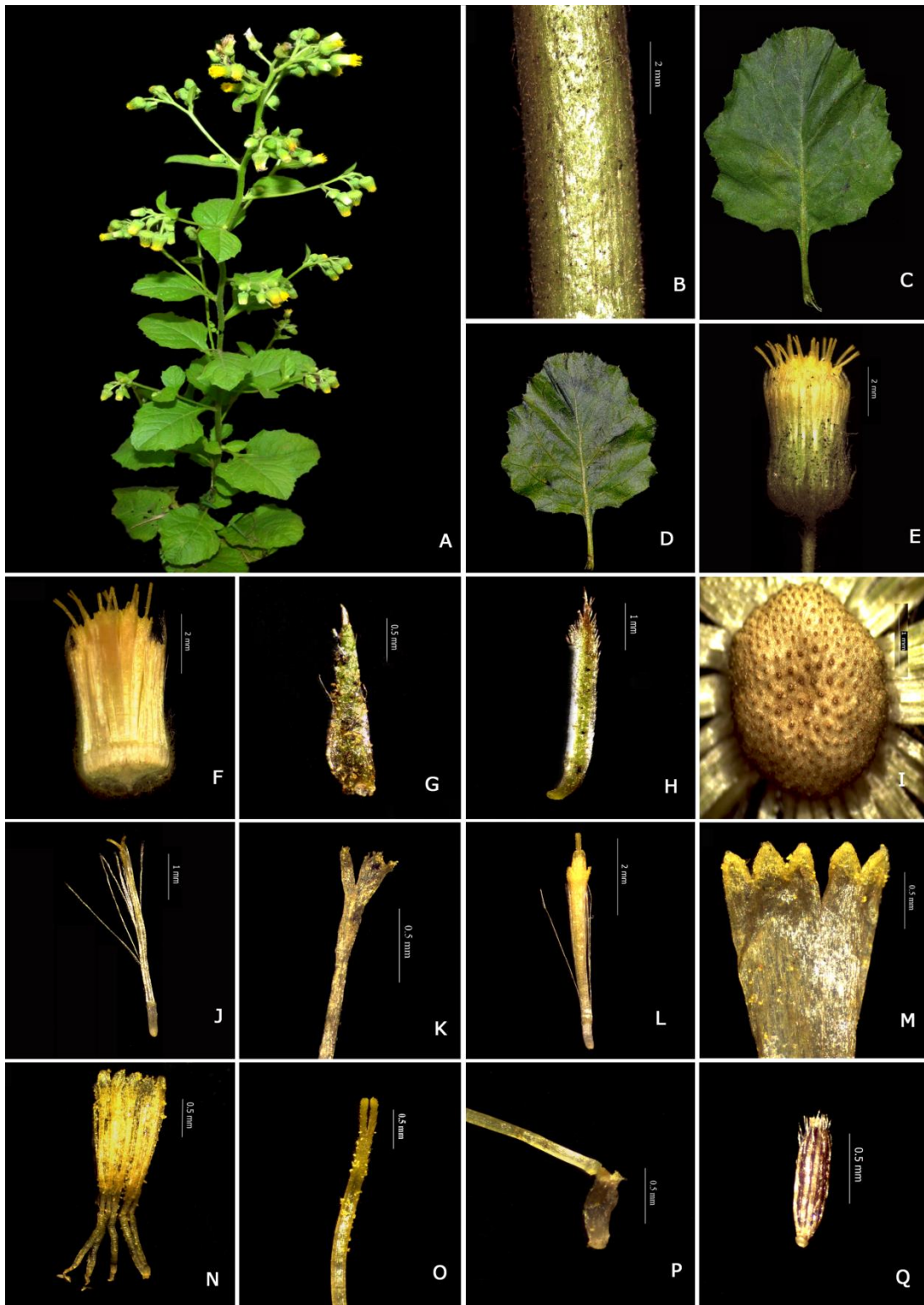


Fig. 26. *Blumea lacera* var. *glandulosa* Hook.f: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 27. Type of *Blumea lacera* var. *glandulosa* Hook.f. © The Board of Trustees of the Royal Botanic Gardens, Kew.

Annual herbs, 150 cm. Tap root, 2 cm, woody. Stem erect, terete, simple or branched, many branches arise from base, base woody, stout, brown, upto 2 cm long, glabrous, others green, 3.28 mm thick, long pilose multicellular yellowish hairs sparsely distributed and numerous short capitate glandular hairs, tip of glandular hairs yellow. Leaves simple, alternate, lower and upper leaves different; lower leaves petiolate, petiol 2 cm, laminae orbicular or slightly lyrate lobed, 10 x 7 cm, base cuneate, margin sinuate, apex rounded, adaxial bright or green, abaxial pale or whitish green; middle leaves ovate or orbicular, margin sinuate and serrate dentate; upper leaves and inflorescence leaves sessile, laminae elliptic lanceolate, margin distantly serrate, both surface with sparsely distributed long pilose multicellular hairs and more short capitate glandular hairs. Inflorescence terminal and axillary, dense to loose panicles, upto 30 cm. Capitula slightly hourglass to campanulate, 6.21 x 3.40 mm, pedunculate, peduncle 4-10 cm long, green or pale green, tomentose or pubescent with short capitate glandular hairs and distantly placed long pilose multicellular hairs. Involucral scales 6 seriate, persistent; first phyllary lanceolate, light green, pilosulose with short capitate glandular hairs and sparsely long multicellular hairs at upper portions, 4.42 x 0.384 mm; second phyllary lanceolate, 2.907 x 0.386 mm, one or two long hairs, others glandular; third phyllary 2.70 x 0.361 mm, linear lanceolate; fourth phyllary 2.919 x 0.347 mm, scarious margins, linear lanceolate, tip green; fifth phyllary 4.53 x 0.411 mm, tip ciliate, glandular hairs at entire surface, scarious margins; sixth phyllary glabrous, linear, tip ciliate, 4.98 x 0.352 mm. Receptacle flat or convex, scrobiculate, glabrous, 3.38 mm wide, epaleaceous. Florets ± 401 no., peripheral female florets, central bisexual florets. Female floret ± 390 no., filiform, corolla tube 5.7 mm, corolla yellow, lobes 3-5, glandular, style bifid, arms equal, 0.453 mm, pappus longer than the corolla. Bisexual floret ± 11 no., tubular, corolla tube 4.63 mm, pappus not reach upto the starting of corolla lobes; corolla yellow at lobes, others pale yellow to whitish, 5 lobes, papillate, lanceolate, 0.442 mm, glandular hairs and sparsely unicellular hairs. Stamen 5, syngenesious; anther 1.56 mm, yellow, anther apical appendages of same length, truncate to emarginate, 0.151 mm, base with unbranched tails, tails equal or slightly greater than the thickened portion of filament; filament 1.30 mm, pale

yellow to whitish. Style bifid, arms equal, 0.219 mm long, yellow, sweeping hairs present below on arms and below the bifurcation, style base not swollen, style attached to ovary by a cylindrical structure which is narrower than both style and ovary, ovary brown. Cypselas homomorphic, linear oblong, size, ribbed, ribs not uniformly distributed, dark brown, straight or slightly curved at base, apex pubescent, other portion sparsely hairy. Pappus white, 8-12 no., uniseriate, 4.03 mm long, caducous or easily detachable.

Flowering & Fruiting: December-April.

Distribution: India, this taxon is mostly distributed in South India.

Habitat & Ecology: Waste lands, roadsides, forest edges, etc.

Specimens examined: **Kerala:** Idukki district, Triveny, 650 m, 10/10/1972, *B.D. Sharma* 42447 (MH); Way to Mangala Devi temple, 950 m, 10/10/1976, *K. Vivekananthan* 48657 (MH); Meenmutty, 14/02/1982, *C.N. Mohanan* 73232 (MH). Kottayam district, Thalayolaparambu, 28-09-86, *C. Ramesan* 42274 (CALI). Kozhikode district, on the way to Malabar Botanic Garden, Calicut, 04/04/2018, *M.V. Dilsha* 6932 (DEV). Malappuram district, Nilambur, Nadukani churam, 14/11/86, *E.V. Soniya* 1481 (CALI); Nilambur, 100 m, 02/03/1970, *J.L. Ellis* 33647 (MH); Irumpuzhi, 09/02/2021, *M.V. Dilsha* 8685 (DEV). Palakkad district, Way to Vaniampara, 15/02/1979, *E. Vajravelu* 60453 (MH). Pathamthitta district, Near Pathanamthitta, 175 m, 20/11/1976, *Chandrabose* 49145 (MH); Wayanad district, Cheranbady, 3000 ft, *Lawson s.n.* (MH). **Tamil Nadu,** Coimbatore district, Swasavaram, 24/02/1994, *K.C. Jacob* 17384 (MH); *Ibid.*, 24/02/1994, *K.C. Jacob* 17384 (MH); Ceubal farm, 01/1993, *J.R. Naganathan s.n.* (MH); Sanjiri hills, 633 m, 14/02/1957, *K.M. Sebastine* 2314 (MH); Perur dam, Noyil river, 633 m, 15/02/1957, *K. Subramanyam* 2327 (MH); Bank of Noyil river, 466 m, 02/05/1968, *M. Chandrabose* 29078 (MH); Karian shola, 2500 alt, 25/02/1942, *S.R. Raja* 20291 (MH); Selvapuram, 468 m, 31/08/1968, *M. Chandrabose* 30648-A (MH). Cuddalore district, Chidambaram Municipal Rest House, 63/04/1978, *K.M. Mathew* 12659 (CAL); Chidambaram taluk, Killai, opposite karithurai, 06/04/1978, *K.M. Mathew* 12827 (CAL); South arcot, Chidambaram, 06/03/1976, *C. Rajamani* RHT1393

(RHT); *Ibid.*, 01/04/1977, *K.M. Mathew* 7160 (RHT); *Ibid.*, 03/04/1978, *K.M. Mathew*, 12659 (RHT). Dharmapuri district, Marur taluk, Tirthamalai, 360m, 18/06/1978, *K.M. Mathew & N. Venugopal* RHT14284 (CAL). Kallakurichi district, Kallakurichi, 13/06/1978, 860 m, *K.M. Mathew & Venugopal* 13876 (RHT). Kanyakumari district, Thamaraiikulam near cape, Sea level, 31/07/1977, *A.N. Henry* 49509 (CAL, MH); Colachel, 07/12/1980, *M.S. Swaminathan* 68963 (CAL, MH). Namakkal district, Kolli hills, Moodubally village, 1300 m, 16/04/1977, *D.I. Arockiaswamy* 7667 (RHT). Nilgiri district, Theppakadu, 09/04/1972, *K. Vivekananthan* 40759 (MH). Pudukottai district, Vellaru, 110 m, 03/10/1984, *C. Arulappan*, 188 (MH). Salem district, Namakkal, kollihills, 1000 m, 18/04/1978, *A. Mohan* 13042 (RHT); Attur, chinnakalryans, 600 m, 28/06/1978, *N. Venugopal* 14465 (RHT); Chinnakalryans, 30/04/2002, *KM Mathew*, 63547 (RHT); Attur, periakalryans, 750 m, 27/06/1978, *K. Murugesan* 15034 (RHT). Tiruchirapalli district, Tiruchi, Pachamalais, Puthur, 900 m, 21/03/1978, *Rajendran* 12636 (CAL); Kilikkoodu near grand anicut, 65 m, 17/02/1978, *Perianayagam & Diraviam* 11958 (CAL); Srirangam island, 65 m, 23/02/1978, *Perianayagam* 12186 (CAL); Thuraiyur, 800 m, 09/07/1976, *K.M. Mathew* 2313 (RHT); Lalgudi side, 07/03/1968, *K.M. Mathew* 8606 (RHT); *Ibid.*, 07/03/1968, *K.M. Mathew* 8607 (RHT); Sengattupatty, 26/07/1970, *K.M. Mathew* 15639 (RHT). **Karnataka**, Mysore district, Agumbe, 18/05/1962, *R. Sundara Raghavan* 80741 (CAL).

Conservation status: Least concern

Notes: This variety is recognized by Hooker in the flora of British India. This taxon is mostly represented in South India. Most of the previous workers did not recognize its varietal status. When compared to *B. lacera* var. *lacera*, it has more glandular hairs. The differences in the type of hair are not continuous characters in the genus *Blumea*. Therefore, *B. lacera* var. *glandulosa* can be considered a separate taxon.

Blumea lanceolaria (Roxb.) Druce, Rep. Bot. Soc. Exch. Club. Brit. Isles 4: 609. 1917; Randeria, *Blumea* 10(1): 218. 1960; Grierson in Dassan. & Fosbery, Revis. Handb. Fl. Ceylon 1:171. 1980; Keshava Murthy & Yoganarasimhan, Fl. Coorg

240. 1990; S. Kumar in Hajra *et al.*, Fl. India 13: 130. 1995; Sasidh. & Sivar., Fl. Pl. Thrissur For. 247. 1996; Sivar. & P. Mathew, Fl. Nilambur 363. 1997; Sasidh., Fl. Periyar Tiger Reserve 196. 1998; M. R. Almeida, Fl. Maharashtra. 3A: 80. 2001; Sasidh., Fl. Parambikulam WLS 167. 2002; Mohanan & Sivad., Fl. Agasthyamala 371. 2002; Ratheesh Narayanan, Fl. Stud. Wayanad Dist. 410. 2009. *Conyza lanceolaria* Roxb., Fl. India 3: 432. 1832. Type: India, Roxburgh Flora Indica drawing no. 2333 (Lectotype K!, designated by Pornporngrueng *et al.*, 2016).

Figs. 28, 29

Blumea longifolia DC. Prodr. 5: 446. 1836. *Conyza longifolia* Heyne in Wall. Numer. List, no 3026. 1831. nom. nud. *Blumea wallichii* C. B. Clarke, Compos. Ind. 87. 1876. Type: India, Wallich Cat. 3026, comp. no. 136 (Holotype G-DC!; K-W).

Blumea nitida Zoll. & Moritzi in Zollinger, Natuur-Geneesk. Arch. Ned. -Indie 2:244. 1845. Type: Indonesia, Java, Zollinger 2341 (Holotype P!; Isotype G!, U).

Blumea squarrosa C. B. Clarke, Compos. Ind. 87. 1876. *Conyza squarrosa* Wall. Numer. List, no 3025. 1831. nom. nud. *Blumea myriocephala* DC. Prodr. 5: 445. 1836. Type: Pakistan, Sylhet, Wallich Cat. 3025, comp. no. 135 (Lectotype G-DC! designated by Pornporngrueng *et al.*, 2016; Isotypes DD, E!, G-DC!, GH, K-W!).

Blumea laxiflora Elmer, Leafl. Philipp. Bot.1: 110.1906. Type: Philippines, Luzon, A. D. E. Elmer 8231 (Holotype PNH; Isotype E!, K!, L!, NY).

Bileveillea granulatifolia H. Lév. Repert. Spec. Nov. Regni Veg. 8: 449. 1910. Type: China, Chevalier 3708 (Holotype P!; Isotypes E!, K!).

Blumea lanceolaria var. *spectabilis* (DC.) Randeria, Blumea 10(1): 220.1960; Saldanha & Nicolson, Fl. Hassan Dist. 605. 1976; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2: 137. 1984; V.S. Ramach. & V.J. Nair, Fl. Cannanore 243. 1988; Manilal, Fl. Silent Valley 151. 1988; M. Mohanan & Henry, Fl. Thiruvanthapuram 256. 1994; S. Kumar in Hajra *et al.*, Fl. India 13: 132. 1995; S.D. Deshp. *et al.*, Fl. Mahabaleshwar & Adjoinings 2: 305. 1995; M R. Almeida, Fl. Maharashtra. 3A:

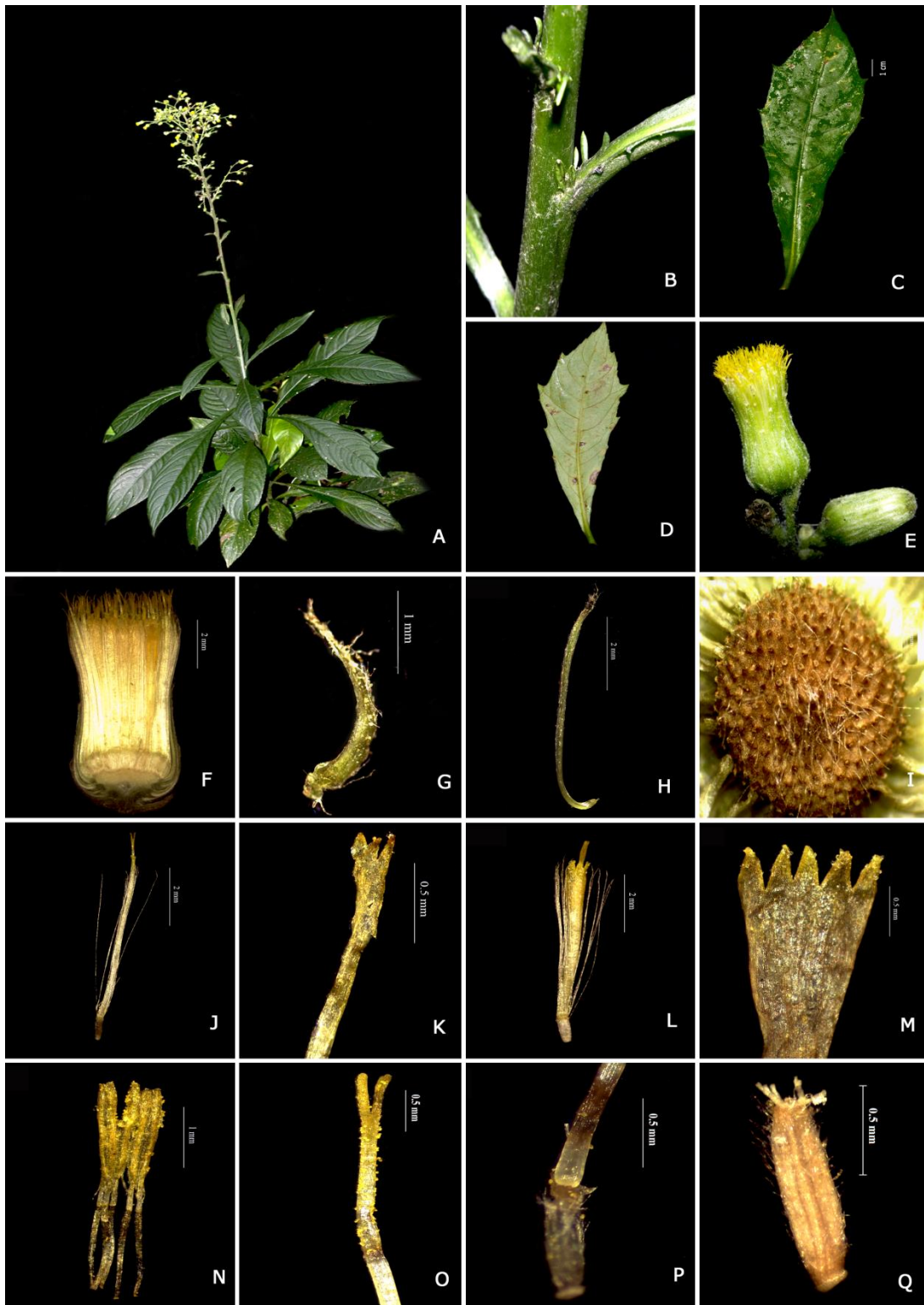


Fig. 28. *Blumea lanceolaria* (Roxb) Druce: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 29. Type of *Blumea lanceolaria* (Roxb.) Druce © The Board of Trustees of the Royal Botanic Gardens, Kew.

80. 2001; B.K. Manjun., *et al.*, Fl. Devanagare 220. 2004; S.R. Yadav & Sardesai, Fl. Kolhapur 241. 2002; N. Anilkumar *et al.*, Fl. Pathanamthitta. 278. 2005; Manikandan & Lakshminarasimhan, Fl. Rajiv Gandhi NP 223. 2013. ***Blumea spectabilis*** DC., Prodr., 5: 445. 1836; Gamble, Fl. Pres. Madras 484. 1921; Cooke, Fl. Pres. Bombay 2:79. 1958; K.K.N. Nair & M.P. Nayar, Fl. Courtallum 2: 332. 1987. Type: India, Wight *s.n.* (Holotype G-DC!).

Subshrubs or shrubs, annual, 50-180 cm, on forest edges. Fibrous roots. Stem erect, terete, generally unbranched, woody, base light green, sparsely hairy at base, long multicellular hairs, 1.5 cm width at base, others 6.22 mm width, hollow at center, green, puberulous in the middle and pilose in younger parts and on inflorescence axis with yellow curved multicellular hairs; internodes 2-5 cm. Leaves simple, alternate, laminae elliptic lanceolate, 25 x 5 cm, base attenuate or prolonged tapering, margin minutely serrate-dentate or serrulate, apex acuminate, thick, upper surface corrugated, dark green, lower pale or whitish green, both surfaces sparsely hairy; upper leaves margins distantly serrated, in between distant serrations small serrations present, wings or projections near to where the leaf attached to stem, petioles subpinnatifid but not decurrent. Inflorescence large, loose spreading panicle, 30-80 cm, after leaves a large peduncle with short leaves then the inflorescence branches, very short leaves present in inflorescence branches. Capitula slightly hourglass shaped, 8.22 x 3.84 mm, pedunculate, peduncle 10 mm, pale green, villous with long multicellular hairs; bracteoles ovate, pubescent. Involucral scales 8 seriate, linear oblong, equal or slightly shorter than florets, olive or dark yellow green, persistent; first phyllary ovate-lanceolate, 1.79 x 0.517 mm long, base with very long multicellular hairs, pubescent; second phyllary 2.73 x 0.741 mm, pubescent, oblong lanceolate; third phyllary 3.73 x 0.613 mm, pubescent not crowded as first, oblong lanceolate or linear lanceolate; fourth phyllary 4.51 x 0.640 mm, tip ciliated, scarcely capitate glandular hairs at center, scarcely hairy, linear lanceolate, scarious margins; fifth phyllary 4.65 x 0.648 mm, linear lanceolate, scarious margins, scarcely hairy; sixth phyllary 5.73 x 0.794 mm, tip ciliate, scarcely hairy, scarious margins, linear lanceolate; seventh phyllary 6.392 x 0.581 mm, tip ciliate, almost glabrous, scarious margins; eighth phyllary 7.33 x 0.701 mm, tip

ciliate, glabrous. Receptacle convex, areolate, pilose with long white multicellular hairs, more hairs crowded at center, 2.57 mm wide, epaleaceous. Florets ± 185 no., peripheral female florets, central bisexual florets. Female floret ± 170 no., filiform, corolla tube 6.43 mm long, yellow, lobes 3, glandular, 21-24 pappus, pappus length not reach upto the corolla. Bisexual florets ± 15 no., corolla tube 4.96 mm long, pappus length equal to corolla or slightly higher; corolla yellow, 5 lobed, 0.384 mm, linear lanceolate, glandular, 26 pappus. Stamen 5, syngenesious; anther yellow, 1.59 mm, anther apical appendages of different length (3 longer and 2 shorter), truncate, base with unbranched tails, tail length not upto the thickened portion of filament or anther collar, 0.397 mm; filament whitish yellow, 1.91 mm. Style arms with sweeping hairs upto bifurcation only, style base not swollen, attached to ovary by a cylindrical structure which is same thickness as style. Cypselas homomorphic, linear oblong, 1.02 x 0.278 mm, ribbed, 9 ribs, pale yellow, base slightly curved, pubescent with glandular hairs. Pappus pale yellowish or white changing to pale red on drying, 20-22 no, uniseriate length, persistent.

Flowering & Fruiting: February-April.

Distribution: India, China, Bangladesh, Cambodia, Borneo, Myanmar, Jawa, Malaya, Laos, Philippines, Sri Lanka, Vietnam, Sumatra, Thailand and Taiwan. In Peninsular India, the species is found in the states of Karnataka, Kerala, Tamil Nadu and Maharashtra.

Habitat & Ecology: Edges of evergreen forests.

Specimens Examined: Karnataka: Kodagu district, Kertiblock, watecolly, Makut, 25/02/63, A.S. Rao 86705 (BSI); Coorg Highway, 21/02/2021, M.V. Dilsha 8690 (DEV). Uttara Kannada district *s.l.*, 17/03/49, J. Fernandez 168 (BLAT). **Kerala,** Kozhikode district, Kakkayam, 13/03/2021, M.V. Dilsha 8699 (DEV). Malappuram district, Nadukani, 09/02/2021, M.V. Dilsha 8686 (DEV). Palakkad district, Dam site area silent valley, 06/05/1981, B.K. Nayar & K. Rajappan 10383 (CALI); *Ibid.*, 05/04/1981, B.K. Nair & K. Rajappan K10383 (CALI). Pathanamthitta district, IC Tunnel area, Sabarigiri, 30/03/1981, B.K. Nayar & K. Rajappan 10498 (CALI); Sabarigiri, IC Tunnel area, 10-03-1991, B.K. Nayar & K. Rajappan K10498 (CALI).

Thiruvananthapuram district, Bonaccord, Agasthyamala, 17/10/87, *N. Mohanan* 7871 (CALI). **Tamil Nadu**, Coimbatore district, Sholaiyar, 1040 m, 26/12/1963, *K. Ramamurthy* 18117 (MH). Tirunelveli district, Thekkumalai, Courtallum, 833 m, 21/03/1958, *K. Subramanyam* 5617 (CAL).

Conservation status: Least Concern.

Notes: The distinctive leaves of this taxon are dark green above and soft light green below, almost glabrous and brittle. According to Randeria (1960), *B. lanceolaria* was split into two varieties (var. *lanceolaria* and var. *spectabilis*) depending on the presence or absence of peduncle, broadly lanceolate or elliptic leaves and shape. These features do not, however, serve as a foundation for the constant identification of infraspecific taxa because of their continuous variation.

Blumea malcolmii (Clarke) Hook. f., Fl. Brit. India. 3(8): 266. 1882; Gamble, Fl. Pres. Madras 482. 1921; Cooke, Fl. Pres. Bombay 2:78. 1958; Randeria, *Blumea* 10(1): 278. 1960; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2:137. 1984; P. Lakshminarasimhan & B.D. Sharma, Fl. Nasik Dist. 261. 1991; M.J. Kothari & S. Moorthy, Fl. Raigad Dist. 211. 1993; S. Kumar in Hajra *et al.*, Fl. India 13: 132. 1995; S.D. Deshp. *et al.*, Fl. Mahabaleshwar & Adjoinings 2: 305. 1995; S.R. Yadav & Sardesai, Fl. Kolhapur 241. 2002. *Pluchea malcolmii* C.B. Clarke, Compos. Ind. 95. 1876. *Pluchea lanuginosa* Hook.f., Fl. Brit. India. 3(8): 266. 1882. nom. inval. *Placus lanuginosus* (Hook.f) Kuntze, Revis. Gen. Pl. 1: 357. 1891. *Blumea lanuginosa* Law ex Cooke, Fl. Bombay 2: 23. 1904, nom. inval. *Blumea lanuginosa* (C.B.Clarke) T.Cooke ex M.R.Almeida, Fl. Maharashtra 3A: 81. 2001, nom. inval. Type: Concan, Law *s.n* (K!).

Figs. 30, 31

Annual stout herbs, strongly aromatic, 15-40 cm. Taproot, 12 x 0.5 cm, globose velvety buds seen on upper part of root. Stem erect, terete, 10-40 cm, branched from base, usually ascending but sometimes decumbent and branched from root, base reddish brown, woody, long hairs present but not crowded; middle stem with prominent ridges one side other side with lightly ridges, light green, woolly villous with long white multicellular hairs and sparsely distributed capitate glandular hairs at axis of stem and on inflorescence axis and pilose on other portions; internodes 3-7

cm. Leaves simple, alternate, 8.5 x 3 cm, sessile-subsessile, petiol upto 1 cm, laminae ovate to obovate to oblanceolate, base cuneate, margins very closely and irregularly biserrate and spinous toothed, apex acute, thin textured, woolly-silky villous with white long multicellular hairs and short capitate glandular hairs, adaxial and abaxial surface fluorescent green, young leaves leathery or velvety. Inflorescence flower heads borne in branch end fascicles or sometimes solitary or clustered in the axils of upper leaves, 3-6 in one cluster. Capitula campanulate, 4.80 x 4.77 mm, pedunculate, peduncle upto 2 cm long, yellowish green, villous or woolly with long multicellular hairs and capitate glandular hairs equally distributed, tip of capitate glands purple colour, tip narrow compared to other species. Involucral bracts 4 seriate, linear; first phyllary 2.19 x 0.221 mm, villous with long multicellular hairs and capitate glands, olive or dark yellow green; second phyllary 2.75 x 0.272 mm, villous with long multicellular hairs and capitate glands, reddish purple at apex; third phyllary 3.70 x 0.323 mm, villous with long multicellular hairs and small capitate glands, reddish purple at upper margins and at apex, scarious margins at lower; fourth phyllary 4.857 x 0.220 mm, light green, scarious at basal portion. Receptacle convex, fimbriate, glabrous, 1.68 mm wide, epaleaceous. Floret ± 226 no., peripheral female florets, central bisexual florets. Female floret ± 180 no., filiform, corolla tube 3.869 mm, corolla tip yellow, others pale yellow, 3-4 lobes, all surface hairy (long multicellular hairs and scarcely capitate glands), style bifid, arms equal, 1.09 mm, yellow, pappus length equal to the length of floret, white. Bisexual floret ± 46 no., tubular, corolla tube 5.55 mm long, pappus equal in length to corolla, caducous, white; corolla yellow at lobes, other portions light yellow, whole surface villous with long multicellular hairs and capitate glandular hairs, 5 lobes, triangular, 0.469 mm. Stamen 5, syngenesious; anther 2.54 mm, yellow, anther apical appendages of different length (one is smaller), very deep compared to other species, 0.375-0.447 mm, rounded or obtuse, base with unbranched tails, tail small not reach the thickened portion or anther collar; filament 0.991 mm, yellowish white. Style bifid, arms equal, very deep, 0.475 mm, yellow, sweeping hairs reach the centre of style, style base, style connected to ovary by a cylindrical structure which is narrower than style. Cypselas homomorphic, linear oblong, 0.429 x 0.147 mm, ribbed but ribs not conspicuous, pale yellow, straight, pubescent. Pappus white, uniseriate, 8-10 no., 3.49 mm, caducous or easily detachable.

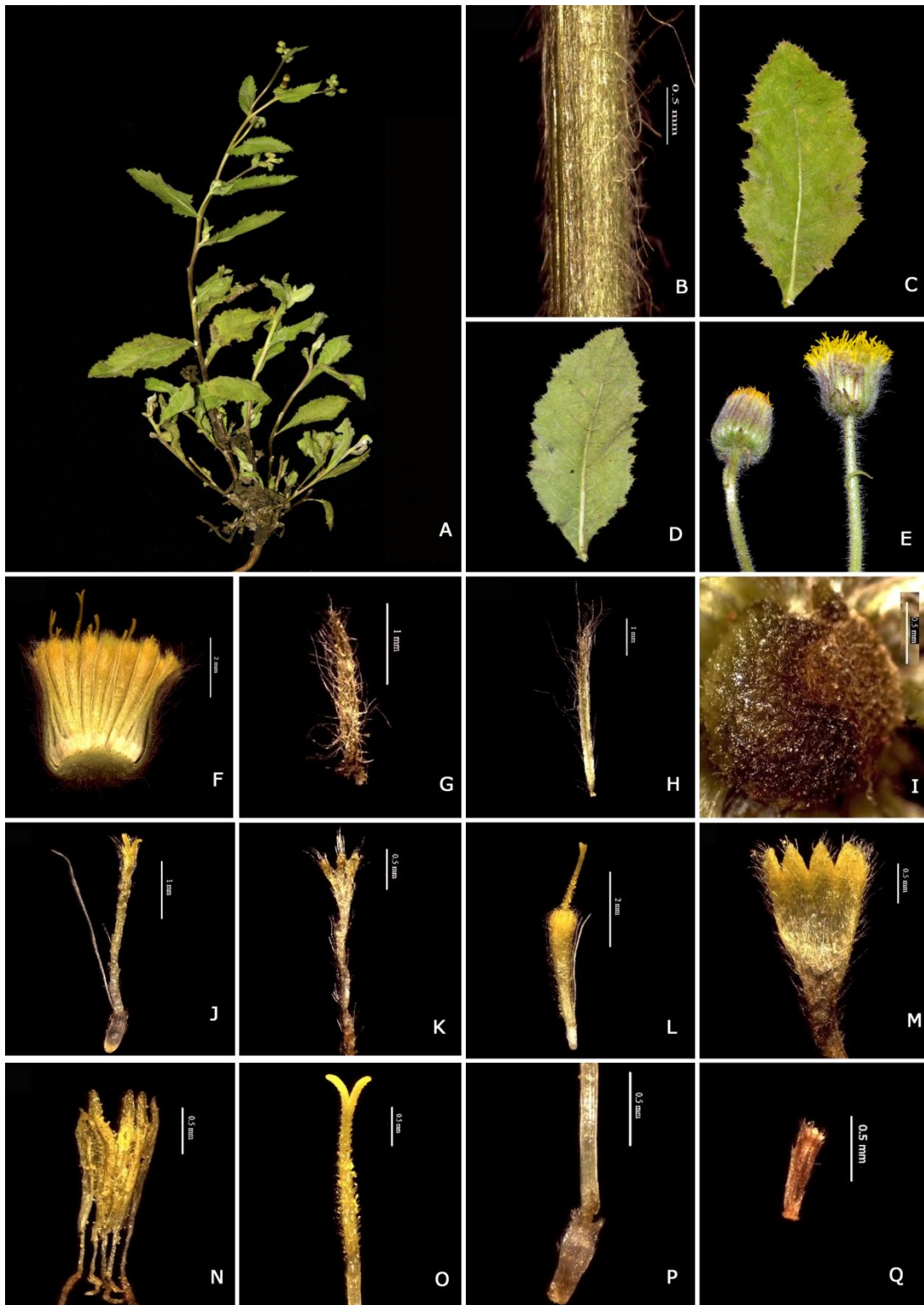


Fig. 30. *Blumea malcolmii* Hook.f: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

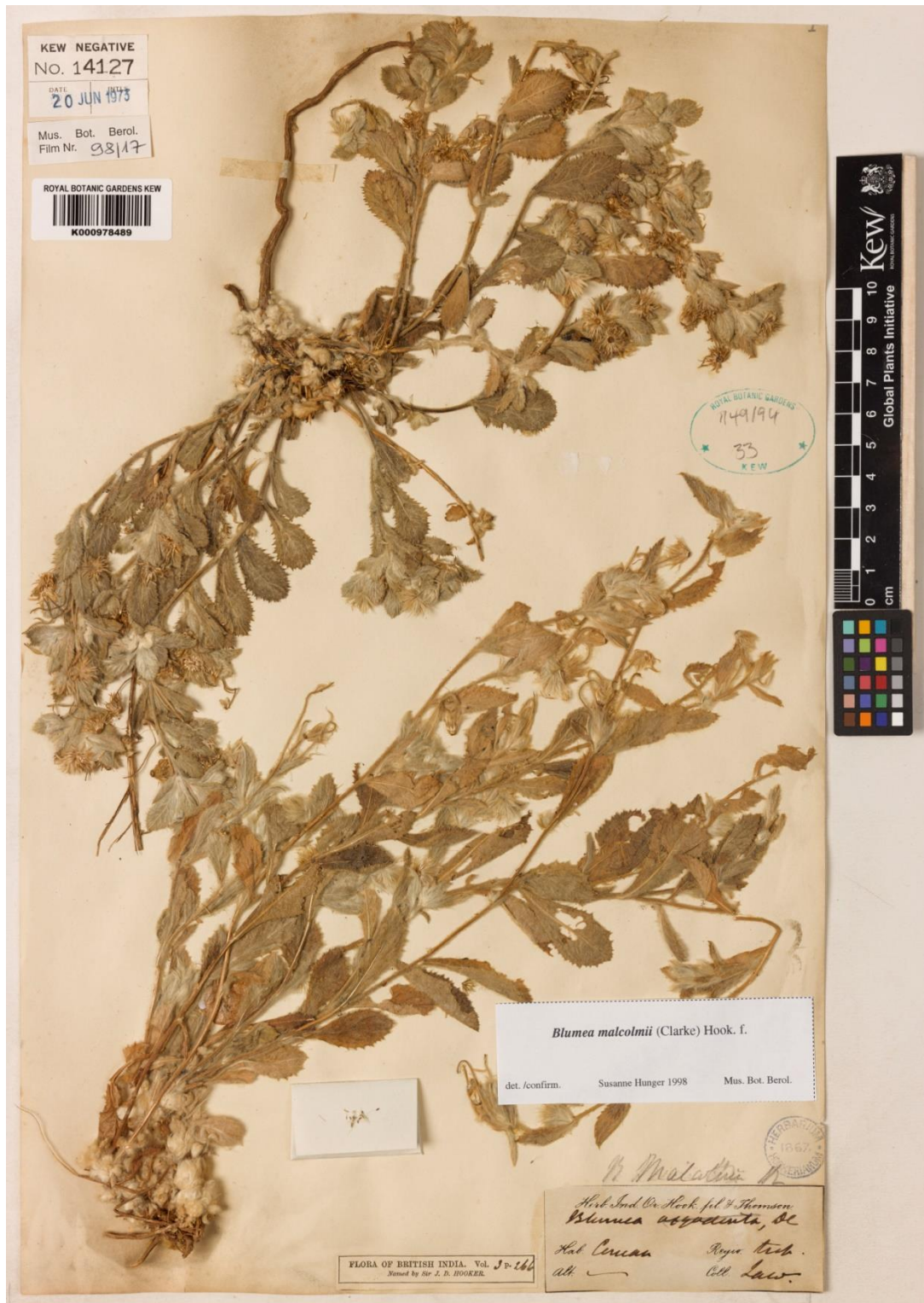


Fig. 31. Type of *Blumea malcolmii* Hook.f. © The Board of Trustees of the Royal Botanic Gardens, Kew.

Flowering & Fruiting: November-April.

Distribution: Endemic to India. This species is found in the states of Goa, Karnataka, and Maharashtra. Maharashtra is the main center of distribution for this species.

Habitat & Ecology: Roasides, waste lands, hillslopes.

Specimens Examined: **Goa**, *s.l.* 106670, *John Cherian* 24/09/65 (CAL). South Goa district, Collem along the railway line, 02/02/2018, *M.V. Dilsha* 6910 (DEV). **Karnataka**, Uttara Kannada district, North kanara, 18/01/1886, W.A. Talbot 1363 (CAL); Siddulagutta, 29/02/1884, *s.coll.* 900 (BSI). **Maharashtra:** Ahmednagar district, Harishchandragad, 07/10/01, *S.B. Nagarkan s.n.* (AHMA); *Ibid.*, 04/10/01, *S.B. Nagarkan s.n.* (AHMA); Taramati hill upto top, Harishchandra ghat, 18/11/68, *s.coll.* 115652 (BSI); Kalsubai hills, 13/10/09, *G.B. Patwardhan* 21760 (BLAT). Kolhapur district, Panhala, *s.d.*, *Mlind sardesai* 593 (SUK); Radhanagiri, 29/12/1958, *B.S. Ahuja* 47331 (BSI). Nashik district, Igatpuri, 1000m, 11/1887, *Otto Kuntze s.n.* (CAL); *Ibid.*, 26/12/59, *G.L. Shah* 10070 (BLAT); *Ibid.*, 03/01/1917, *H. Santapau* 20539 (BLAT). Pune district, Kamshet, 30/12/56, *G.S. Puri* 9101 (CAL); Pune, 31/01/64, *B. Venkata Reddy* 95828 (CAL); Bhimashankar, 31/03/57, *G.S. Puri* 12640 (CAL); Mutha river side, 1800 ft, 15/01/57, *V.D. Vartak* 7873 (AHMA); Raireshwar, 4000 ft, 12/02/58, *V.D. Vartak* 11998 (AHMA); Bhimashankar, 3500 ft, 10/03/56, *V.D. Vartak* 3549 (AHMA); Sinhadagad, 4200 ft, 12/10/55, *V.D. Vartak* 1598 (AHMA); *Ibid.*, 07/10/03, *P.P. Sharma* 04 (AHMA); *Ibid.*, 13/06/63, *M.Y. Ansari* 87392 (BSI); Sinhadagad hill, Pune, top of the fort, 3200 ft, 24/04/56, *V.D. Vartak* 4354 (AHMA); *Ibid.*, 4000 ft, 24/11/56, *V.D. Vartak* 7215 (AHMA); *Ibid.*, 4000 ft, 24/11/56, *V.D. Vartak* 7216 (AHMA); *Ibid.*, 4000 ft, 24/11/56, *V.D. Vartak* 7211 (AHMA); *Ibid.*, 4000 ft, 24/11/56, *V.D. Vartak* 7213 (AHMA); Nasrapur, 2000 ft, 08/02/58, *V.D. Vartak* 12612 (AHMA); Vetat hill, 23/08/88, *V.N. Joshi* VH577 (AHMA); Bhimashankar, 3500 ft, 10/03/56, *V.D. Vartak* 3552 (AHMA); Pachgaon-Parvati, 28/01/81, *D.K. Kulkarni* 639 (AHMA); Mutha river side, 15/01/57, *V.D. Vartak* 7872 (AHMA); Sinhadagad hill, top of the fort, 3200 ft, 24/04/56, *V.D. Vartak* 4353 (AHMA); Bhimashankar, 3500 ft, 10/03/56, *V.D. Vartak* 3551 (AHMA); *Ibid.*,

3500 ft, 10/03/56, *V.D. Vartak* 3550 (AHMA); *Ibid.*, 08/11/62, *K.P. Janardhanan* 78082 (BSI); *Ibid.*, Pune, 21/03/07, *G.M. Ryan* 1694 (BSI); Bhor, nira river, 19/08/50, *V.D. Vartak* 69 (AHMA); Nasrapur, 2000 ft, 12/04/58, *V.D. Vartak* 12627 (AHMA); Purandhar fort (top) near Commandants office, 18/02/63, *Seshagiri Rao Rolla* 86524 (BSI); Shivneri hill-Junnar, 31/01/1967, *K. Hemadri* 108117 (BSI); Dhak Range, Junnar, 21/01/1966, *K. Hemadri* 108217 (BSI); Ustad-Kaldare hills, 10-12 miles west of Junnar, 30/10/1964, *K. Hemadri* 104277 (BSI); Top of Vahagaon hill (Khed taluk), 10/12/61, *K.P. Janardhanan* 76456 (BSI); Vandra (Khed taluk), 30/11/61, *K.P. Janardhanan* 75980 (BSI); Southern slope of Shinga hill (Khed taluk), 27/11/61, *K.P. Janardhanan* 75902 (BSI); Hill facing Malavli village, 06/03/62, *Seshagiri Rolla Rao* 77622 (BSI); Dhak range, Junnar, 21/01/1966, *K. Hemadri* 108217 (BSI); Top of vahagaon hill (Khed taluk), 10/12/61, *K.P. Janardhanan* 76456 (BSI); Purandar slopes, 22/12/45, *H. Santapau* 8185 (BLAT); Purandar, Pune, 12/1917, *H. Santapau* 20936 (BLAT); Purandhar fort, 18/02/63, *Seshagiri Rao Rolla* 86524 (BSI); Purandhar, 12/1917, *V. Narayanaswami*, 20899 (BLAT); *Ibid.*, 12/1917, *H. Santapau* 50000 (BLAT); *Ibid.*, 23/12/44, *H. Santapau* 5615 (BLAT); Purandhar, 07/11/51, *H. Santapau* 13902 (BLAT); Lohagad, 12/1918, *E. Blatter* 28326 (BLAT); Khandala, 13/05/1917, *H. Santapau* 20407 (BLAT); *Ibid.*, 03/1917, *H. Santapau* 20398 (BLAT). Raigad district, Matheran, 22/11/1958, *N.A. Irani* 2509 (BLAT); Matheran, 03/1925, *R.D. Aclaud* 594 (BLAT); Karnala, 28/02/75, *V.D. Vartak s.n.* (AHMA); *Ibid.*, 27/02/75, *Rekha Datar* 37 (AHMA); *Ibid.*, 25/02/75, *Rekha Datar* K643 (AHMA); Rajgad top, 4500 ft, 03/11/54, *V.D. Vartak* 246 (AHMA). Ratnagiri district, Ramghat-Bhedshi, 09/02/70, *B.S. Kulkarni* 119586 (BSI). Satara district, Panchgani way to table land, *s.d.*, *E. Blatter* 21577 (BLAT); Panchgani, 27/04/1957, *G.S. Puri* 14452 (CAL); *Ibid.*, 3200 ft, 01/02/56, *V.D. Vartak* 3059 (AHMA); *Ibid.*, 3200ft, 01/02/56, *V.D. Vartak* 3058 (AHMA); *Ibid.*, 3200 ft, 01/02/56, *V.D. Vartak* 3060 (AHMA); *Ibid.*, 3300 ft, 01/02/56, *V.D. Vartak* 3063 (AHMA); *Ibid.*, 3200 ft, 01/02/56, *V.D. Vartak* 3061 (AHMA); Koima valley, 3500 ft, 12/11/55, *V.D. Vartak* 2176 (AHMA); Mahabaleswar, Panchgani Road, 14/10/57, *S.D. Mahajan* 24711 (BSI); Konya WLS, Satara, Pali, 17/01/2014, *Prajakta S. Pathare* 196804 (BSI);

Mahabaleswar, China man's falls, 4500 m, 17/12/50, *P.V Bole* 109 (CAL); *Ibid.*, 20/10/51, *P.V. Bole* 349 (BLAT); *Ibid.*, 12/03/66, *B. Balamani* 552 (BLAT); Mahabaleswar, 28/12/60, *H. Santapau* 23584 (BLAT); *Ibid.*, 10/04/57, *H. Santapau* 12572 (BLAT); *Ibid.*, 12/03/60, *H. Santapau* 23402 (BLAT); *Ibid.*, 10/01/2022, *M.V. Dilsha* 9125 (DEV). Sindhudurg district, Amboli, 30/12/1977, *S.M. Almeida* 1291 (BLAT); Amboli, 12/1979, *S.M. Almeida* 4421 (BLAT); Amboli, Savantavadi, 24/12/1968, *M.R. Almeida* 888 (BLAT).

Conservation status: Least Concern.

Notes: *B. malcolmii* is distinguished from *B. eriantha* due to densely silvery woolly nature, larger capitula and fasciculate nature of the former compared to not woolly, smaller capitula and generally pedunculate nature. In their extreme forms the two species are quite distinct and clear cut. However, where they overlap, the boundaries between them become indistinct and possible intermediate conditions occur.

Blumea obliqua (L.) Druce, Rep. Bot. Soc. Exch. Club Bri. Isles 4 (Suppl.2): 609. 1917; Randeria, *Blumea* 10(1): 286. 1960; Saldanha & Nicolson, Fl. Hassan Dist. 605. 1976; Grierson in Dassan. & Fosbery, Revis. Handb. Fl. Ceylon 1:174. 1980; K.M. Matthew, Fl. Tamilnadu Carnatic 3(1): 772. 1981; Yogan *et al.*, Fl. Chikmagalur Dist. 184. 1981; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2:137. 1984; M. Chandrabose & N.C. Nair, Fl. Coimbatore 160. 1987; K.K.N. Nair & M.P. Nayar, Fl. Courtallum 2: 331. 1987; N.P. Singh, Fl. Eastern Karnataka 1: 364. 1988; Pull. & N. Yesoda, Fl. Anantapur Dist. 135. 1989; K.M. Mathew, Excursion Fl. Central Tamil Nadu 255. 1991; S. Kumar in Hajra *et al.*, Fl. India 13: 137. 1995; Sivar. & P. Mathew, Fl. Nilambur 365. 1997; Pull. & Ali Moulali, Fl. Andhra Pradesh 2: 515. 1997; K.M. Matthew, Fl. Palni hills 2: 668. 1999; Pull. *et al.*, Fl. Guntur Dist. 201. 2000; M.R. Almeida, Fl. Maharashtra. 3A: 81, 2001; B Suryanarayana & A Sreenivasa Rao, Fl. Nellore dist. 2: 304. 2002; S.R. Yadav & Sardesai, Fl. Kolhapur 241. 2002; S.G. Pradhan *et al.*, Fl. Sanjay Gandhi NP 330. 2005; Manikandan & Lakshminarasimhan, Fl. Rajiv Gandhi NP 224. 2013. *Erigeron obliquum* Linn., Mant. 2: 573. 1771. *Conyza obliqua* Willd. Sp. Pl. 3: 1930. 1804. Type: India, Linn. Savage catalogue Number 994.1. **Fig. 32**

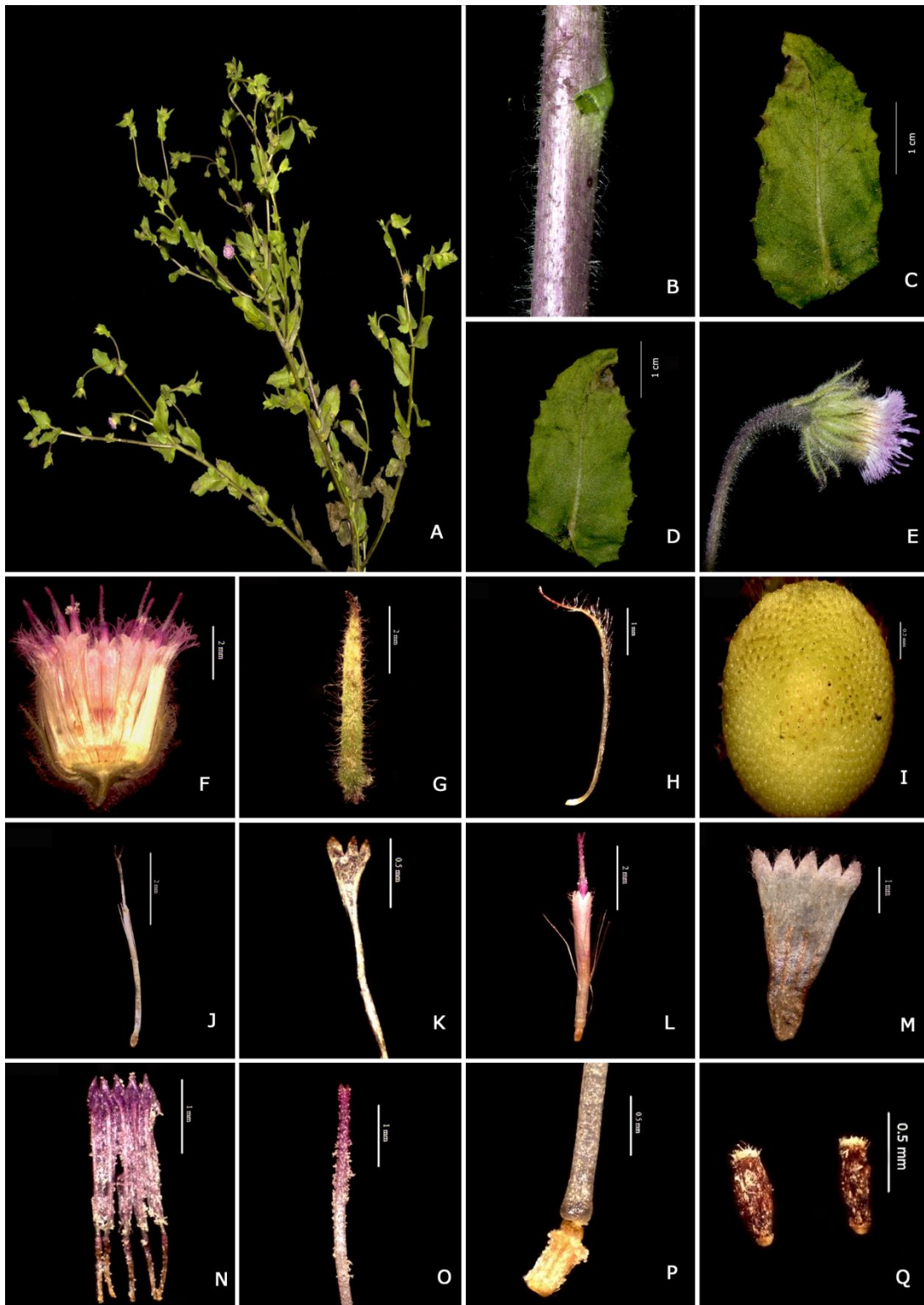


Fig. 32. *Blumea obliqua* (L.) Druce: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

Conyza amplexicaulis Lam. Encl. 2: 84. 1786. Type: not traced

Blumea amplexens DC. in Wight, Contrib. Bot. Ind. 13. 1834; Gamble, Fl. Pres. Madras 482. 1921; Cooke, Fl. Pres. Bombay 2:19. 1958; Hook.f., Fl. Brit. India 3: 260. 1882. *Conyza amplexens* Wall., Numer. List, no 3096. 1831. nom. nud. Type: Negapatam, Wallich, 3096 comp. no. 206 (K!).

Blumea anagallidifolia DC. in Wight, Contrib. Bot. Ind. 13. 1834. *Conyza anagallidifolia* Wall., Numer. List, no 3098. 1831. nom. nud. Type: India, Negapatam, K!.

Blumea pubiflora DC. Prodr. 5: 434. 1836. *Erigeron asteroides* Wall., Numer. List, no. 2975 B. 1831. nom. nud. Type: India, Maderaspatana, Wallich, combination no 85 (G-DC!, K!).

Blumea obliqua var. *maritima* (C.B. Clarke ex Hook.f.) G.S. Giri & B. Mitra, India J. Forest. 7: 143. 1984, *syn. nov.* *Blumea amplexens* var. *maritima* C.B. Clarke ex Hook.f., Fl. Brit. India 3: 260.1882. Type: Salt lakes, Calcutta, 29/03/1874, C.B. Clarke, 21613 (CAL) Lectotype designated by Giri & Mitra, 1984).

Blumea obliqua var. *tenella* (Clarke) Mahesh., JBNHS. 54. 805. 1921, *syn. nov.*; M R. Almeida, Fl. of Maharashtra. 3A. 82, 2001. *Blumea amplexens* var. *tenella* (Clarke) Hook.f., Fl. Brit. India 3: 260. 1882; Cooke, Fl. Pres. Bombay 2:75. 1958. Type: not traced.

Annual herbs, 47 cm. Tap root, small rootlets arise from it, upto 13 cm. Stem erect, terete, branched from base, dichotomously branched, base woody, upto 1 cm thick, terete, base purplish red (vinaceous), sparsely long multicellular hairs in base, other portions purplish red and green mixed, 2.75 mm thick, middle villous with long white multicellular hairs; internodes 3-7 cm. Leaves sessile, laminae obovate-oblongate, 4.5 x 1 cm, base truncate or cordate, margins of some leaves reddish brown, margins serrated, apex attenuate, thick textured, velutinous on both surface with long white multicellular hairs, bright green on both surface, in vegetative stage the main veins of lower leaves purplish red. Inflorescence at the ends of branches, solitary. Capitula campanulate, 5.43 x 3.67 mm, long pedunculate, peduncles 2.3 cm

long, green, pilose with long white multicellular hairs; bracteoles linear lanceolate, villous. Involucral bracts 4 seriate, shorter than florets; first phyllary linear-lanceolate, 4.71 mm, green, orange line through the centre, villous with long multicellular hairs; second phyllary 4.492 x 0.627 mm, apex acuminate, 4.492 mm long, woolly with long multicellular hairs, linear lanceolate (or ensiform), tip purple; third phyllary 4.99 x 0.587 mm, linear lanceolate, tip purplish red, tip acuminate or aristate, villous with long multicellular hairs, scarious margins, others green; fourth phyllary 5.78 x 0.402 mm, linear lanceolate, subscarious, only a small portion at center is green, tip acuminate or aristate, purplish red, pilose with multicellular hairs. Receptacle concave, foveolate, glabrous, 3.21 mm wide, epaleaceous. Floret ± 382 no, peripheral female florets, central bisexual florets. Female floret ± 358 no., filiform, corolla tube 4.56 mm long, corolla yellowish white, 3 lanceolate lobes, lobes deep, 0.147 mm compared to other *Blumea* sp, glabrous, style bifid, arms equal, 0.919 mm long, pink, others whitish pink pappus reach upto the ending of corolla. Bisexual floret ± 24 no., tubular, corolla tube 7.78 mm long, pappus reach upto the starting of lobes, 7 pappus, caducous or easily detachable; corolla, pink, orange coloured stripes on, five oblanceolate lobes, papillate, lobes villous with long multicellular hairs. Stamen 5, syngenesious; anther 2.26 mm, light purple, apical appendages of same length, acuminate, base with unbranched tails, tails small or equal to or greater than the thickened portion of filament or anther collar; filament 1.48 mm, whitish purple. Style bifid, arms equal, 0.463 mm, a small portion of style lobe pink other white, sweeping hairs present on style lobes and below bifurcation upto center, style base swollen, style attached to ovary by a cylindrical structure almost same diameter as ovary, ovary whitish with orange lines. Cypselas homomorphic, oblong, 0.649 x 0.215 mm, dark brown, smooth, base slightly tapering, pubescent. Pappus white, uniseriate, 3.22mm long, caducous or easily detachable.

Flowering & Fruiting: September-May.

Distribution: India, Jawa, Pakistan, Myanmar and Sri Lanka. Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Puducherry UT, Tamil Nadu, and Telangana are the states where this species is distributed in Peninsular India.

Habitat & Ecology: Growing in comparatively dry localities on poor sandy soil or in swampy areas.

Specimens examined: **Andhra Pradesh**, Anantapuramu district, Reddypalli farm (Anantapur), 15/08/1981, N. Yesoda 278 (MH); Kalasamudram RF, 08/02/1983, N. Yesoda 1164 (MH); Aluru Kona, 350 m, 14/11/1982, T. Pullaiah & N. Yesoda 1135 (MH). Chittoor district, Kuppam, 30/04/1914, J.S. Gamble 10311 (MH). East Godavari district, Kondapalle RF, 07/02/86, P. Venkanna 5931 (MH). Eluru district, Cultivated fields way to Kolleru lake, sea level, 24/01/1958, P. Subramanyam 5105 (MH). Kurnool district, Kurnool hills, 1873, R.H. Beddome & J.S. Gamble 1873 (MH); Nandyal, 12/12/1957, S.K. Wagh 5274 (BLAT); *Ibid.*, 27/12/1957, S.K. Wagh 5273 (BLAT); *Ibid.*, 27/02/1957, S.K. Wagh 5275 (BLAT); Hussainapuram, 26/12/2021, M.V. Dilsha 9116 (DEV). Nellore district, Krishnapatnam, 05/08/1917, C.E.C. Fischer 4115 (CAL); *s.l.*, 02/1837, J.S. Gamble 20397 (CAL). NTR district, Nandigama, 17/02/86, P. Venkanna 6019 (MH). Sri Sathya Sai district, Nallamada, 08/03/1983, N. Yesoda 1210 (MH). Visakhapatanam district, Cheedipalem, 325 m, 04/07/1965, G.V. Subharao, *s.n.* (MH). YSR district, Cuddapa, 19/03/1923, C.E.C. Fischer 4780 (CAL); Motakatla, 500 m, 28/02/1959, K. Subramanyam 7824 (MH); Cuddapah near airport, 26/12/2021, M.V. Dilsha 9114 (DEV). **Gujarat**, Bharuch district, Broach, 27/01/55, G.L. Shah 1589 (BLAT); Baroda-river bank east, 15/05/1955, G.L. Shah 4367 (BLAT); Broach PWD road, 29/12/56, G.L. Shah 8358 (BLAT); *Ibid.*, 29/12/56, G.L. Shah 8359 (BLAT). Jamnagar district, Jodiya, 30/12/77, V. Singh 5551 (CAL). Kutch district, Mundra, 12/04/1960, K.C. Kanodia 62066 (BSI). **Karnataka**, Dakshina Kannada district, Shiradi ghat, along road in coffee estate, 27/12/1978, C.J. Saldanha, P. Prakash & S.B. Manohar 5508 (CAL). Davanagere district, Devangere-Holalkre road, 01/01/1976, N.P. Singh 141945 (BSI). Bagalkot district, Badami, 18/02/1975, N.P. Singh 129771 (BSI). Kalaburagi district, Sindgi-Janangi road, 19/01/1976, N.P. Singh 102632 (BSI). Yadgir district, Yadgir-Shorapur road, 13/02/1975, N.P. Singh 129530 (BSI). **Maharashtra**, Ahmednagar district, Chapadgaon, 16/12/2011, J. Jayanthi & S.C. Yadav 199320 (BSI). Jalgaon district, Khandesh, Raver, 13/03/1957, S.D. Mahajen 13240 (BSI). Mumbai district, Borivali NP, Versova Creek side, 11/01/55, B.D. Sharma 167404 (BSI). Palghar district, Bordi range, 10/01/1968, K.V. Billore 113417 (CAL); *Ibid.*, 10/01/1968, K.V. Billore 113416 (CAL); Palghar range, 15/01/1968, K.V. Billore

113563 (CAL); Bordi range, 10/01/68, *K.V. Billore* 113417 (BSI); Agashi creek, 16/01/68, *K.V. Billore* 113603 (BSI). Pune district, Talegaon near the lake, 05/03/1962, *R.S. Rao* 33007 (CAL); Junnar, 18/01/1966, *K. Hemadri* 108135 (BSI). Raigad district, Padmdurg, 10/10/16, *Anil Rajbhar* 312 (BLAT). Solapur district, Siddeshwar Van Vihar, 21/12/2011, *J. Jayanthi & S.C. Yadav* 199391 (BSI). Thane district, Bassien creek, near fort, 21/01/1968, *K.V. Billore* 113698 (CAL); Kelve creek, 13/01/1968, *K.V. Billore* 113539 (CAL); Bassieu Creek, near fort, 21/01/68, *K.V. Billore* 113698 (BSI); Thana creek, 25/01/1968, *K.V. Billore* 113821 (CAL).

Puducherry UT, Karaikal district, Karaikkal, 25/04/72, *A.R.K. Sastry* 9138 (CAL); Karaikkal, 25/04/72, *A.R.K. Sastry* 9144 (CAL). **Tamil Nadu**, Coimbatore district, Maruthamalai (Coimbatore), 653 m, 14/11/1956, *K.M. Sebastine* 1304 (MH); *Ibid.*, 653m, 23/11/1956, *K.M. Sebastine* 1450 (MH); Coimbatore, Songapalli, 23/01/1906, *C.E.C. Fischer* 825 (CAL); Vellingiri hills, 667 m, 26/04/1957, *K.M. Sebastine* 3143 (MH); Agricultural college, Coimbatore, 07/09/1968, *M. Chandrabose* 29772 (MH); *Ibid.*, 06/08/1968, *M. Chandrabose* 30645 (MH). Cuddalore district, Parangipettai, 2 m, 10/02/1979, *K. Ramamurthy* 58173 (CAL, MH). Dindigul district, Kodaikanal, 19/03/1930, *D. Daniel Sundaraj s.n.* (MH). Kallakurichi district, Forest near Kallakurichi-Cuddalore way, 200 m, 05/02/1983, *K. Ramamurthy* 77305 (CAL, MH). Madurai district, Paddyfield near the pond, Poyakarai, 133 m, 12/06/1957, *K. Subramanyam* 3437 (MH). Nagapattinam district, Nagore, 26/04/72, *A.R.K. Sastry* 9158 (CAL); Velankanni, 27/04/72, *A.R.K. Sastry* 9198 (CAL); *Ibid.*, sea level, 29/01/87, *S. Ragunathy* 51 (CAL); Kodikkarai beach, 01/10/1986, *S.J. Britto & M. Charles* 30511 (RHT). Nellore district: Venadu Island, Pulicat lake, 27/02/71, *A.R.K. Sastry* 7836 (CAL). Pudukottai district, Kottaipatinam, 5 m, 30/01/78, *K. Ramamurthy* 53681 (CAL, MH); Manamelkudi, 28/08/1985, *C. Arulappan* 454 (MH); Vellanur, Pudukottai, 110 m, 03/10/1984, *C. Arulappan* 175 (MH); Poovatrakkudi, Pudukottai, 60 m, 24/02/1985, *C. Arulappan* 374 (MH); Kattumavadi to Kottaipatnam, 5 m, 31/01/1978, *Ramamurthy* 53681 (MH). Ramanathapuram district, Krusadi Island, way to the Museum, sea level, 18/02/1987, *N. Parthasarathy & K. Ravikumar* 8350 (BSID, MH); Rameswaram island, 225 m, 13/09/1961, *A.K. Mukherji* 225 (CAL); *Ibid.*, 21/12/1960, *T.A. Rao* 579 (CAL); Narikuzhi, Rameswaram, 15 m, 09/04/88, *V. Balasubramaniam* 1723 (MH); Rameswaram south, 13/05/1992, *T.A. Rao* 1403 (CAL); Anandur cut road, 02/01/88, *V. Balasubramaniam* 1556 (CAL, MH); Uthirakosamangai, ± 50 m,

08/02/87, V. Balasubramaniam 1225 (CAL); Krishnakoil to Alagapuri, ± 250 m, 22/02/1979, N.C. Nair 61068 (CAL); Mudukulathur, 75 m, 18/06/1978, N.C. Nair 57317 (CAL, MH); Krusadi island, 12/09/1961, A.K. Mukherjee 201 (CAL); Narikuzhi, Rameswaram, 09/04/88, V. Balasubramaniam 1723 (CAL); Nalli, 06/06/1954, D. Meenakshi Sundaram 22005 (MH); Sathanur, Paramakudi, 21/02/1953, J. Sankaram Rao 21779 (MH); Paramakudi, 19/02/1953, J. Sankaram Rao 21671 (MH); Perunazhi, 75 m, 22/02/80, V. Balasubramaniam 1623 (MH). Salem district, Mannur, 50 m, 24/07/1977, R. Ansari 49987 (CAL, MH). Sivaganga district, Tirupachetti, 110 m, 23/08/1964, s.coll. 21050 (MH). Tenkasi district, Kasimajorpuram, Courtallum, 300 m, 28/07/1957, K. Subramanyan 3893 (MH). Thanjavur district, Pattukottai to Kottumavdi, 5 m, 30/01/1978, K. Ramamurthy 53670 (MH). Tiruchirappalli district, Tiruchi, Srirangam island, Kondayampettai, 65 m, 23/02/1978, Perianayakam 12186 (RHT); Lalgudi, srirangam island, 65 m, 05/02/1980, Perianayakam & Xavier 26309 (RHT); Mullakkudi, 65 m, 03/03/1984, K.M. Mathew & Britto 29610 (RHT); Rattamalai, 23/03/1984, K.M. Mathew 29873 (RHT). Tirunelveli district, Singampatti valley, 92 m, 03/03/1958, K.M. Sebastine 5498 (MH). Viluppuram district, Melkondai RF, 60 m, 21/02/1979, K. Ramamurthy 60367 (CAL, MH). Virudhunagar district, Krishnakoil to Alagapuri, 250 m, 22/02/1979, N.C. Nair 61068 (MH). **Telangana**, Khammam district, NSTR (Nagarjunsagar-Srisailem Tiger Reserve), 411 m, Gundlamula, 04/02/2016, L. Rasingam 4698. Mahbubnagar district, NSTR (Nagarjunsagar-Srisailem Tiger Reserve), Maddimadugu, 04/03/2014, L. Rasingam 4698 (BSID). Rangareddy district, Gangaram, 250 m, 21/02/2000, R.K. Premanath 110949 (MH). Warangal District, Pakhal, 250 m, 24/01/2001, R.K. Premanath 111572 (MH, BSID).

Conservation status: Least Concern.

Notes: The cypselae of this species is dark brown and smooth, similar to cypselae of *Pseudoconyza viscosa*. Daruwalla (1995) investigated the cytological studies of *Blumea* and related species and concluded that *B. obliqua* has close affinities with *Pseudoconyza viscosa*. Both have a chromosome count of $n=10$. Randeria (1960) pointed out that *B. obliqua* is extremely variable according to its habitat. Several authors have recognized taxonomic varieties based on these variations. Through the field work as part of this work, we collected different forms of *B. obliqua* which

differ in leaf and indumentum characters. But all that except one are ecological variants only.

Blumea obliqua var. *arenaria* (DC.) G.S. Giri & B. Mitra, Indian J. Forest. 7(2): 143. 1984. *Blumea arenaria* DC., Contr. Bot. India 13. 1834. Type: India (Lectotype K!, designated by Dilsha & Satheesh, 2021). **Figs. 33, 34**

Annual herbs, 3-30 cm. Taproot, upto 10 cm. Stem erect, terete, simple or branched, dichotomously much branched, base upto 0.5 cm thick, pale green, pubescent with long white multicellular hairs; large ones reddish brown in most of the areas, younger branches and tips green, base reddish brown and other portion pale green in short forms, pilose with long multicellular hairs and absence of capitate glandular hairs, short forms all silky villous; internodes 1-2 cm. Leaves simple, alternate, sessile, semiamplexicaul in large ones, laminae oblanceolate, 4 x 1.5 cm, margin distantly denticulate in short forms, apex acute, both surface pale green. Inflorescence solitary, terminal and in the axils of upper leaves. Capitula campanulate, 5.33 x 3.63 mm, long pedunculate, peduncles upto 2.5 cm, green or purplish tinged, villous with long white multicellular hairs, 0.755 mm wide; bracteoles linear lanceolate, pubescent. Involucral bracts 4 seriate, shorter than florets; first phyllary elliptic lanceolate, pilose with long multicellular hairs, 6.35 x 0.644 mm, margins reddish brown; second phyllary 4.83 x 0.741 mm, villous with long multicellular hairs, orange line through the center prominent upto the center from tip, linear lanceolate; third phyllary 6.06 x 0.695 mm, linear lanceolate, villous with long multicellular hairs; fourth phyllary 5.863 mm, linear, subscarios, orange line through center. Receptacle concave, foveolate, glabrous, 3.14 mm wide, epaleaceous. Florets ± 374 no., peripheral female florets, central bisexual florets. Female floret ± 350 no., filiform, corolla tube 4.58 mm long, corolla, purplish white, 3 lobes, glabrous, style bifid, arms equal, 0.731 mm long, pappus hair reach upto the starting of corolla. Bisexual floret ± 24 no, corolla tube 3.62 mm long, tubular, pappus hair reach upto the starting of corolla lobe, corolla tip to center pink, whitish to the base, glabrous on tube, 5 lobed, lobes 0.588 mm long, lanceolate or ovate oblong, long multicellular and glandular hairs. Stamen 5, syngenesious; anther 2.14

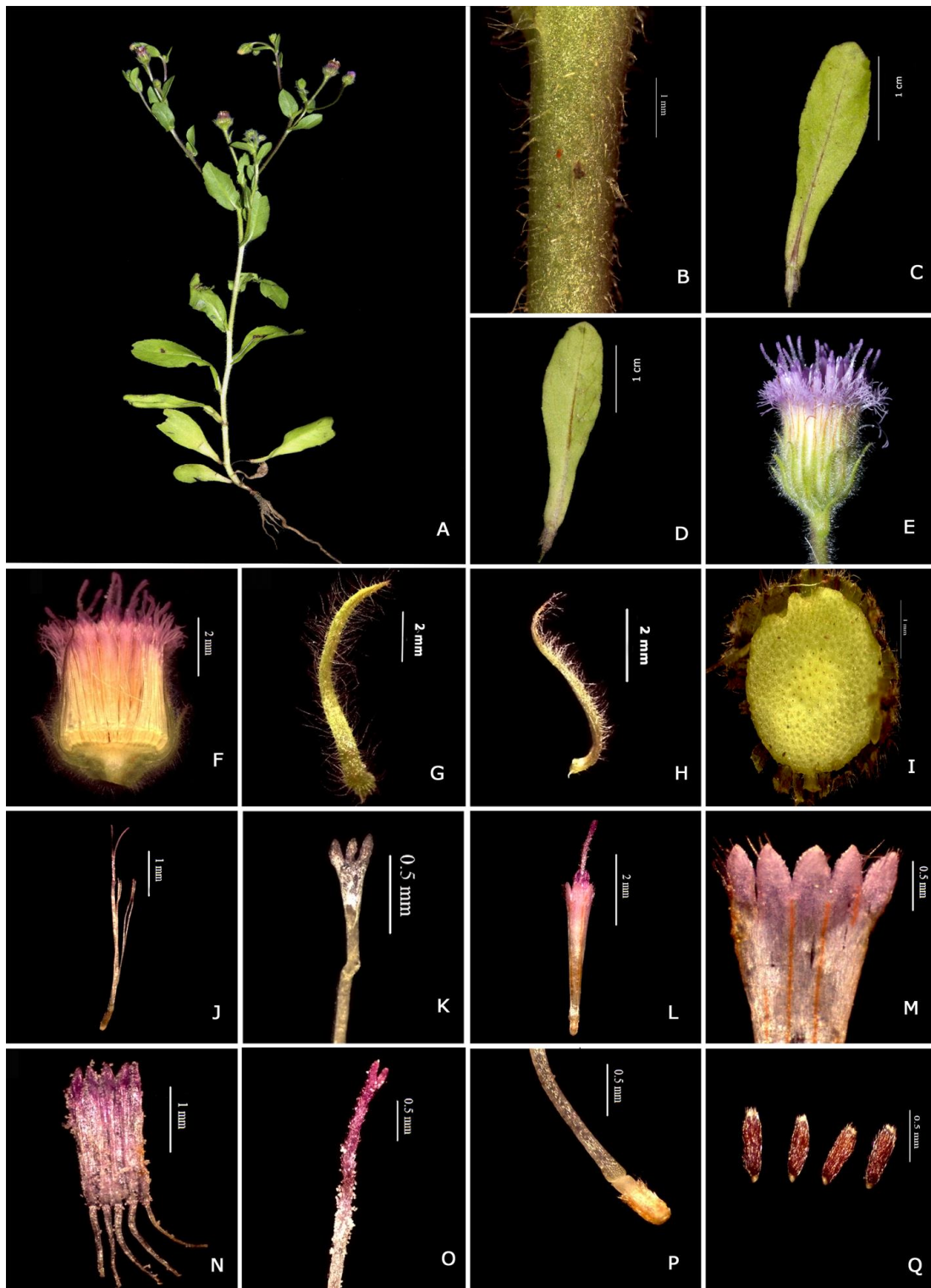


Fig. 33. *Blumea obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

mm, dark pink upto center, others pale pink, anther apical appendages of same length, acuminate, 0.180 mm, base with unbranched tail, tail same length as the thickened portion of filament. Style bifid, arms equal, 0.321 mm, style arms and upto center purple, others whitish or translucent, sweeping hairs present on lobes and below bifurcation upto center of style, style base slightly swollen, attached to ovary by a cylindrical structure which is same thickness as style, ovary yellowish with orange lines. Cypselas homomorphic, oblong, 0.681 x 0.236 mm, smooth, dark brown, base slightly tapering, pubescent. Pappus white, 8-10, uniseriate, caducous or easily detachable, 2.90 mm long.

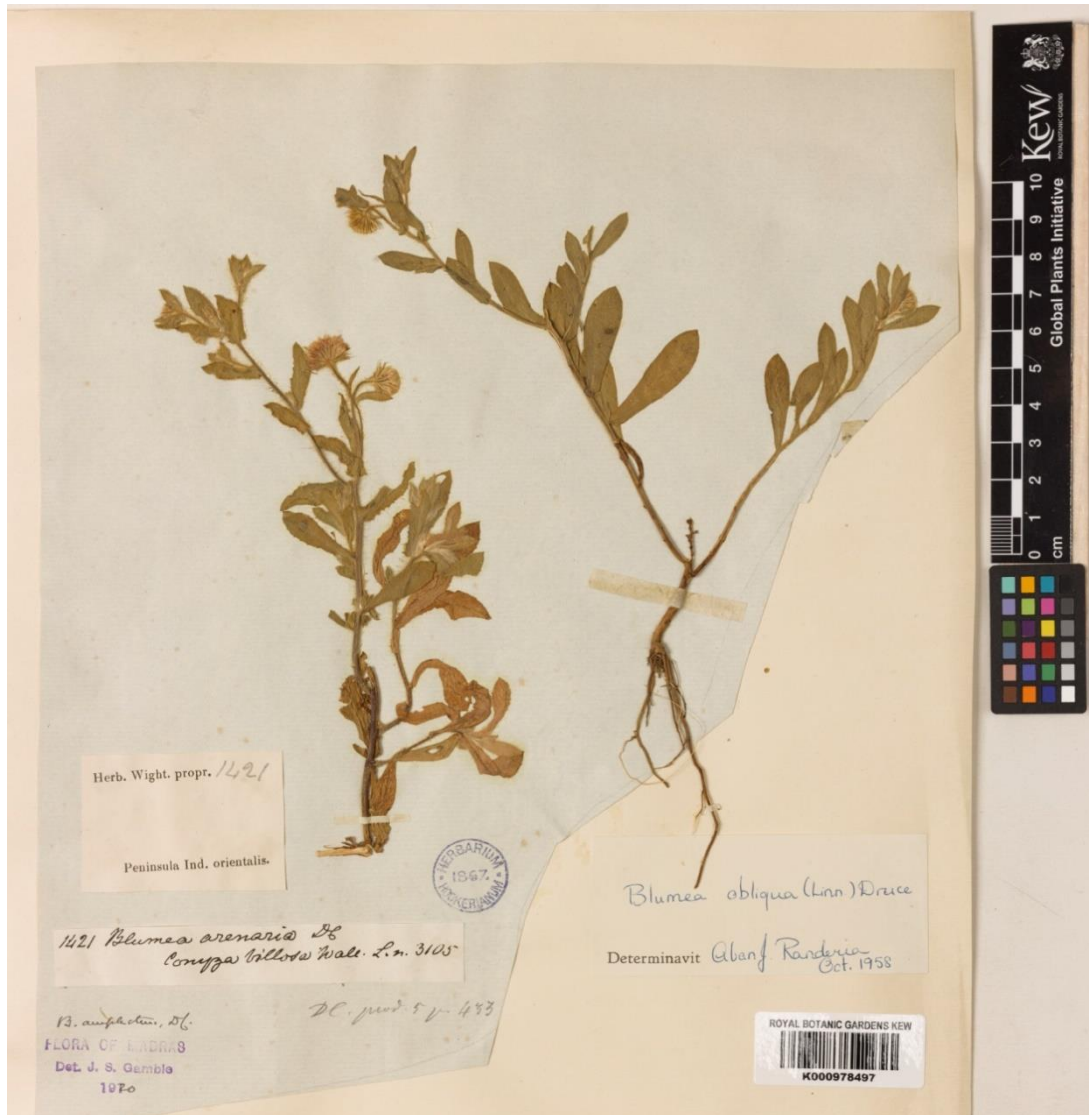


Fig. 34. Type of *Blumea obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra © The Board of Trustees of the Royal Botanic Gardens, Kew.

Flowering & Fruiting: September-April.

Distribution: The species is reported so far from India only. Endemic, found only in Puducherry UT and Tamil Nadu.

Habitat & Ecology: Growing in comparatively dry localities on poor sandy soil or in swampy areas.

Specimens examined: Puducherry UT, Karaikal, 11/04/2022, *M.V. Dilsha* 9136 (DEV). Tamil Nadu, Thanjavur district, Kodikarai RF, 15/09/1977, *K. Ramamurthy* 51253 (MH); Point Calimere beach, sea level, 07/08/1960, *K.M. Sebastine* 10605 (MH). Thiruchirapally district, In fields way to Thuraiyur, 233 m, 21/03/1959, *K.M. Sebastine* 7930 (MH). Ramanathapuram district, Krishnakoil to Alagapuri, ± 250 m, 22/02/1979, *N.C. Nair* 61068 (MH!); Ramanathapuram, sea level, 18/02/87, *N. Parthasarathy & K. Ravikumar* 85350 (MH); Gopalpuram burial ground, Pudupatti, ± 200 m, 15/02/1979, *S.R. Srinivasan* 60816 (MH); Krusadi island, sea level, 30/12/87, *V. Balasubramanyam* 1447 (MH!); Rameswaram, sea level, 28/10/88, *V. Balasubramanyam* 1899 (MH); Krusadai, 30/09/1945, *D. Daniel & S.R. Raju* 20550 (MH).

Conservation status: Least Concern.

Notes: When creating the combination (*Blumea obliqua* (Linn.) Druce var. *arenaria* (DC) Giri et B. Mitra) Giri and Mitra (1984) cited the type as Wight 1421 (K). Wight 1421 has two herbarium sheets at Kew, and we traced other sheets from E and G. In order to reduce Giri and Mitra's to a single specimen, effective lectotypification is required (Art. 9.6 of the ICN). As a result, we chose sheet K000978497 to represent the lectotype of *Blumea arenaria* since it exactly fits the protologue.

Blumea oxydonta DC., Wight, Contr. Bot. India. 15. 1834; Prodr. 5: 444. 1836; Hook. f., Fl. Brit. India 3: 266. 1882; Gamble, Fl. Pres. Madras 482. 1921; Cooke, fl. Pres. Bombay 2:77. 1958; Randeria, Blumea 10(1): 280. 1960; Saldanha & Nicolson, Fl. Hassan Dist. 606. 1976; K.M. Matthew, Fl. Tamilnadu Carnatic 3(1):773.1981; Manilal & Sivar., Fl. Calicut 150. 1982; B.D. Sharma *et al.*, Fl.

Karnataka Analysis 2:137. 1984; Ansari, Fl. Kasaragod Div. 210. 1985; V. S. Ramach. & V.J. Nair, Fl. Cannanore 245. 1988; Keshava Murthy & Yoganarasimhan, Fl. Coorg 242. 1990; K.M. Mathew, Excursion Fl. Central Tamil Nadu 255. 1991; M.J. Kothari & S. Moorthy, Fl. Raigad Dist. 212. 1993; S. Kumar in Hajra *et al.*, Fl. India 13: 139. 1995; S.D. Deshp. *et al.*, Fl. Mahabaleshwar & Adjoinings 2: 307. 1995; Sasidh. & Sivar., Fl. Pl. Thrissur For. 247. 1996; Pull. & Ali Moulali, Fl. Andhra Pradesh 2: 518. 1997; Sivar. & P. Mathew, Fl. Nilambur 365. 1997; Sasidh., Fl. Periyar Tiger Reserve 197. 1998; M.R. Almeida, Fl. Maharashtra. 3A. 82, 2001; Sasidh., Fl. Parambikulam WLS 167. 2002; S.R. Yadav & Sardesai, Fl. Kolhapur 241. 2002; K. Gopalakrishna Bhat, Fl. Udipi 305. 2003; S.G. Pradhan *et al.*, Fl. Sanjay Gandhi NP 330. 2005; Pull. *et al.*, Fl. Eastern Ghats 3: 239. 2007; C.N. Sunil & Sivad., Fl. Alappuzha Dist. 378. 2009; Ratheesh Narayanan, Fl. Stud. Wayanad Dist. 411. 2009; Manikandan & Lakshminarasimhan, Fl. Rajiv Gandhi NP 225. 2013; Sasidh., Fl. Aralam WLS. 212.2013. ***Erigeron graminosum*** Russ. ex DC., Prodr. 5: 444. 1836. in syn. ***Placus oxyodontus*** (DC.) Kuntze. Revis. Gen. Pl. 1: 357.1891. Type: India, Negapatam, Wight Cat. 1436 (Lectotype K!, designated by Randeria; Isolectotypes E!, NY, P!). **Figs. 35, 36**

Conyza oxyodonta (DC.) Wall. ex Miq. Fl. Ned. Ind. 2: 45. 1856. Type: Wallich Cat. 3015. comp. no. 125 (Holotype G-DC!; Isotype K-W!).

Blumea oxyodonta DC. var. ***glabrata*** DC. Prodr. 5: 444. 1836. ***Conyza tenera*** A Wall. Numer. List, no 3023. 1831. nom. nud. Nepal, Wallich Cat. 3023 A, comp. no. 133 (Holotype G-DC!; Isotype K-W!).

Conyza tenera B Wall. Numer. List, no 3023 B. 1831. nom. nud. Type: Nepal, Wallich Cat. 3023 B, comp. no. 133 (Holotype G-DC!; Isotype K-W!).

Blumea oxyodonta var. ***tenera*** DC. Prodr. 5: 444. 1836. ***Conyza tenera*** C Wall., Numer. List, no 3023 C. 1831. nom. nud. ***Conyza bovina*** Buch.-Ham. ex DC. in syn. Prodr. 5: 444. 1836. ***Erigeron cuspidatus*** Spreng. ex DC. Prodr. 5: 444. 1836 in syn. ***Blumea bovina*** Edgew. J. Asiat. Soc. Bengal 21(2): 178. 1852. Type: Nepal, Wallich Cat. 3023 C, comp. no. 133 (Lectotype G-DC!, designated by Pornporngrueng *et al.*, 2016; Isolectotype K-W!).

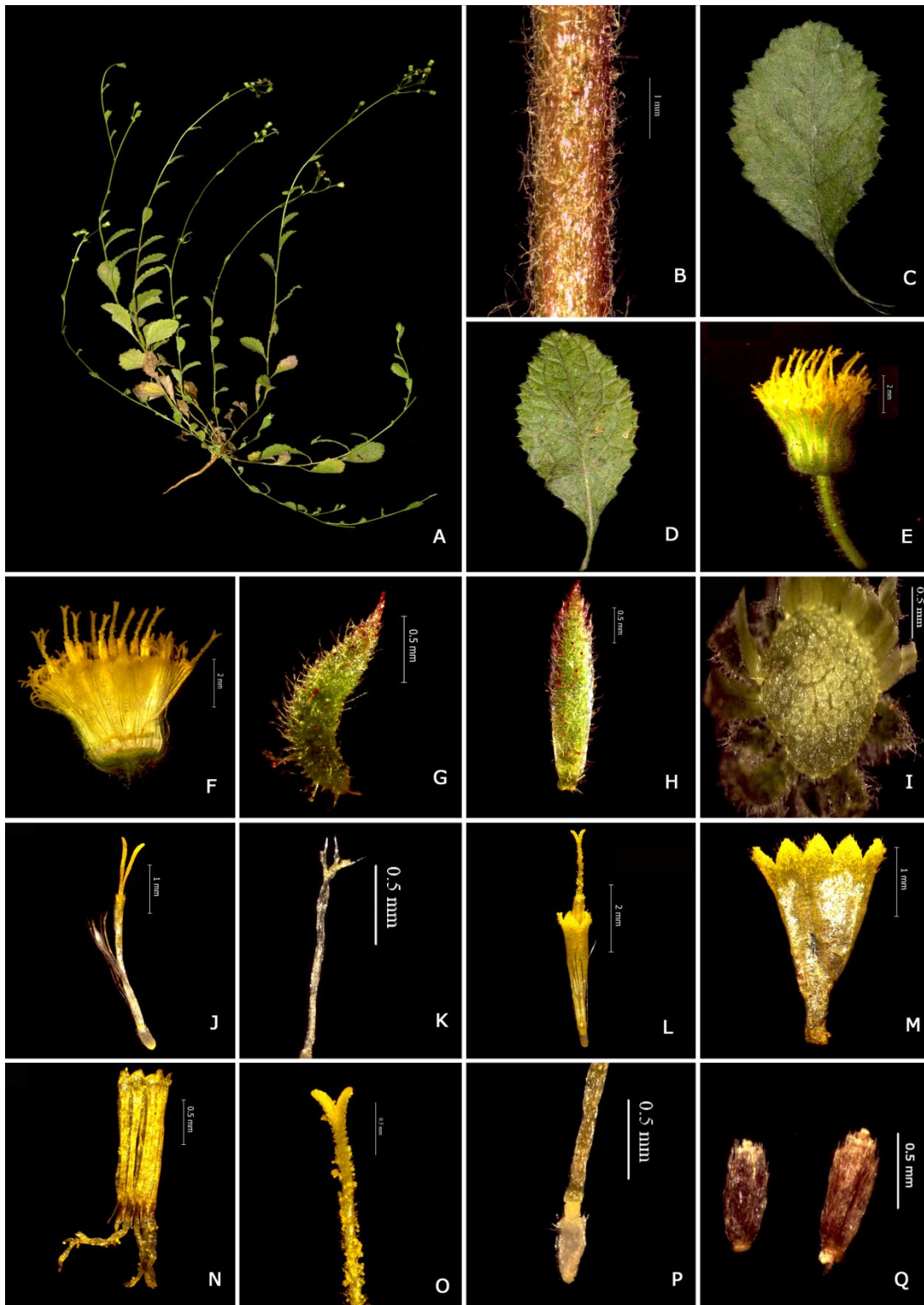


Fig. 35. *Blumea oxyodonta* DC.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypselas.



Fig. 36. Type of *Blumea oxyodonta* DC. © The Board of Trustees of the Royal Botanic Gardens, Kew.

Annual herbs, 8-40 cm. Taproots, upto 1 cm thickness, velvety buds seen on upper part of roots, upto 8 cm long. Stem procumbent, terete, numerous from root, spreading procumbent or partially ascending, branched, lower portion sparsely hairy with long yellowish multicellular pilose hairs and upper lanate with long yellowish white multicellular hairs on middle, apex villous with long yellowish white multicellular hairs and capitate glandular hairs, capitate glandular hair tips reddish brown or yellow; green with small brownish patches in lower stem, dark brown in most of the portion. Leaves simple, alternate, upper and lower leaves different; lower leaves petiolate, petiol upto 5 mm long, mostly crowded at base, laminae oblanceolate or ovate, prolonged at base into petiole, 3-7.5 x 1-3 cm, base cuneate, margins serrate, apex rounded or obtuse, thick textured, adaxial pubescent with yellow colored long multicellular hairs, abaxial villous with long multicellular hairs, upper surface bright green, lower whitish green; upper leaves sessile, laminae elliptic or narrowly obovate, 0.5-3 x 0.2-1.5 cm, younger leaves velvety, woolly villous with numerous long white multicellular hairs. Inflorescence in tips of branches, terminal corymbose panicle, few headed, 3-16 cm long. Capitula campanulate, subsessile or long pedicellate, 6.46 x 3.32 mm, peduncle 5.50 mm, bright green, pilose or villous with long yellowish multicellular hairs and capitate glandular hairs, tip of glandular hairs reddish brown or green; Involucral scales 4 seriate, margins hyaline or scarious, scarious or hyaline margine increases in inner phyllaries; first phyllary lanceolate, tip acute, green, purple tipped, 1.72 x 0.434 mm, densely villous on dorsal surface, capitate glandular hairs purple; second phyllary same as first, 2.51 x 0.486 mm; third phyllary 2.83 x 0.647 mm, ciliate margins; fourth phyllary scarious margins is more visible, 3.78 x 0.687 mm; ciliate margins. Receptacle flat or slightly convex, foveolate, glabrous, 1.69 mm wide, epaleaceous. Florets ± 156 no., peripheral female florets, central bisexual or with sterile anthers. Female floret ± 139 no., filiform, corolla tube 4.52 mm long, yellow to whitish yellow, translucent to base, corolla lobes 3, pubescent, style bifid, arms equal, 1.10 mm, pappus 8, shorter than corolla. Bisexual floret ± 17 no., tubular, corolla tube 3.82 mm, pappus shorter than corolla; corolla bright yellow at lobes, others pale yellow or whitish yellow, corolla tube glabrous or base of corolla with sparsely long hairs, lobes 5, triangular or oblong lanceolate, papillate, short multicellular and glandular hairs. Stamen sometimes sterile, with staminodes, if fertile 5, syngenesious; anther yellow, 1.63 mm, apical appendages of same length, obtuse or

rounded, 0.208 mm long, base with unbranched tails, tail larger than the thickened portion of filament or anther collar, 0.263 mm long; filament 1.39 mm long, pale yellow. Style bifid, arms equal, 0.402 mm, sweeping hairs present on arms and below the bifurcation upto centre, base not swollen, connected to ovary by a cylindrical structure which is equal or slightly narrower than style base and narrower than ovary. Cypselas homomorphic, oblong, 0.890 x 0.310 mm, smooth or ribs not conspicuous, black or brown, slightly tapering to base, whole surface pubescent. Pappus white, uniseriate, 8-10 no, caducous or easily detachable, 3.01 mm long.

Flowering & Fruiting: October-April.

Distribution: India, Bangladesh, China, Cambodia, Nepal, Laos, Vietnam, Myanmar and Thailand. This species is widely distributed in all Peninsular Indian states.

Habitat & Ecology: Common in stream beds, on river banks, in grassy clearings, pastures and rice fields and along railway lines and roadsides.

Conservation status: Least Concern.

Specimens Examined: **Andhra Pradesh**, East Godavari district, Maredumilliz, 550 m, 24/02/94, *M. Mohanan* 101390 (MH). Kurnool District, Pecherur, 22/02/1957, *S.K. Wagh* 5143 (CAL). Prakasam district, Near Rollapenta, 12/04/1986, *N. Rama Rao & V.B. Hosagoudar* 83746 (BSID, MH). **Goa**, South Goa district, Raia village, 12/03/64, *K. C. Kanodia* 96204 (BSI); Butpal village, 24/04/63, *K. C. Kanodia* 88234 (BSI); Mormugao, 20/10/91, *s.coll.* 2579 (BSI); Collem along the railway line, 02/02/2018, *M.V. Dilsha* 6908 (DEV). **Gujarat**, Dang district, Waghai, 13/03/54, *H. Santapau* 138440 (BLAT), Panchmahal district, Pavagadh hill station, 02/11/2018, *M.V. Dilsha & V. Drishya* 6934 (DEV). **Kerala**, Ernakulam district, Near irrigation department, Boothathaankett, 14/12/2018, *M.V. Dilsha & V. Drishya* 6954 (DEV). Idukki district, Narakathode to Parumthe, ± 100 m, 21/11/1991, *P. Bharghavan* 98666 (BSID); Adimali-munnar route, 1000 m, 19/01/87, *K. Ramamurthy* 84691 (CAL, MH). Kannur district, Madayippara, 19/10/2012, *C. Pramod* 290319 (CALI); *Ibid.*, 09/12/2010, *C. Pramod* 126600 (CALI); Payyanur, 350 m, 21/12/1980, *R. Ansari* 69944 (CAL, MH); Panur, ± 75 m, 21/12/1979, *V.S.*

Ramachandran 65371 (CAL, MH); Cannanore, 18/11/72, *T.A. Rao* 9951 (CAL); Cannanore shore, 18/11/72, *T.A. Rao* 9851 (CAL); Kannoth RF, 140 m, 25/09/1979, *V.S. Ramachandran* 61901 (MH); Kannur, Guest house, 28/12/1996, *P.S. Jothish* 27863 (TBGT); Kotta, Kannur, 20/10/1997, *G. Madhu* 35382 (TBGT); Madayippara, 14/11/2018, *M.V. Dilsha & V. Drishya* 6939 (DEV). Kasargod district, Nileshwar, 175 m, 29/01/1979, *V.J. Raju* 59971 (CAL, MH); Kasargod, 100m, 15/10/1970, *R. Ansari* 64940 (CAL, MH); *Ibid.*, 16/05/1982, *V.J. Nair* 73930 (CAL, MH); Bekhal fort, 12/12/1998, *N. Ravi* 33730 (TBGT). Kollam district, Punalur, 100 ft, 27/03/15, *C.C. Calder* 1513 (CAL). Kottayam district, Changanachery, below 10 m, 08/03/1984, *V.J. Antony* 336 (CAL, MH). Kozhikode district, Vatakara, 12/10/90, *G. Preseena* 4580 (CALI); Devagiri, 30/07/74, *Sivarajan s.n.* (CALI); Devagiri, Calicut, 60 m, 10/04/83, *s.coll.* 2053 (DEV); *Ibid.*, 55 m, 23/09/91, *K.M. Joseph* 142 (DEV); *Ibid.*, 60 m, 07/04/05, *Rajeev & Sareena* 1320 (DEV); Mukkam, 21/11/74, *Lila Thomas* 4756 (CALI); Kadalundi, 12/09/80, *Karthy Sankaran K* 119 (CALI); *Ibid.*, 08/02/86, *K.P. Karthiyani* 6421 (CALI); Ramanattukara, 41 m, 07/01/07, *Drishya Das Pulloor* 112681 (DEV); Ambalappara grassland, Kakkayam, 30/11/2018, *M.V. Dilsha & V. Drishya* 6950 (DEV). Malappuram district, CU Campus, 17/10/90, *P.K. Shalima* 3231 (CALI); *Ibid.*, 01/05/85, *A.C. Jayalakshmi* 12614 (CALI); Nilambur, 06/08/85, *A. Babu* 42524 (CALI); CU Campus, 10/02/86, *Jeeja Majeed* 8413 (CALI); *Ibid.*, 12/10/85, *A.K. Pradeep* 6143 (CALI); *Ibid.*, 04/09/84, *M.V. Sowmini* 1015 (CALI); *Ibid.*, 15/08/84, *Shaji Sebastian* 1794 (CALI); *Ibid.*, 05/02/90, *K. Rajitha* 1967 (CALI); *Ibid.*, 29/10/89, *N. Latha* 1208 (CALI); *Ibid.*, 28/10, *A. Mini* 3908 (CALI); *Ibid.*, 07/04/88, *Elsie Joseph* 43106 (CALI); *Ibid.*, 15/03/03, *Ligimol* 89895 (CALI); *Ibid.*, 20/12/75, *C.R. Suresh* 12844 (CALI); Thenjipalam, 20/12/75, *C.R. Suresh* 12845 (CALI). Kodikuthimala, 24/11/2018, *M.V. Dilsha* 6943 (DEV). Thrissur district, Trichur, 03/05, *Naseem Bhanu* UM4175 (CALI); *Ibid.*, 03/05/87, *E.V. Soniya* 1716 (CALI); Santhanathode area, 300 m, 26/11/1982, *K. Ramamurthy* 75561 (CAL); Chavakad to Trichur via paravatty and nattika roadside, 300 m, 28/09/1982, *K. Ramamurthy* 74915 (CAL, MH); Peechi dam area, 250 m, 09/04/1974, *K. Ramamurthy* 49274 (CAL, MH); Chalakudi range, 100 m, 09/12/1965, *K.M. Sebastine* 26683 (MH).

Palghat district, Vaniampara, ± 175 m, 15/02/1979, *E. Vajravelu*, 60448 (CAL, MH); Aruvampara slopes, 850 m, 19/01/1980, *P. Bhargavan* 65595 (CAL, MH); Dhoni, 500 m, 25/03/1910, *C.E.C. Fischer* 1821 (CAL); Malampuzha, 28/02/1997, *P.S. Jothish* 27879 (TBGT); Kotta, Palakkad, 18/12/1997, *G. Madhan* 35393 (TBGT). Wayanad district, Vaithiri, 04/12/81, *Surayya Beegam* 13918 (DEV); Santhanathode area, 300 m, 26/11/1982, *K. Ramamurthy* 75561 (MH); Kalpetta, 05/12/94, *A.E.S. Khan & E.S. Santhosh* 23210 (TBGT); Thirunelli, 06/03/2018, *M.V. Dilsha* 6931 (DEV). **Maharashtra**, Ahmednagar district, Khandgaon, 10/1986, *Rajendra Shinde* 856 (BLAT); Chapadgaon, Karjat, 16/12/2011, *J. Jayanthi & S.C. Yadav* 199315 (BSI). Jalgaon district, Bhadgaon, 12/02/66, *M.Y. Ansari* 107879 (BSI). Kolhapur district, Radhanagiri, 01/1928, *R.D. Aclaud* 606 (BLAT); Kolhapur, 11/02/2018, *M.V. Dilsha* 6914 (DEV). Mumbai city district, Worli, Bombay, 1952, *G.P. Amma* 46 (BLAT). Mumbai Suburban district, Malad, Quarry hills, 25/11/56, *G.L. Shah* 8070 (BLAT); Malad, 16/01/1955, *G.L. Shah* 1557 (BLAT); *Ibid.*, 16/01/1955, *G.L. Shah* 1560 (BLAT); *Ibid.*, 08/12/1954, *G.L. Shah* 1177 (BLAT); Near Goregaon Railway line, 20/01/56, *G.L. Shah* 6776 (BLAT); Goregaon, 13/03/1955, *G.L. Shah* 1811 (BLAT); National park, Borivali, 15/03/1952, *A.J. Randeria* 233 (BLAT); *Ibid.*, 09/01/1954, *A.J. Randeria* 581 (BLAT); *Ibid.*, 09/02/1952, *A.J. Randeria* 181 (BLAT); *Ibid.*, 08/12/1951, *A.J. Randeria* 149 (BLAT); National park Borivali, 08/12/1951, *A.J. Randeria* 148 (BLAT); Malad, grasses field, 14/12/57, *G.L. Shah* 9620 (BLAT). Nagpur district, Nagpur, 02/02/1961, *N. Hirashi* 749 (BLAT). Pune district, Talegaon near lake, 05/03/1962, *R.S. Rao* 33011 (CAL); *Ibid.*, 05/03/1962, *R.S. Rao* 33012 (CAL); Saltar forest, 28/03/64, *B. Venkata Reddi* 97616; Hill top of Valad, 27/07/1956, *G.S. Puri* 3716 (CAL); Bhimasankar, 27/02/75, *V.D. Vartak & Rekha Datar* 3510 (AHMA); *Ibid.*, 3500 ft, 10/03/56, *V.D. Vartak* 3561 (AHMA); Sinhagad, 4000 ft, 25/02/56, *V.D. Vartak* 3165 (AHMA); *Ibid.*, 3500 ft, 12/02/56, *V.D. Vartak* 3157 (AHMA); Khandala St. X Ravine, 16/04/56, *H. Santapau* 20396 (BLAT); Khandala, Monkey hill, 05/11/51, *H. Santapau* 13851 (BLAT); Khandala, 01/03/45, *H. Santapau* 6070 (BLAT); *Ibid.*, 04/03/44, *H. Santapau* 3640 (BLAT); *Ibid.*, Kume plattoo away from stream, 21/03/44, *H. Santapau* 3922 (BLAT); Shivneri hill, Junnar, 15/01/1966, *K. Hemadri* 108108 (BSI); Foot of choura hill,

Bhimasankar, 07/04/62, *K.P. Janardhanan* 76608 (BSI); Shinga hill (Khed taluk), 27/11/61, *K.P. Janardhanan* 75875 (BSI); Sinhagadh, 08/03/61, *S.R. Rolla* 67790 (BSI); Pirangut, 26/04/56, *S.K. Jain* 718 (BSI); Base of shivneri hill, 26/03/1964, *K. Hemadri* 98001 (BSI); Shivneri Hill, Junnar, 15/01/1966, *K. Hemadri* 108108 (BSI); Roadsides near Pavna dam, 25/12/2019, *M.V. Dilsha* 8618 (DEV); Cultivated fields near Karla caves, 26/12/2019, *M.V. Dilsha* 8625 (DEV). Raigad district, Matheran to water pipe, 06/12/1958, *N.A. Irani* 2613 (BLAT); Dasturi point, water pipe, 24/12/1958, *N.A. Irani* 2752 (BLAT); Neral-Jummapatti, 14/01/1959, *N.A. Irani* 2804 (BLAT); Karjat, 20/11/53, *H. Santapau* 17627 (BLAT). Ratnagiri district, Math forest near Akeri, Ratnagiri, 15/11/65, *B.G. Kulkarni* 106467 (BSI); Varad near kudal, 18/11/65, *B.G. Kulkarni* 107630 (BSI); Opposite rest house Ratnagiri, 15/02/65, *M.Y. Ansari* 107781 (BSI); Ramghat-Bhedshi, 09/02/70, *B.G. Kulkarni* 119587 (BSI). Satara district, Mahabaleswar, 03/12/87, *K. Mohanan* 10327 (CALI); *Ibid.*, 03/12/87, *P.S. Ajitha* 13427 (CALI); *Ibid.*, 25/12/1969, *K. Hemadri* 120562 (CAL); *Ibid.*, 12/03/1960, *Y.A. Merchant* 1435 (BLAT); Panchgani, 3300ft, 01/02/56, *V.D. Vartak* 3064 (AHMA); Shivaji sagar lake, 14/04/1978, *M.P. Nayar* 153130 (BSI). Sangli district, Khanapur, 13/08/69, *M.Y. Ansari* 99879 (BSI). Sindhudurg district, Amboli, 28/12/1977, *S.M. Almeida* 1140 (BLAT); *Ibid.*, 29/12/1977, *S.M. Almeida* 1265 (BLAT). Solapur district, Near Nandore, 03/05/63, *K.C. Kanodia* 88379 (BSI). Thane district, Ganeshpuri forests, 02/02/81, *K.C. Koshy* KCK105 (TBGT); Panchgani plateau, 18/11/1968, *K.V. Billore* 115639 (CAL); Thane, 20/12/63, *B. Venkata Reddi* 93109; Mumbra, 26/01/1954, *K.V. Shenoy* 2096 (BLAT); *Ibid.*, 19/01/1954, *K.V. Shenoy* 2063 (BLAT); Thana, Panchnai plateau, 18/11/68, *K.V. Billore* 115639 (BSI). **Karnataka**, Chikkamagaluru district, Sansaveri Bababudangiri, 4000 m, 10/1908, *A. Meebold* 9625 (CAL). Dakshina Kannada district, Kolambe, 14/02/1962, *R.S. Raghavan* 79410 (BSI!). Hassan district, Maranahalli, mysore, 02/1908, *A. Meebold* 8427 (CAL); Yettinahalla, shiradi ghat, 05/04/1972, *T.P. Ramamoorthy & K.N. Gandhi* 2738 (CAL). Kodagu district, Coorg, Arekad, 08/03/58, *G.S. Puri* 31861 (BSI). Mysuru district, Krisnaraj garden Mysore, 06/03/58, *G.S. Puri* 32338 (BSI). Shimoga district, Melandur, Agumbe, 08/02/1961, *R. Sundara Raghavan* 69480 (BSI); Hulical, 14/02/1963, *R.*

Sundara Raghavan 86231 (BSI); Agumbe, 14/05/1960, *R. Sundara Raghavan* 91899 (BSI); *Ibid.*, 14/05/1960, *R. Sundara Raghavan* 62435 (CAL). Udupi district, Byndoor, 26/12/1938, *S.R. Raja* 481 (MH). Uttara Kannada district, Dandeli, 10/04/92, *W.A. Tallre* 2263 (CAL); *Ibid.*, 10/04/92, *W.A. Tallre* 2718 (CAL); *Ibid.*, 09/03/1957, *S.K. Jain* 16042 (BSI); *Ibid.*, 09/03/1957, *S.K. Jain* 16180 (BSI); *Ibid.*, 01/11, *W.A. Talbot* 2718 (BSI); Murdeshwar, 19/02/1962, *R.S. Raghavan* 79513 (BSI); Yellapur, 11/03/57, *S.K. Jain* 16292 (BSI); Uppinattann, 01/05/56, *G.S. Puri* 1390 (BSI); Vincholi, 04/03/1884, *W.A. Talbot* 939 (BSI). **Tamil Nadu**, Chennai district, Madras Christian college Campus, 29 m, 07/11/85, *s.coll.* 937 (MH). Chengalpattu district, *s.l., s.d., D. Narasimhan s.n.* (MH). **Telangana**, Adilabad district, Along Godawari river, 12/04/1987, *T. Ravisankar* 85211 (BSID, MH).

Notes: This species is distinguished by its prostrate habit and mostly abortive anthers. It has been reported that this species naturally reproduces by apomixis (Randeria, 1960).

Blumea paniculata (Willd.) M. R. Almeida, Fl. Maharashtra 3A: 82. 2001. *Conyza paniculata* Willd. Sp. Pl., ed.4.3: 1920.1803. *Pluchea paniculata* (Willd.) Karthik. & Moorthy, Fl. Pl. India 259. 2009. *syn. nov.* Type: India *s.coll., s.n.* (Holotype B-W!).

Figs. 37, 38

Blumea membranaceae DC., Prodr., 5:440. 1836; Gamble, Fl. Pres. Madras 483. 1921; Cooke, Fl. Pres. Bombay 2:77. 1958; Randeria, *Blumea* 10(1): 270. 1960; Saldanha & Nicolson, Fl. Hassan Dist. 605. 1976; Grierson in Dassan. & Fosbery, Revis. Handb. Fl. Ceylon 1:171. 1980; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2:137. 1984; Ansari, Fl. Kasaragod Div. 209. 1985; R.S. Rao & S. Hara, Fl. Srikakulam Dist. 270. 1986; N.P. Singh, Fl. Eastern Karnataka 1: 364. 1988; V. S. Ramach. & V.J. Nair, Fl. Cannanore 244. 1988; M.J. Kothari & S. Moorthy, Fl. Raigad Dist. 212. 1993; S. Karthikeyan & Anand Kumar, Fl. Yavatmal Dist. 136. 1993; M. Mohanan & Henry, Fl. Thiruvanthapuram 256. 1994; S. Kumar in Hajra *et al.*, Fl. India 13: 135. 1995; Subram., Fl. Thenmala Div. 190. 1995; S.D. Deshp. *et al.*, Fl. Mahabaleshwar & Adjoinings 2: 307. 1995; Sasidh. & Sivar., Fl. Pl. Thrissur For. 247. 1996; Sivar. & P. Mathew, Fl. Nilambur 364. 1997; Pull. & Ali Moulali,

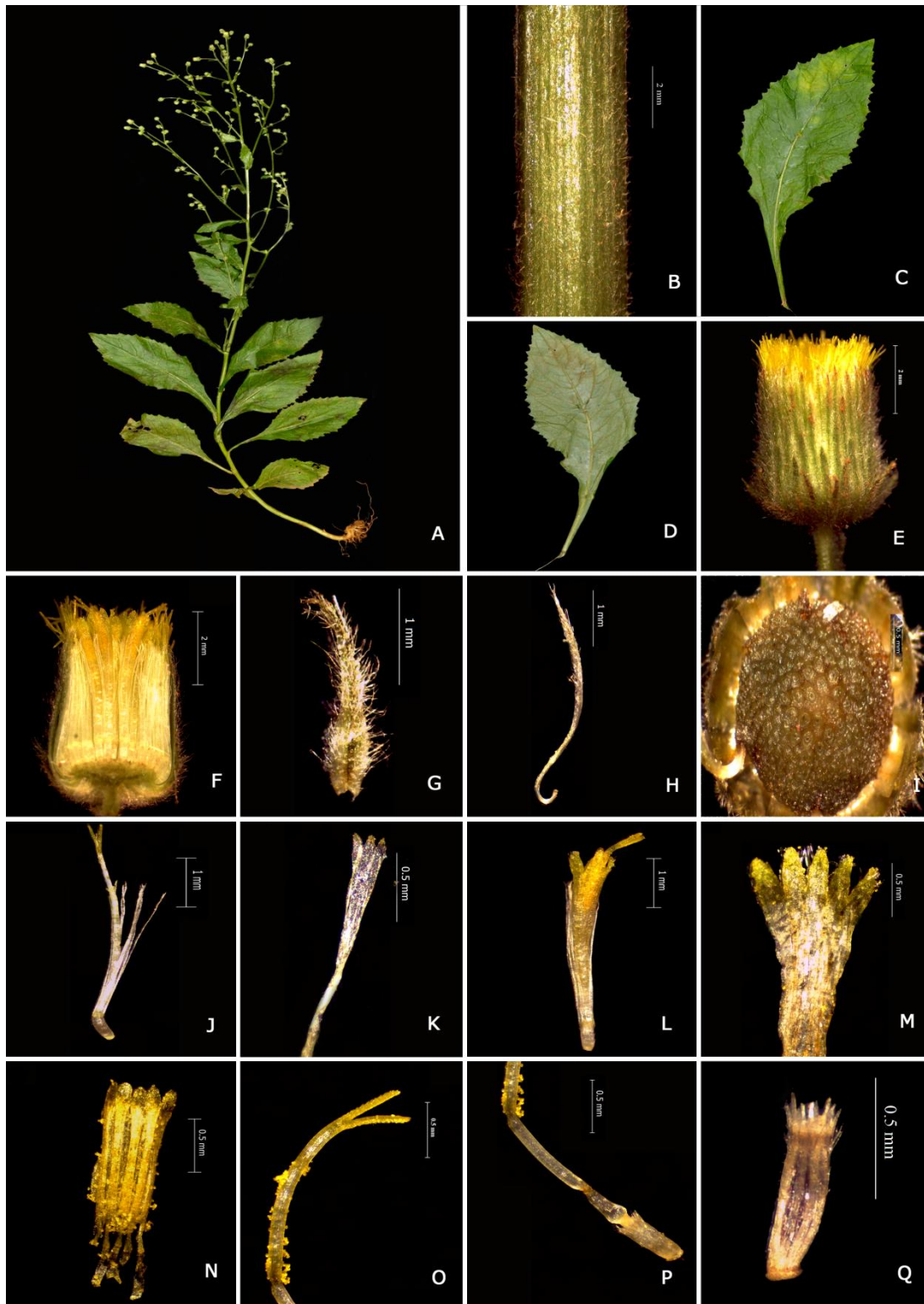


Fig. 37. *Blumea paniculata* (Willd.) M. R. Almeida: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 38. Type of *Blumea paniculata* (Willd.) M. R. Almeida © Botanic Garden and Botanical Museum Berlin-Dahlem, Freie Universität Berlin.

Fl. Andhra Pradesh 2: 517. 1997; K.M. Matthew, Fl. Palni hills 2: 668. 1999; N. Anilkumar *et al.*, Fl. Pathanamthitta. 279. 2005; S.G. Pradhan *et al.*, Fl. Sanjay Gandhi NP 328, 2005; Pull. *et al.*, Fl. Eastern Ghats 3: 234. 2007. *Conyza membranacea* Wall. ex Miq. Fl. Ned. Ind. 2: 49. 1856. Type: Myanmar, Prome, Wallich Cat. 3019, comp. no.129 (Holotype G-DC!; Isotypes GH, K-W!).

Blumea paucifolia DC. Prodr. 5: 440. 1836. *Conyza virens* E Wall. Numer. List, no 3037 E. 1831. nom. nud. Type: Bangladesh, Sylhet, Wallich Cat. 3037 E, comp. no. 147 (Holotype G-DC!; Isotype GH!).

Blumea subsimplex DC. Prodr. 5: 441. 1836. *Conyza subsimplex* Wall. Numer. List, no 3003. 1831. nom. nud. *Blumea membranacea* var. *subsimplex* Hook. f., Fl. Brit. India 3: 263. 1882. *Pluchea paniculata* var. *subsimplex* (DC.) Karthik. & Moorthy, Fl. Pl. India: 259 2009. *syn. nov.* Type: Bangladesh, Sylhet, Wallich Cat. 3003, comp. no. 113 (Holotype G-DC!; Isotypes K!).

Blumea senecioides DC. Prodr. 5: 439. 1836. *Conyza senecioides* Ham. in Wall. Numer. List, no 3102. 1831. nom. nud. *Laggera senecionidea* Benth. & Hook.f. Gen. Pl. 2: 290. 1873. Type: India, Nawabgunj, Wallich 3102, comp. no. 212 (Holotype KW!; Isotype G-DC!).

Blumea balansae Gagnep. Bull. Soc. Bot. France 68: 41. 1921. Type: Vietnam, Tonkin, Balansa 3022 (Holotype P!).

Blumea paniculata var. *gracilis* (Hook.f.) M. R. Almeida, Fl. Maharashtra 3A: 83. 2001. *syn. nov.* *B. membranacea* var. *gracilis* Hook.f., Fl. Brit. India 3: 265. 1882. *syn. nov.*; V. S. Ramach. & V.J. Nair, Fl. Cannanore 244. 1988; Ratheesh Narayanan, Fl. Stud. Wayanad Dist. 409. 2009; Fl. Pres. Madras 483. 1921; T. Pullaiah & D. Ali Moulali, Fl. Andhra Pradesh, India, 2:517, 1997; Pull. *et al.*, Fl. Eastern Ghats 3: 233. 2007. *Pluchea paniculata* var. *gracilis* (DC.) Karthik. & Moorthy. Fl.Pl. India 259. 2009, *syn. nov.* *Blumea gracilis* DC., Prodr. 5: 443 1836. *Conyza gracilis* Heyne in Wall. Numer. List, no 3064. 1831. nom. nud. Type: India. Wallich 3064, comp. no. 174. (Holotype G-DC!; Isotype K!, GH! (fragment)).

Annual herbs, 3-70 cm. Roots taproot, adventitious roots from the base of stem, 2-7 cm. Stem erect, simple except inflorescence branches, inflorescence branches arise from middle of stem, base sparsely hairy, terete, pale green, 6.75 mm wide, others green, furrowed, 4.33 mm wide, pilose or tomentose with long yellowish multicellular and capitate glandular hairs particularly in the younger parts and inflorescence axis. Leaves alternate, upper and lower leaves different; lower leaves shortly petiolate, petiols upto 6 cm long, hair, laminae lanceolate-ovate lanceolate, after 3 or 4 basal leaves sublyrate (small lateral lobes present), 21 x 8 cm, base prolonged tapering, margin irregularly serrate dentate, apex acute, thin textured or membranous, pilose with long multicellular hairs with bulbous base and scarcely distributed capitate glandular hairs; upper leaves subsessile to sessile, laminae lyrate lobed, 5-10 x 2-4 cm, margins serrate dentate; inflorescence leaves sessile, elliptic oblanceolate. Inflorescence large loose panicles, terminal or axillary lax panicle or few terminal, 1-40 cm. Capitula cylindric to slightly hourglass shaped, 4.17-5.06 x 2.61- 4.75 mm, pedunculate or subsessile-sessile; peduncles green, pilose or tomentose with long yellowish multicellular hairs and sparsely capitate glandular hairs, tip of glandular hairs yellow. Involucral bracts 5 seriate, completely reflexed at maturity (curved like 'S'), straw coloured when mature, slightly larger than corolla, imbricated phyllaries, persistent; first phyllary lanceolate, not curved, multicellular hairs on the entire surface, 2.288 x 0.345 mm; second phyllary linear, not that much hairy as first, 2.859 x 0.230 mm, curved; third phyllary linear, 3.267 x 0.221 mm, center to tip crowded with hairs but lower portion glabrous; fourth phyllary linear, 4.604 mm; fifth phyllary linear, 4.846 mm long, hairiness decreases to lower part. Receptacle slightly convex, fimbriate, glabrous or 1 to 3 long multicellular hairs in the centre, 1.93 mm wide. Florets \pm 162-327 no., peripheral female florets, central bisexual florets. Female floret \pm 146-310 no., filiform, corolla tube 3.632- 4.442 mm, lightly yellowish at lobes and hyaline to the lower portions, 3-4 lobes, one lobe larger, sparsely distributed unicellular hairs, pappus persistent. Bisexual floret \pm 16-17 no., tubular, corolla tube 4.726 mm, pappus length not reach upto the starting of corolla lobe, pappus persistent; corolla bright yellow at lobes, others pale yellow to whitish, 5 lobed, lobes linear lanceolate, unicellular hairs and

glandular hairs, corolla tube glabrous. Stamen 5, syngenesious; anther yellow, apical appendages of same length, obtuse, base with unbranched tails, 0.251 mm, tail length upto or shorter than the thickened portion of filament or anther collar; filament 0.904 mm, pale yellow. Style bifid, arms equal, 0.596 mm, dark yellow in arms, others whitish to pale yellow, sweeping hairs on arms only, style base swollen, style attached to ovary by a cylindrical structure which is narrower than style and ovary. Cypselas homomorphic, linear oblong, 0.604 x 0.202 mm, ribbed, ribs 7 or 8, brown with yellow ribs, straight, hairy. Pappus white, uniseriate, 9-14 no., 2.59 mm, persistent.

Flowering & Fruiting: November-February.

Distribution: India, China, Bangladesh, Laos, Sri Lanka, Borneo, Jawa, Cambodia, Malaya, Nepal, Pakistan, Myanmar, Vietnam and Thailand. Even though this taxon is distributed in all Peninsular Indian states, the main center of distribution is South India.

Habitat & Ecology: Roadsides, edges of dry evergreen forests.

Conservation status: Least Concern.

Specimens Examined: **Andhra Pradesh**, Godavari district, on the way to Korutura, 07/03/62, *D.C.S. Raju* 94 (CAL). Krishna District, Duggiralapadu, 12/02/85, *P. Venkanna* 5968 (CAL). Kurnool district, *s.l., s.d., JS Gamble* 10939 (MH). **Gujarat**, Saurashtra, 26/10/1953, *H. Santapau s.n.* (BLAT); *Ibid.*, 23/10/1952, *H. Santapau s.n.* (BLAT); *Ibid.*, 25/10/1952, *H. Santapau* 15125 (BLAT); *Ibid.*, 23/10/1952, *s.coll.* 15086 (BLAT). **Karnataka**, Chikkamagaluru district, Mudigre, *s.d., R.D. Austeal* 4013 (MH); Mudigere, Mysore, 02/1916, *R.D. Austeal* M304 (MH). Dakshina Kannada district, Sullia, 15/02/1962, *RK Arora* 605 (CAL); Shiradi ghat, 26/02/2020, *M.V. Dilsha* 8652 (DEV). Hassan district, Maranahalli, 3000m, 02/1908, *A Meebold* 8434 (CAL). Mysore district, Katedevargudi vicinity, 04/09/1961, *Rolla Seshagiri Rao* 73615 (CAL). **Kerala**, Alappuzha district, Chathurthiakari, *C. N. Sunil* 1435 (CALI). Ernakulam district, Neriamangalam, 15/12/2018, *M.V. Dilsha & V. Drishya* 6961 (DEV). Kannur

district, Brahmagiri, 1000 m, 05/03/1929, V.S. *Ramachandran* 62136 (CAL); Ambayathode, ±850 m, 20/02/1979, V.S. *Ramachandran* 6004; *Ibid.*, ±550 m, 20/02/1979, V.S. *Ramachandran* 60047 (MH). Kollam district, Kazhuthuruthy, 500 m, 20/12/1978, C.N. *Mohanan* 59560 (CAL). Kozhikode district, IISR Peruvannamuzhy, 13/06/96, P.A. *James* 55345 (CALI); Wayanad Churam, 14/02/2021, M.V. *Dilsha* 8689 (DEV); on the way to Kakkayam dam, 30/11/2020, M.V. *Dilsha* 8670 (DEV). Malappuram district, Tirur, 04/09/91, T.P. *Sheeja* 3273 (CALI); CU Campus, 04/02/92, C.G. *Solly* 4429 (CALI); *Ibid.*, 10/12/05, A. *Ramya* 104515 (CALI); *Ibid.*, 21/11/14, A.V. *Lasitha* 143344 (CALI); Nedumgayam to Meenmutty, 650 m, 13/03/1984, N.C. *Nair* 81220 (CAL); Manimooli, Nilambur, 11/12/2020, M.V. *Dilsha* 8672 (DEV); Kodikuthimala, 24/11/2018, M.V. *Dilsha* 6944 (DEV); *Ibid.*, 27/11/2020, M.V. *Dilsha* 8664 (DEV); *Ibid.*, 29/11/2021, M.V. *Dilsha* 9109 (DEV); *Ibid.*, 29/11/2021, M.V. *Dilsha* 9110 (DEV); *Ibid.*, 29/11/2021, M.V. *Dilsha* 9111 (DEV); Nadukani, 29/11/2021, M.V. *Dilsha* 9112 (DEV). Palakkad district, Palakkad, 06/07/91, V.T. *Smitha* 4184 (CALI); Damsite, 10/03/82, K.S. *Prasanna Kumar* SV10409 (CALI); Silent valley RF, 800 m, 17/01/1980, P. *Bhargavan* 65531 (CAL); Way to valiyaprathode SVRF, 850 m, 15/01/1980, N.C. *Nair* 65487 (CAL); Below kundipuzha dam, 1000 m, 06/11/1976, E. *Vajravelu* 48863 (CAL); Walayar south Malabar, 900 m, 09/03/1960, J.S. *Gamble* 1802 (CAL); Attappady, 15/12/2020, M.V. *Dilsha* 8674 (DEV). Thiruvananthapuram district, Boneccord, 1000 m, 08/03/1974, M. *Mohanan* 61735 (CAL); Attayar, Agasthyamala, 21/12/2018, M.V. *Dilsha*, V. *Drishya* & Manu *Philip* 6975 (DEV). Thrissur district, Peechi, 3/10/1988, N. *Sasidharan* 5791 (KFRI); *Ibid.*, 3/10/1988, N. *Sasidharan* 5792 (KFRI); Cheruvathani, 02/03/92, *Sheeja Jacob* 3579 (CALI); *Ibid.*, 08/03/92, *Meena Nair* 2060 (CALI); Athirappilli-Vazhachal Roadsides, 12/12/2019, M.V. *Dilsha* & V. *Drishya* 8608 (DEV). Wayanad district, Near Pookkode lake, 05/03/2018, M.V. *Dilsha* 6926 (DEV). **Maharashtra**, Mumbai Suburban district, National park Borivali, 09/01/1954, A.J. *Randeria* 594 (BLAT). Pune district, Khandala, St. X Ravine, 16/04/56, H. *Santapau* 20361 (BLAT); *Ibid.*, 18/05/1917, H. *Santapau* 20358 (BLAT); *Ibid.*, St X Ravine, 16/04/56, H. *Santapau s.n.* (BLAT); *Ibid.*, 05/05/1951, H. *Santapau* 12755 (BLAT); *Ibid.*, 27/01/45, H.

Santapau 5868 (BLAT); *Ibid.*, 03/05/1951, *H. Santapau* 12733 (BLAT); *Ibid.*, 11/12/43, *H. Santapau* 3208 (BLAT); *Ibid.*, 15/03/52, *H. Santapau* 14117 (BLAT); *Ibid.*, St. X Ravine, 16/04/56, *H. Santapau* 20358 (BLAT); *Ibid.*, St.X Ravine, 16/04/56, *H. Santapau* 20357 (BLAT); *Ibid.*, 18/11/1961, *M.Y. Ansari* 32864 (BSI). Satara district, Mahabaleswar, 12/03/60, *H. Santapau* 23395 (BLAT); *Ibid.*, 27/12/57, *H. Santapau* 22185 (BLAT); Koyna WLS, Satara, 26/02/2013, *Prajakta S. Pathare* 199069 (BSI). Sindhudurg district, Salashi, 24/10/45, *H. Santapau* 7733 (BLAT). Thane district, Mumbra, 08/11/1953, *K.V. Shenoy* 1291 (BLAT); *Ibid.*, 15/11/1953, *K.V. Shenoy* 1314 (BLAT); *Ibid.*, 08/11/1953, *K.V. Shenoy* 1288 (BLAT); *Ibid.*, 15/11/1953, *K.V. Shenoy* 1315 (BLAT). **Tamil Nadu**, Coimbatore district, Nemigipu, 11/01/1906, *C.E.C. Fischer* 865 (CAL); Dindigul district, Sirumalai, 26/05/58, *Pallithanam* 3497 (RHT); Sirumalai, 1936, *s.coll.* 27679 (RHT). Dharmapuri district, Dharmapuri, 600 m, 05/04/2002, *K.M. Mathew* 63481 (RHT); Tiruvannamalai district, Javadi hills, 600 m, 27/01/2001, *K.M. Mathew* 72521 (RHT).

Notes: This taxon is divided into 3 varieties. It is variable with respect to leaf characters, panicle size, plant size, etc.

Blumea paniculata var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George, *comb.nov. Blumea membranacea* var. *gardneri* Hook. f., Fl. Brit. India 3: 265. 1882; Gamble, Fl. Pres. Madras 483. 1921. *Pluchea paniculata* var. *gardneri* (Hook.f.) Karthik. & Moorthy, Fl. Pl. India: 259. 2009, *syn. nov.* Type: Nilgiris, Tamil Nadu, Gardner, *s.n* (K!).

Figs. 39, 40

Annual herbs, 15- 150 cm. Taproot, upto 10-15 cm, numerous rootlets arising from main roots. Stem erect, base woody, terete, 1- 5 cm wide, sparsely hairy or glabrous, pale yellowish green or light brown; other furrowed, green, 2.90 mm wide, pubescent or puberulous with long multicellular hairs and capitate glandular hairs of same length, long multicellular sparsely represented; internodes 2-6 cm. Leaves alternate, upper and lower leaves different; lower leaves petiolate, petiols 6 cm, laminae lyrate lobed with two lateral lobes, terminal lobes elliptic ovate and lateral lobes elliptic lanceolate or more or less triangular, 7-10 x 3.5-4 cm, base prolonged

tapering upto the center of petiol, margin serrate or distantly serrate with unequal serrations, apex acute or acuminate, thin textured or membranous, both surface puberulous or pilose with multicellular hairs and capitate glandular hairs; upper leaves shortly petiolate or sessile, petiole upto 2 cm, laminae elliptic lanceolate, shortly lyrate lobed, 3-5 x 1.5-3 cm, base prolonged tapering to the base of petiole, margin distantly serrated with sharp teeth, apex attenuate, thin textured or membranous, puberulous or pilose on both surface, shining green on upper and pale green lower. Inflorescence leaves sessile, laminae elliptic lanceolate, 6 x 2.5 cm, margin entire or distantly serrated, apex acute or acuminate or apiculate. Inflorescence terminal and axillary lax panicle, terminal to all branches, upto 50cm. Capitula cylindrical, 5.40-8.48 x 3.28-4.27 mm, pedunculate, peduncle 7.9-9.47 mm, light green, long, puberulous with multicellular hairs and capitate glandular hairs of same length, very long multicellular hairs present in between. Involucral bracts 5-7 seriate, purplish tinged in some capitulas, equal to the length of corolla of florets, in some capitula some phyllaries purple tipped; first phyllary linear lanceolate, green with slightly scarious margins, 2.11 x 0.423 mm, pubescent, long multicellular hairs and absence of capitate glandular hairs, apex attenuate; second phyllary 2.16 x 0.570 mm, linear lanceolate, pubescent with slightly scarious margins, apex attenuate; third phyllary 2.91 x 0.570 mm, linear lanceolate, pubescent, apex attenuate with scarious margins; fourth phyllary 3.30 x 0.586 mm, slightly linear lanceolate, green at center and tip, others scarious; fifth phyllary 5.61 x 0.583 mm, puberulous, tip ciliate, scarious margins, linear; sixth phyllary linear, 6.51 mm, tip ciliate; seventh phyllary glabrous or sparsely hairy, tip ciliate, 6.175 mm. Receptacle flat or slightly convex, areolate, glabrous or 2 to 3 hairs in the middle, 4.28 mm wide. Florets numerous, peripheral female floret, central bisexual florets. Female floret 181-213 no., filiform, corolla tube 4.73-7.73 mm long, corolla pale yellow, 4 or 5 lobes, lobes hairy, style bifid, arms equal, pappus length pappus same length as corolla, 16-22 pappus. Bisexual floret 21-22 no., tubular, corolla tube 4.81-8.21 mm, pappus length reach upto the starting of corolla lobes or not reach upto the starting of corolla lobe, pappus persistent; corolla yellow, corolla tube 4.34-5.61 mm long, 5 lobed, lobes 0.488 mm, papillate, acute lanceolate, both unicellular, multicellular and glandular

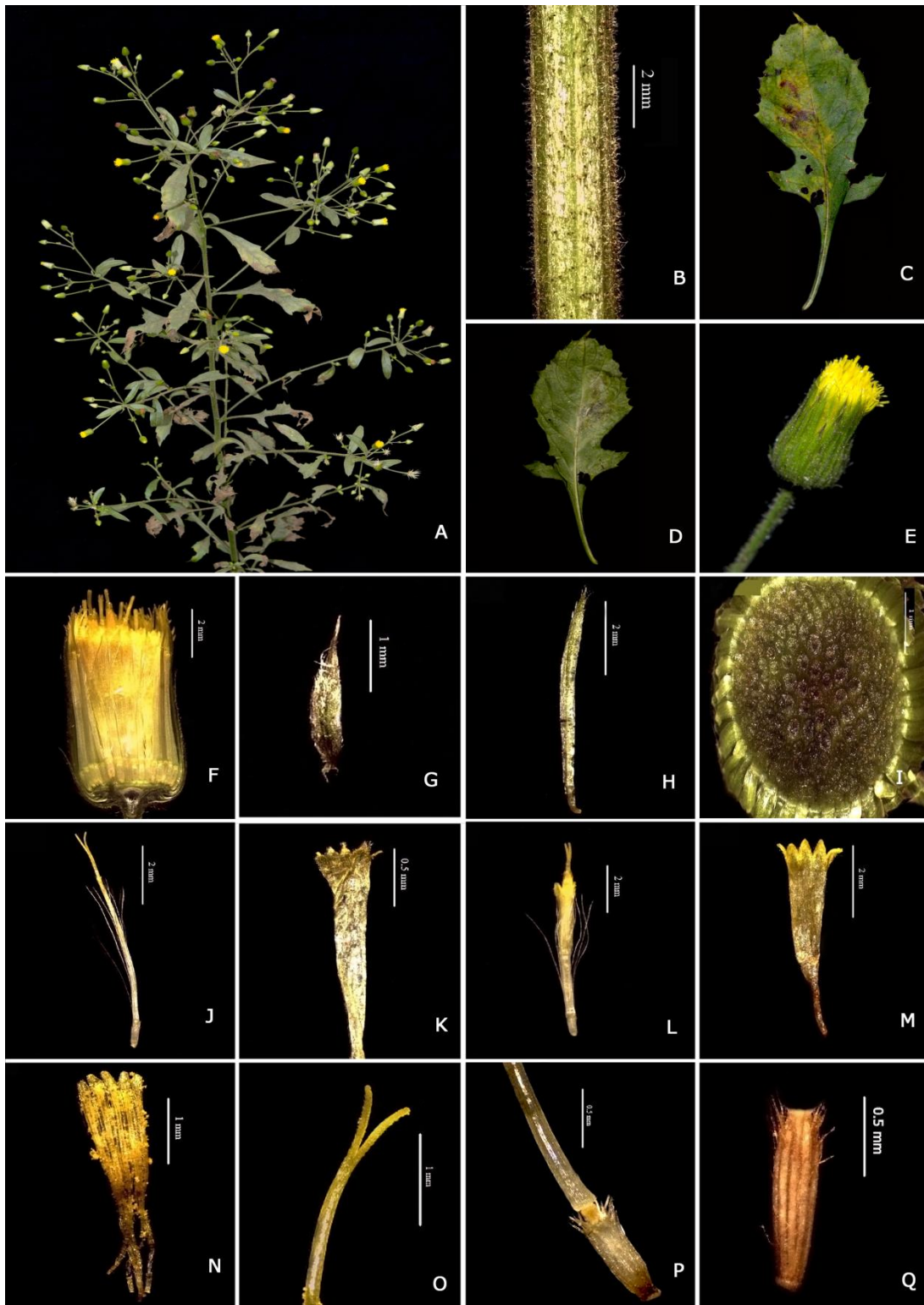


Fig. 39. *Blumea paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypselas.



Fig. 40. Type of *Blumea paniculata* var. *gardneri* © The Board of Trustees of the Royal Botanic Gardens, Kew.

hairs, lobes bright yellow others pale or whitish yellow. Stamen 5, syngenesious; anther 1.84 mm, yellow, anther apical appendages of same length or unequal with 3 equal and 2 smaller, obtuse, base with unbranched tails, tail longer than the thickened portion of filament; filament 1.30-1.50 mm, pale yellow. style bifid, arms equal, yellow, 0.566-0.731 mm, sweeping hairs on arms only, style base not swollen, style attached to ovary by a cylindrical structure which is narrower than style and ovary. Cypselas homomorphic, oblong, 1.17 x 0.307 mm, ribbed, 10 ribs, brown with yellowish ridges, slightly curved, pubescent. Pappus white, uniseriate, 4.01 mm long, persistent.

Flowering & Fruiting: January-April.

Distribution: India and Vietnam. In Peninsular India, this taxon is found in the states of Karnataka, Kerala, and Tamil Nadu.

Habitat & Ecology: Edges of forests, stream sides, disturbed areas in dry evergreen forests.

Conservation status: Least Concern.

Specimens Examined: **Karnataka**, Kodagu district, Silent Valley, 23/03/2021, *M.V. Dilsha* 9103 (DEV). **Kerala**, Kannur district, Ambayathode, ±550 m, 15/12/1979, *V.S. Ramachandran* 65241 (CAL). Palakkad district, Kundipuzha, 825 m, 09/04/1978, *N.C. Nair* 56690 (MH!); Ibid., Silent Valley, 23/03/2021, *M.V. Dilsha* 9103 (DEV). **Tamil Nadu**, Coimbatore district, Konalar, 1800 m, 14/02/1980, *M. Chandrabose* 65808 (MH). Dindigul district, Periyashola, Pulneys, Bourne 1515 (MH); Shembaganur, 800 m, 09/02/1985, *K.M. Mathew* 4108 (RHT); Palamalai-Thalayar slope, 900 m, 21/02/1986, *K.M. Mathew* 44285 (RHT); Periyur to sothupparai path, 07/07/1986, *K.M. Mathew & N. Rajendran* 45748 (RHT); Thandigudi ghat road, 700 m, 06/03/1987, *K.M. Mathew & N. Rajendran* 48496 (RHT); Pudur-kavalppatty path, 900 m, 02/05/1988, *K.M. Mathew* 52866 (RHT). Madurai district, Way to alagarcoil, 500 m, 28/02/1978, *M. Chandrabose s.n.* (MH).

Notes: This variety was synonymized by earlier workers. The characters observed in this variety are discontinuous; therefore, we reinstate this taxon.

Blumea paniculata var. ***jacquemontii*** (Hook.f.) M.R. Almeida, Fl. Maharashtra 3A: 83 (2001). ***Blumea membranacea*** var. ***jacquemontii*** (Hook. f.) Randeria in *Blumea* 10: 271. 1960; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2:137. 1984; K.M. Matthew, Fl. Tamilnadu Carnatic 3(1):771.1981; Keshava Murthy & Yoganarasimhan, Fl. Coorg 241. 1990; K.M. Mathew, Excursion Fl. Central Tamil Nadu 255. 1991; S. Kumar in Hajra *et al.*, Fl. India 13: 135. 1995; Sasidh., Fl. Periyar Tiger Reserve 196. 1998; B Suryanarayana & A Sreenivasa Rao, Fl. Nellore dist. 2: 304. 2002; Pull. *et al.*, Fl. Eastern Ghats 3: 234. 2007. ***B. jacquemontii*** Hook. f., Fl. Brit. India 3: 265. 1882; Gamble, Fl. Pres. Madras 484. 1921. Type: India, Bihar, Hooker 386 (K!).

Figs. 41, 42

Blumea Kingii C.B. Clarke ex Hook.f., Fl. Brit.India 3: 265. 1882. Type: Mount Aboo, Rajasthan, *s.coll.*, *s.n.* (K!)

Blumea obovata C.B. Clarke, Compos. Ind. 77.1876. Type: Parasnath, Bihar, C.B. Clarke, 14034 (K!)

Blumea paniculata var. ***muralis*** (DC.) M.R. Almeida, Fl. Maharashtra 3A: 84. 2001. **syn. nov.** ***Blumea muralis*** DC., Prodr. 5: 440. 1836. ***Conyza muralis*** Buch. - Ham., Numer. List, no 3077.1831. nom. nud. ***B. membranacea*** var. ***muralis*** Hook.f., Fl. Brit. India 3: 265. 1882. ***Pluchea paniculata*** var. ***muralis*** (DC.) Karthik. & Moorthy, Fl. Pl. India. 259. 2009, **syn.nov.**

Annual herbs, 15-170 cm. Stem erect, base woody, terete, 4 cm, reddish brown, glabrous or sparsely hairy, unbranched except inflorescence branches, others

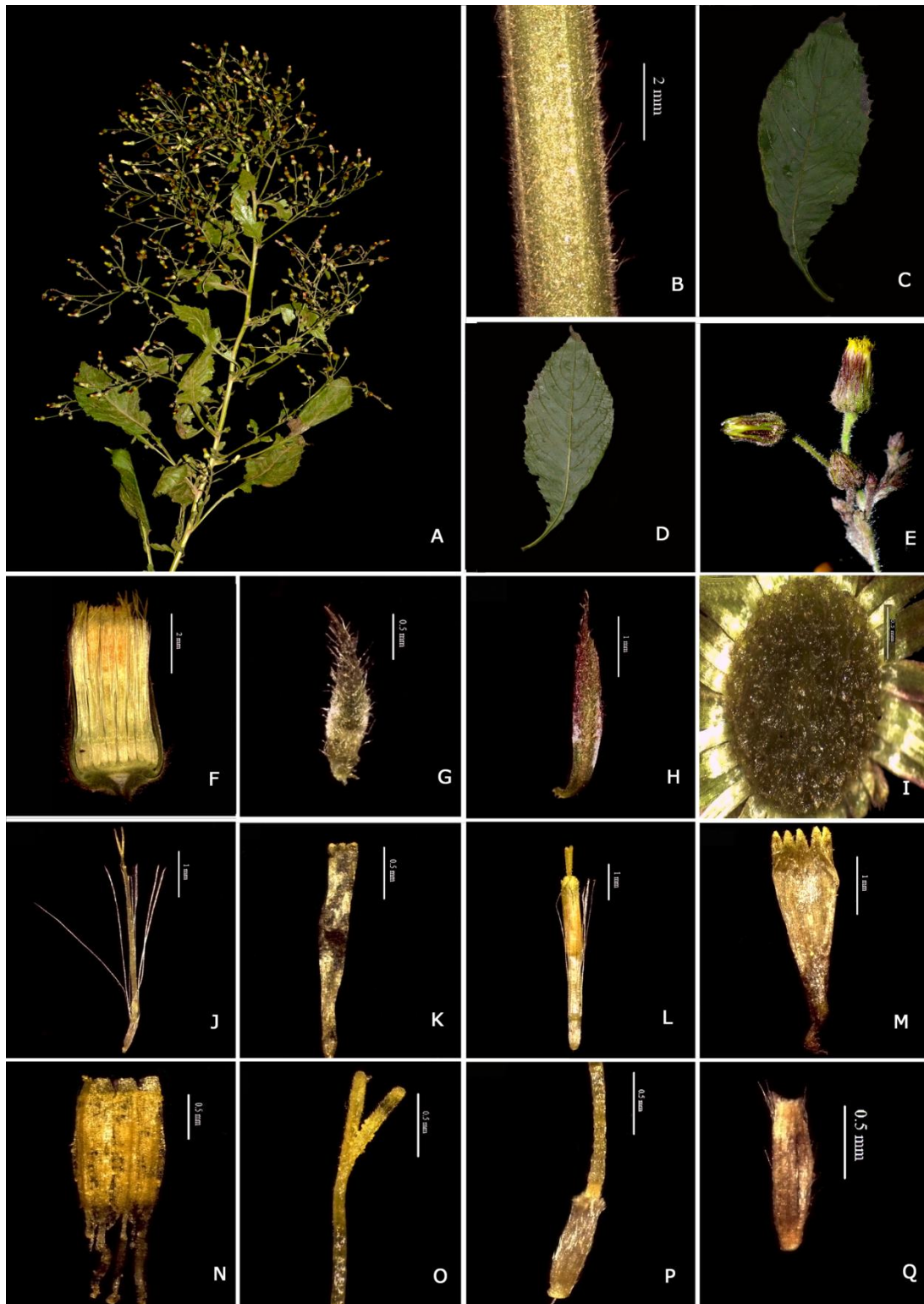


Fig. 41. *Blumea paniculata* var. *jacquemontii* (Hook.f) Randeria: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 42. Type of *Blumea paniculata* var. *jacquemontii* (Hook.f) Randeria © The Board of Trustees of the Royal Botanic Gardens, Kew.

furrowed, green, 3.92 mm, conspicuous ribs at two sides and others almost inconspicuous, villous with spreading soft hairs, short same length multicellular and capitate glandular hairs and sparsely distributed long multicellular hairs. Leaves alternate, upper and lower leaves different; lower leaves petiolate, petiol 3 cm, laminae obovate lanceolate or shortly lyrate lobed with small inconspicuous lateral lobes and ovate or obovate terminal lobe, prolonged tapering to the base, 12 x 5.5 cm, margin coarsely irregularly serrated, apex attenuate, thin textured or membranous, both surface puberulous with yellowish multicellular and capitate glandular hairs; upper leaves petiolate, petiole 3-5 cm, puberulous, prolonged tapering to the base, laminae runcinate or lyrate lobed with conspicuous one pair of lateral lobes more or less triangular and terminal lobe ovate or elliptic lanceolate or with two pair of lateral lobes, one lower pair inconspicuous or underdeveloped, 8 x 4 cm, margin coarsely irregularly serrate, both surface puberulous with multicellular and capitate glandular hairs; inflorescence leaves sessile, laminae lyrate or elliptic lanceolate or linear lanceolate, 5 x 0.8 cm, base attenuate, apex acute, margin distantly serrate. Inflorescence terminal and axillary tight panicle, highly branched (divaricating branches), upto 80 cm. Capitula narrowly campanulate, 6.38 x 2.93 mm, pedunculate, peduncles 5.63-8.73 mm, green, villous with spreading long multicellular and capitate glandular hairs. Involucral bracts 5 seriate, purple tinged or green; first phyllary 1.92 x 0.395 mm, linear lanceolate, villous with multicellular and capitate glandular hairs, tip purple, margin scarious, others green; second phyllary 1.98 x 0.507 mm, puberulous, margin scarious, others yellow, linear lanceolate; third phyllary 2.70 x 0.507 mm, villous or puberulous, capitate glandular hairs present at upper portion, scarious margin, linear lanceolate; fourth phyllary 3.47 x 0.547 mm, tip fimbriate, lanulose, margin reddish brown from center to tip, others light green, margin from centre to base scarious, capitate glandular hairs at tip, linear lanceolate; fifth phyllary 5.50 x 0.439 mm, entire surface from centre to tip reddish brown, center to base green, small hairs from center to tip, sparsely hairy at lower portions, scarious margin at base. Receptacle flat, fimbriate, pubescent or sparsely hairy, 2.14 mm wide, epaleaceous. Female floret ± 101 no., filiform, corolla tube 4.967 mm, corolla pale yellow, lobes 3-4, corolla lobes glabrous to sparsely

hairy to pubescent, style bifid, equal, 0.787 mm, pappus slightly longer than corolla, style arms equal. Bisexual floret ± 17 no., corolla tube 3.94 mm long, pappus same as the size of corolla or not reach upto the starting of corolla lobe, pappus persistent; Corolla yellow, other portion light yellow, 5 lobes, lobes papillate, 0.409 mm, linear triangular, unicellular and glandular hairs. Stamen 5, syngenesious; anther 1.60 mm, yellow, apical appendages of same length, emarginate, base with unbranched tails, 0.501 mm, shorter or equal to the thickened portion of filament; filament whitish yellow, 1.10 mm. Style bifid, equal, 0.734 mm, sweeping hairs on lobes only, style base not swollen, attached to ovary by a cylindrical structure which is narrower than both ovary and style. Cypselas homomorphic, linear oblong, 0.952 x 0.256 mm, ribbed, light brown, straight, hairy on entire surface. Pappus 9-11 no., white, uniseriate, 3.92 mm long, persistent.

Flowering & Fruiting: January-March.

Distribution: Endemic to India. In Peninsular India, this taxon is found in Goa, Karnataka, Maharashtra, Orissa, and Tamil Nadu.

Habitat & Ecology: Growing in forests in shady localities or edges of evergreen forests.

Specimens Examined: **Goa**, Panchmahal district, Pavagadh hill station, 02/11/2018, *M.V. Dilsha & V. Drishya* 6935 (DEV). **Karnataka**, Mysore district, Along the road-Bandipur, 1550 m, 29/01/1965, *B.D. Naithani* 23244 (MH). **Maharashtra**, Ahmednagar district, Akrani fort foot hills Bari, 24/10/66, *R.D. Pataskar* 110314 (BSI). Kolhapur district, Kolhapur, 11/02/2018, *M.V. Dilsha* 6912 (DEV). Pune district, Kamshet, 25/12/2019, *M.V. Dilsha* 8622 (DEV); Near Karla caves, 26/12/2019, *M.V. Dilsha* 8624 (DEV). Raigad district, Matheran neral road, 02/02/1957, *G.S. Puri* 14129 (BSI); Matheran echo point, 28/01/1957, *G.S. Puri* 10970 (BSI). Pune district, Bhivadi khurd-Inglni Junnar, 12/01/1965, *K. Hemadri* 104415 (BSI); Bhimasankar-near Hanuman temple, 24/02/61, *K.P. Janardhanan* 69230 (BSI); Ambavne forest, 24/12/63, *B. Venkata Reddi* 93416 (BSI). Sangli district, Balwadi, Khanapur, 06/01/1965, *M.Y. Ansari* 104787 (BSI). Satara district, Mahabaleshwar, 10/01/2022, *M.V. Dilsha* 9126 (DEV). **Orissa**, Ganjam district,

s.d., *J.S Gamble s.coll.* (MH). **Tamil Nadu**, Erode district, Ayinigiri betta, Gaddesal, 4500 m, *K. Cherian Jacob* 346 (MH). Tiruchirappalli district, Thuraiyur taluk, 1000 m, 17/03/1978, *K.M. Mathew* 12349 (CAL); Tiruchi, Pachamalais, 1000 m, 17/03/1978, *K.M. Mathew* RHT12349 (RHT). Nilgiri district, Upper tiger shola, 1750 m, 25/03/1957, *K.M. Sebastine* 2652 (MH).

Conservation status: Least Concern.

Notes: *B. paniculata* var. *jacquemontii* is distinguished from other varieties in its receptacle and leaf characters. The receptacle is sparsely pubescent and the margins of the leaves are clearly different from other two varieties.

Blumea sessiliflora Decne., *Nouv. Ann. Mus. Hist. Nat.* 3: 410. 1834; Randeria, *Blumea* 10(1): 257. 1960; S. Kumar in Hajra *et al.*, *Fl. India* 13: 142. 1995; M. R. Almeida, *Fl. Maharashtra* 3A: 84. 2001. *Conyza sessiliflora* (Decne.) Miq. *Fl. Ned. Ind.* 2:48. 1856, nom. illeg. Type: Timor, Decaisne *s.n.* (Lectotype P!, designated by Randeria, 1960). **Figs. 43, 44**

Blumea fasciculata DC. *Prodr.* 5.442. 1836. *Conyza fasciculata* Wall. *Numer. List*, no 3094. 1831. nom. nud. Type: Myanmar, Wallich *Cat.* 3094, comp. no. 204 (Holotype G-DC!; Isotypes K-W!).

Blumea floresiana (Sch.Bip. ex Miq.) Boerl. *Handl. Fl. Ned. Ind.* 2: 238. 1891. *Conyza floresiana* Sch.Bip. ex Miq. *Fl. Ned. Ind.* 2:45.1856. *Blumea acutata* DC. var. *floresiana* Koster. *Blumea* 4: 488. 1941. Type: Barie island, *Zollinger* 3329 (Lectotype, P!, designated by Dilsha & Satheesh, 2023).

Annual herbs, 24 cm, scabrous. Taproot, upto 8 cm long, numerous small narrow root hairs present, two comparatively large rootlets. Stem erect, simple or branched, base terete, upto 0.5 cm, sparsely hairy, furrowed, scabrous with long yellowish multicellular hairs and capitate glandular hairs, tip of glandular hair yellow, yellowish green; internodes 0.5-2 cm. Leaves alternate, upper and lower leaves different, glandular hairs comparatively low; in small ones the basal leaves arranged like rosette with a leaf stalk on both sides; Lower 2 or 3 leaves lanceolate or oblanceolate after that lyrate lobed, lamina tapering to base, 11 x 5 cm, base

attenuate or semiamplexicaul, margins serrate without sharp teeth, apex acute, thin textured or membranous, velutinous to pilose with scabrid long yellowish multicellular hairs and short capitate glandular hairs, adaxial bright green, abaxial whitish green; upper leaves sessile, shortly lyrate lobed, almost thick textured, margins entire, scabrid with numerous long multicellular hairs and capitate glandular hairs. Inflorescence terminal large loose panicles or interruptedly spiciform panicle in which capitula arranged in clusters of 3-5, 5-50 cm. Capitula slightly campanulate, 4.48 x 3.93 mm, mostly sessile, clustered at the tip, clusters of 3-5, sometimes pedunculate, peduncles upto 2 mm, woolly villous with scabrid long multicellular hairs and comparatively short capitate glandular hairs. Involucral bracts 4 seriate, reflexed or curved at maturity; first phyllary 2.38 x 0.442 mm wide, lanceolate; second phyllary 2.89 mm, lanceolate; third phyllary 3.61 mm, lanceolate; fourth phyllary 4.041 mm long; Receptacle convex, srobiculate or foveolate, glabrous, 2.08 mm wide, epaleaceous. Florets ± 216 no, peripheral female florets, central bisexual florets. Female floret ± 196 no., filiform, corolla tube 2.58 mm long, yellow at apex, whitish to base, 3 lobes, glabrous, style bifid, arms equal, yellow, 0.315 mm long, pappus not reaching upto the starting of corolla lobe. Bisexual floret ± 20 no., tubular, corolla tube 2.52 mm long, length of pappus upto center of corolla; corolla tip bright yellow, base pale-yellow lobes 5, oblong or elliptic lanceolate, 0.365 mm long, papillate, unicellular and multicellular hairs. Stamens 5, syngenesious; anther 1.17 mm, yellow, apical appendages of slightly different lengths, upto 0.176 mm, rounded or obtuse, base with unbranched tails, tails slightly longer than thickened portion of filament or anther collar, 0.158 mm. Style bifid, arms equal, 0.436 mm, yellow, style arms with sweeping hairs upto the bifurcation, style base swollen, connected to ovary by a cylindrical appendage which is narrower than base of style and ovary. Cypselas homomorphic, oblong, 0.534 x 0.224 mm, ribbed, dark brown with apex, base and ribs yellowish, base slightly tapering, pubescent from center to apex, to base sparsely hairy. Pappus white, 8-10 no., uniseriate, 2.93 mm long, persistent.

Flowering and fruiting: September-March.

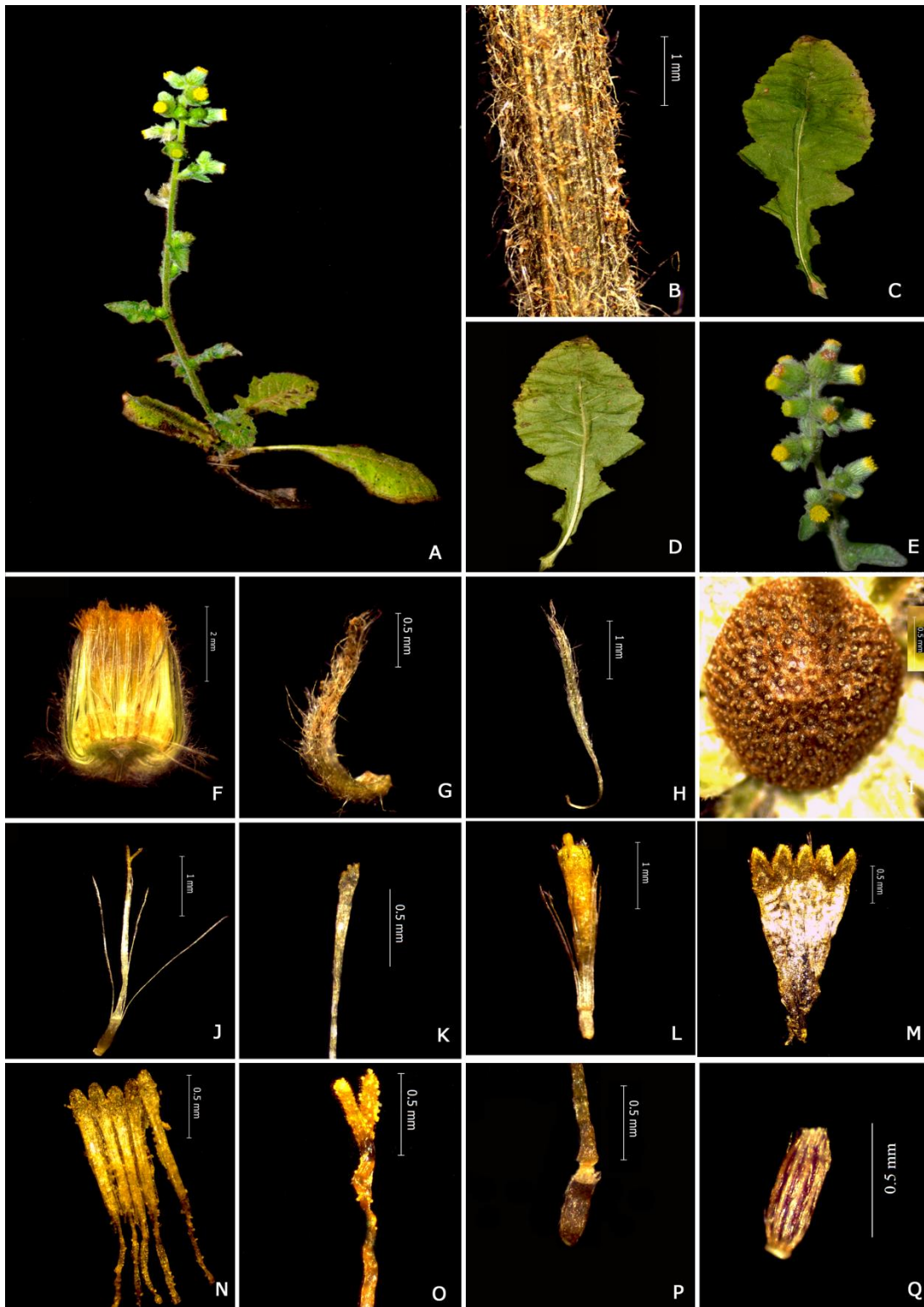


Fig. 43. *Blumea sessiliflora* Decne.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 44. Type of *Blumea sessiliflora* Decne. © Muséum national d'Histoire naturelle, France, Paris.

Distribution: India, Cambodia, China, Malaya, Myanmar, Jawa, Laos, Vietnam, Sulawesi, Nepal, Thailand. Karnataka and Kerala are the states where this species is found in Peninsular India.

Habitat and ecology: Edges of dry evergreen forests, roadsides.

Specimens Examined: **Karnataka**, Kodagu district, Coorg, Garmuri, Sampaje, 05/03/59, *B.M. Wadhwa* 48829 (BSI); Coorg, Nagarholle, 07/01/1959, *R.K. Arora* 46271 (BSI). **Kerala**, Kottayam district, Illikkal Kallu, 09/12/2019, *M.V. Dilsha* 8607 (DEV). Malappuram district, Malappuram, Roadsides, 26/12/2018, *M.V. Dilsha* 6978 (DEV); On the way to Mini Ooty, 25/01/2020, *M.V. Dilsha* 8636 (DEV); Chungathara-Kuttimudda road sides, Nilambur, 11/11/2020, *M.V. Dilsha* 8659 (DEV); Cheruppadimala, 02/01/2021, *M.V. Dilsha* 8681 (DEV); *Ibid.*, 30/03/2022, *M.V. Dilsha* 9130 (DEV).

Conservation status: Least Concern.

Notes: *B. sessiliflora* is very similar to *B. fistulosa*, but it has a glabrous receptacle and lower leaves with more or less lyrate lobes arranged into a subbasal rosette, and its capitula can be sessile or pedunculate (in *B. fistulosa*, the capitula are typically sessile and grouped as an interrupted spiciform panicle).

Blumea sinuata (Lour.) Merr., Tran. Amer. Philos. Soc., n.s., 24 (2): 388. 1935; M R. Almeida, Fl. Maharashtra. 3A: 84. 2001. *Gnaphalium sinuatum* Lour. Fl. Cochinch. 2: 497. 1790. Type: Vietnam, Hue, P. Couderc *s.n.* (Holotype P).

Fig. 45

Blumea laciniata DC., Prodr., 5: 436. 1836; Gamble, Fl. Pres. Madras 484. 1921; Randeria, *Blumea* 10(1): 258. 1960; S. Kumar in Hajra *et al.*, Fl. India 13: 128. 1995; Pull. & Ali Moulali, Fl. Andhra Pradesh 2: 516. 1997; S.G. Pradhan *et al.*, Fl. Sanjay Gandhi NP 329, 2005; Pull. *et al.*, Fl. Eastern Ghats 3: 232. 2007. *Conyza laciniata* Wall. Numer. List, no 3100. 1831. nom. nud. Type: India orientis, Wallich Cat. 3100, comp. no. 210 (Holotype K-W!; Isotype G-DC!).

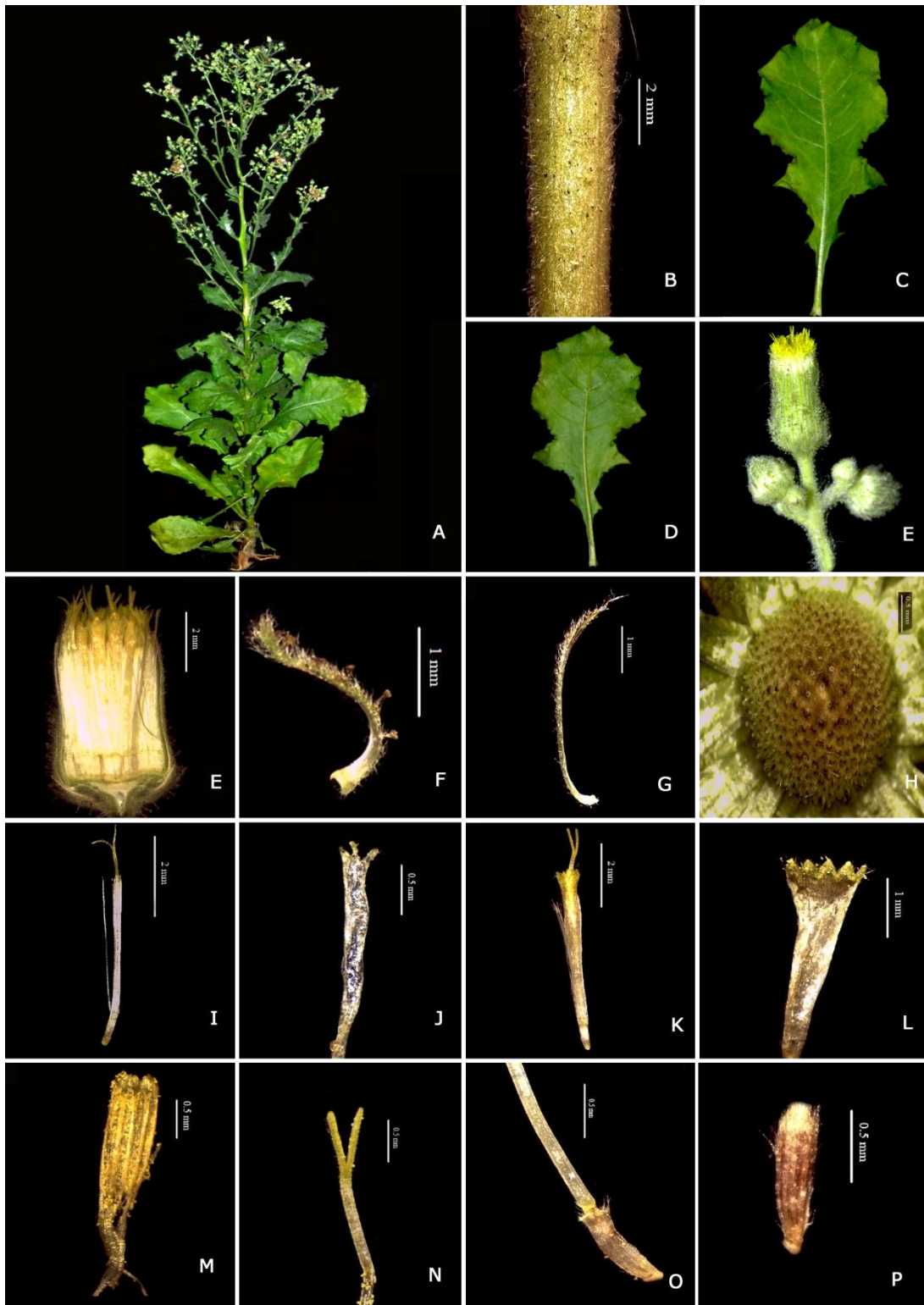


Fig. 45. *Blumea sinuata* (Lour.) Merr.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

Conyza laciniata Roxb. Fl. Ind., 3: 427. 1832. Type: Bengal, Roxburgh Flora Indica drawing no. 1642 (Lectotype K!, designated by Pornporngrueng *et al.*, 2016).

Blumea cichoriifolia DC. in Decne. Nouv. Ann. Mus. Hist. Nat. 3: 410.1834; DC., Prodr., 5: 437. 1836. *Conyza cichoriifolia* Miq. Fl. Ned. Ind. 2: 47. 1856. Type: Timor, Decaisne *s.n.* (Lectotype G-DC!, designated by Pornporngrueng *et al.*, 2016; Isotypes GH, P!)

Blumea acutata DC. in Decne., Nouv. Ann. Mus. Hist. Nat. 3: 410.1834. DC., Prodr., 5: 438. 1836. *Conyza acutata* Miq. Fl. Ned. Ind. 2: 48. 1856. Type: Timor, Guichenot & Riedle *s.n.* (Holotype P).

Blumea sonchifolia DC. Prodr., 5: 438. 1836. *Conyza sonchifolia* Ham. in Wall. Numer. List, no 3085. 1831. nom. nud. Type: India, Patna, Wallich Cat. 3085, comp. no. 195 (Holotype G-DC!; Isotypes GH, K-W!).

Blumea runcinata DC. Prodr., 5: 438. 1836. *Conyza runcinata* Wall. ex Miq. Fl. Ned. Ind. 2: 46. 1856. Type: Nepal, Wallich Cat. 3087A. comp. no. 197 (Lectotype K-W!, sheet A, selected by Pornporngrueng *et al.*, 2016; Isolectotype G-DC!)

Annual herbs, 140 cm. Tap root, upto 15 cm, 3-5 mm thickness, 3-4 large, numerous small rootlets. Stem erect, but branches sometimes ascending, simple or branched from base, woody at base, sparsely hairy at base, pale yellowish green, young stem fluorescent green, upto 1 cm thickness, hollow, ridges or striated, light green, pilose with long multicellular hairs and capitate glandular hairs, tip of glandular hair yellow; internodes 2-7 cm. Leaves simple, alternate, branch leaves and main stem leaves different; main stem leaves sessile to subsessile, laminae lyrate lobed, 14 x 6 cm, base attenuate or sometimes semiamplexicaul, margins curled, serrate, adaxial bright green, abaxial light green, lanate with long yellow multicellular hairs and capitate glandular hairs; branch leaves petiolate, petiole upto 3cm. Inflorescence leaves less lobes, 3.3 cm, fluorescent green on both sides. Inflorescence terminal large dense or lax panicle, 60 cm. Capitula almost cylindrical, 7.31 x 3.75 mm, pedunculate, peduncle 2.78 x 1.06 mm, green, villous with long multicellular hairs and numerous capitate glandular hairs. Involucre scales 6 seriate, margins purple,

completely reflexed at maturity, slightly longer or equal to florets; first phyllary 1.85 x 0.310 mm, green, linear lanceolate, long hairs and capitate glandular hairs, capitate glandular hairs 3 or 4, yellow or green tipped; second phyllary 2.75 x 0.325 mm, with capitate glandular hairs and non glandular hairs, tip of glands orangish red or rust coloured, linear lanceolate, green; third phyllary 3.392 x 0.275 mm, glands crowded at the tip portion, one or two at lower portion, glands orangish red or rust coloured, base scarious upper margins purple, linear lanceolate; fourth phyllary 4.84 x 0.254 mm, glands at the tip, absent at base, whitish green at base, scarious margins, margins purple at apex, linear lanceolate; fifth phyllary 5.107 x 0.214 mm, linear, capitate glandular hairs at upper portion, hairs scarce to base, purplish margins particularly at apex; sixth phyllary 5.71 x 0.271 mm, linear, absence of capitate glandular hairs, only multicellular hairs, scarious margins, light green. Receptacle concave, alveolate, pubescent with short hairs, 3.03 mm wide, epaleaceous. Florets \pm 279 no., peripheral female florets, central bisexual florets. Female floret \pm 273 no., filiform, corolla tube 5.54 mm long, corolla whitish yellow, 3 lobes, hairy, pappus equal in length to corolla or slightly longer, persistent, style bifid, arms equal. Bisexual floret \pm 6 no., tubular, corolla tube 4.10 mm, pappus hair not reach upto the starting or corolla lobe, pappus persistent; corolla yellow at lobes, pale yellow others, 5 lobed, 0.279 mm, papillate, unicellular and glandular hairs. Stamen 5, syngenesious; anther 1.50 mm, yellow, anther apical appendages of almost same length, obtuse, 0.279 mm, base with unbranched tails, tail shorter than the thickened portion of filament or anther collar; filament 1.40 mm, pale yellow. Style bifid, arms equal, 0.671 mm, yellow, others pale yellow to whitish or translucent, arms with sweeping hairs upto the bifurcation, style base slightly swollen, style connected to ovary by a cylindrical structure which is narrower than both style and ovary. Cypselas homomorphic, oblong, 1.06 x 0.266 mm, ribbed, 10 ribs, brown, apex and base yellowish, straight, base slightly tapering, pubescent all over the surface. Pappus white, 9-11 no., uniseriate, 3.74 mm long, persistent.

Flowering & Fruiting: January -May.

Distribution: India, Bangladesh, China, Borneo, Nepal, Cambodia, Sri Lanka, New Guinea, Vietnam, Jawa, Maldives, Laos, Myanmar, New Caledonia, Malaya, Philippines, Thailand, Sulawesi, Taiwan. This species was found to be distributed in almost all the states of Peninsular India.

Habitat & Ecology: Roadsides and forest edges.

Specimens Examined: **Karnataka**, Dakshina Kannada district, Shiradi ghat, 26/02/2020, *M.V. Dilsha* 8649 (DEV); *Ibid.*, 22/02/2021, *M.V. Dilsha* 8693 (DEV).

Kerala, Vandalodu-Ettapadappu road, 09/02/61, *KN Subramanyan* 70469 (BSI). Wayanad district, Near Banasura sagar dam, 05/03/2018, *M.V. Dilsha* 6927 (DEV).

Madhya Pradesh, Bhopal, 24/11/66, *K.V. Billore* 73 (BSI). **Maharashtra**, Akola district, Chikhalwal, 20/02/1978, *S.Y. Kamble* 152648 (BSI); Karla, 18/02/1978, *S.Y. Kamble* 150542 (BSI).

Pune district, Behind 7 Koregaon road, 05/70, *K.K. Ahuja* 112329 (BSI); Pune roadsides, 08/01/2022, *M.V. Dilsha* 9119 (DEV). **Orissa**,

Malkangiri district, Balimela, Bandamamidi, 600-1450 m, 24/05/1959, *RS Rao* 18543 (CAL). Mayurbhanj district, Chandua, 12/02/63, *G Panigrahi* 6786 (CAL).

Conservation status: Least Concern.

Notes: *Blumea laciniata* is a well-known alternate name for this plant. The true name, however, is *B. sinuata* (Singh, 1976), which was derived from *Gnaphalium sinuatum* Lour. The neotype for the name was chosen by Pornpongrungrueng *et al.* (2016).

Blumea virens DC., Contr. Bot. India (Wight) 14.1834; Hook. f., Fl. Brit. India 3: 264. 1882; Gamble, Fl. Pres. Madras 483. 1921; Randeria, *Blumea* 10(1): 272. 1960; Saldanha & Nicolson, Fl. Hassan Dist. 606. 1976; Grierson in Dassan. & Fosbery, Revis. Handb. Fl. Ceylon 1:173. 1980; K.M. Matthew, Fl. Tamilnadu Carnatic 3(1):773.1981; B.D. Sharma *et al.*, Fl. Karnataka Analysis 2:137. 1984; Ansari, Fl. Kasaragod Div. 210. 1985; R.S. Rao & S. Hara, Fl. Srikakulam Dist. 271. 1986; R.S. Rao *et al.*, Fl. West Godavari Dist. 235. 1986; V. S. Ramach. & V.J. Nair, Fl. Cannanore 245. 1988; J.L. Ellis, Fl. Nallamalais 2: 233. 1990; Keshava Murthy & Yoganarasimhan, Fl. Coorg 242. 1990; K.M. Mathew, Excursion Fl. Central Tamil

Nadu 256. 1991; M. Mohanan & Henry, Fl. Thiruvanthapuram 257. 1994; Subram., Fl. Thenmala Div. 190. 1995; S.D. Deshp. *et al.*, Fl. Mahabaleshwar & Adjoinings 2: 308. 1995; S. Kumar in Hajra *et al.*, Fl. India 13: 143. 1995; Pull. & Ali Moulali, Fl. Andhra Pradesh 2: 518. 1997; Sasidh., Fl. Periyar Tiger Reserve 197. 1998; K.M. Matthew, Fl. Palni hills 2: 668. 1999; B. Suryanarayana & A. Sreenivasa Rao, Fl. Nellore dist. 2: 305. 2002; G.V. Subbarao & G.R. Kumari, Fl. Visakhapatnam Dist., 1: 439. 2002; K. Gopalakrishna Bhat, Fl. Udupi 305. 2003; N. Anilkumar *et al.*, Fl. Pathanamthitta. 279. 2005; Pull. *et al.*, Fl. Eastern Ghats 3: 229. 2007; C.N. Sunil & Sivad., Fl. Alappuzha Dist. 379. 2009; Ratheesh Narayanan, Fl. Stud. Wayanad Dist. 411. 2009. *Conyza virens* Wall. Numer. List, no 3037. 1831. nom. nud. *Erigeron virens* Russ. ex DC. Prodr. 5: 439. 1836. in syn. Type: India, Negapatam, Wight 1430 (Lectotype E!, designated by Dilsha & Satheesh, 2021). **Figs. 46, 47**

Blumea lapsanoides DC. in Wight, Contr. Bot. India. 15.1834; DC, Prodr. 5: 440. 1836. *Blumea virens* var. *minor* Hook.f., Fl. Brit. India 3: 264. 1882. Type: Courtallum, Wight 1431 (Holotype K!; Isotypes CAL, E!, G!).

Blumea hymenophylla DC. Prodr. 5: 440. 1836. *Conyza hymenophylla* Wall. Numer. List, no 3038. 1831. nom. nud. Type: Myanmar, Martaban, Wallich Cat. 3038, comp. no. 148 (Holotype G-DC!; Isotype E!).

Annual herbs, 20-180 cm. Taproot, adventitious roots arise from the base of stem, upto 10 cm, numerous narrow rootlets. Stem erect, simple except inflorescence branches, base woody, upto 0.5 cm, brown or green, terete, glabrous, others ridged, mostly small inconspicuous ridges only, sparingly pilose with long multicellular hairs distributed at a distance, green, 3.68 mm wide; internodes 1.5-5 cm. Leaves alternate, upper and lower leaves different; lower leaves petiolate, petiole 0.5-3 cm long, green, glabrous or base with sparingly white hairs, 3 or 4 leaves oblanceolate, after that lyrate lobed with obovate terminal lobes and 2 pair of lateral lobes, the pair which is adjacent to terminal lobe somewhat triangular to elliptic lanceolate, other two pair inconspicuous or small triangular oblong, the two lobed condition of lyrate leaves transform into one lobed in the upper portions, it is sessile, base prolonged tapering into petiole, margins sparingly serrate with minute teeth, apex

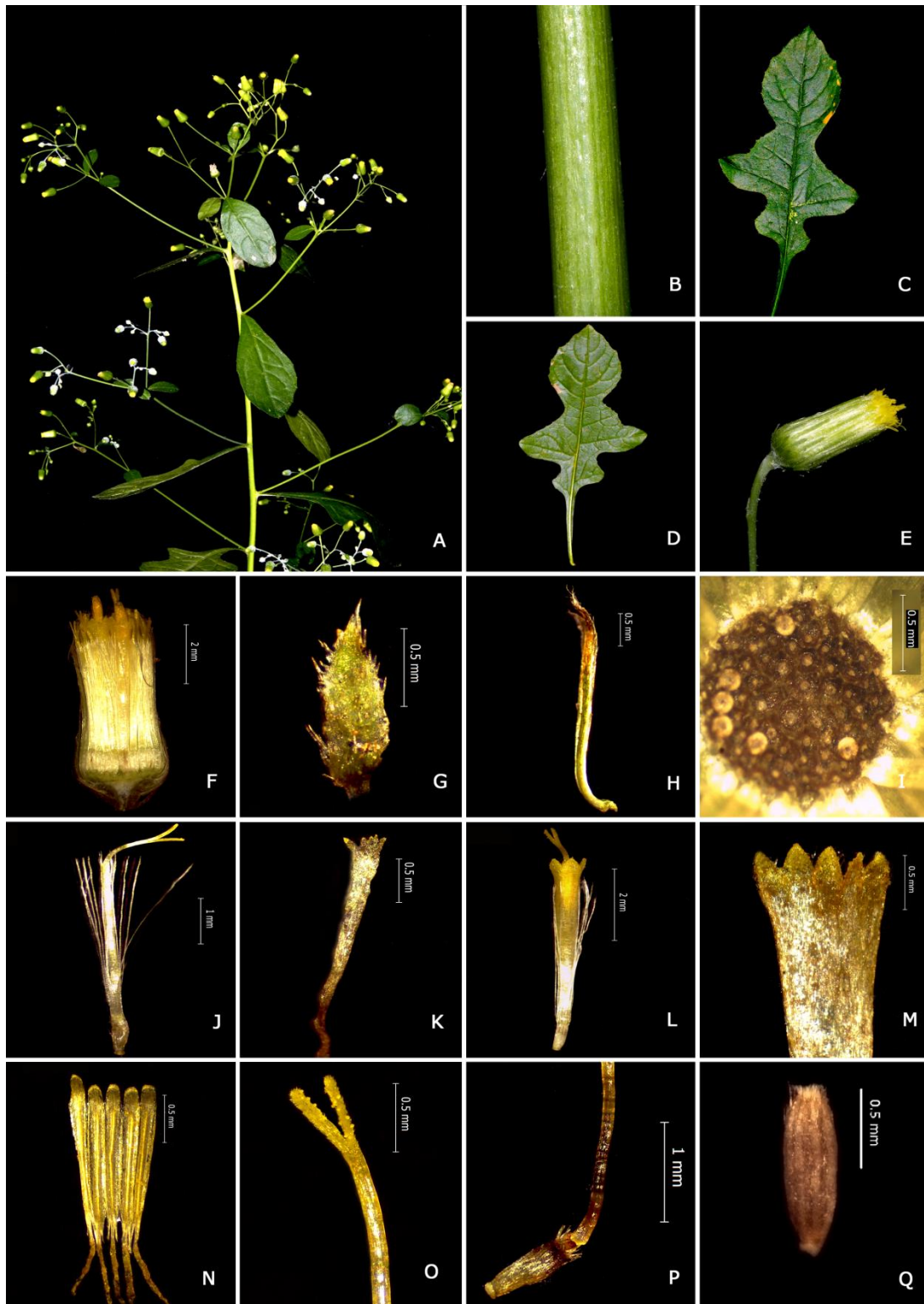


Fig. 46. *Blumea virens* DC.: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 47. Type of *Blumea virens* DC. © Royal Botanic Garden Edinburgh.

acuminate, thin textured or membranous, upper surface sparsely hairy, margins hairy, lower surface pubescent with pilose hairs, more hairy at veins, adaxial bright green, abaxial whitish green; upper leaves sessile, laminae elliptic or ovate or oblanceolate or lyrate lobed, distantly serrate with minute serrations, both surface glabrate or sparingly pilose. Inflorescence large, much branched, loose panicles with small leaves on inflorescence branches, terminal and axillary, 60 cm. Capitula cylindric, 6.15 x 2.68 mm, pedunculate, peduncle 6.50 mm long, light green, narrowly cylindrical, rounded, sparsely hairy; bracteoles ovate or lanceolate, ciliate. Involucral bracts 6 seriate, green; first phyllary 1.0 x 0.350 mm, lanceolate, hairy at margins and lower portion, apex acute to apiculate; second phyllary lanceolate, short hairs present at margins, 1.32 x 0.438 mm, green at center and scarious margins; third phyllary short hairs at tip margins, 1.682 x 0.486 mm, scarious margins; fourth phyllary 2.874 x 0.543 mm, ciliated tip with short hairs, linear lanceolate; fifth phyllary 2.72 mm long, ciliated tip, scarious margins, linear; sixth phyllary 5.40 x 0.512 mm, only a green line at center, other portions completely scarious, ciliate margin. Receptacle slightly convex or flat, areolate, glabrous, 1.40 mm wide, epaleaceous. Florets ± 96 no., peripheral female florets, central bisexual florets. Female floret ± 87 no., filiform, corolla tube 3.81 mm long, yellow at apex, whitish to base, lobes 3 or 4, lobes equal, glabrous, style bifid, arms equal, yellow, pappus 16-17, pappus slightly longer than corolla. Bisexual floret ± 9 no., tubular, corolla tube 3.38 mm long, pappus persistent, not reaching upto the starting of corolla lobes; corolla yellow, 5 lobed; lobes 0.304 mm, papillate, oblong lanceolate, pubescent with unicellular and glandular hairs. Stamen 5, syngenesious; anther 1.42 mm, yellow, apical appendages of different length, acute, one is larger than the other, base with unbranched tails, tail shorter or upto the thickened portion of filament; filament upto 1.13 mm, pale yellow to whitish. Style bifid, arms equal, 0.572 mm, sweeping hairs present upto bifurcation, yellow, base pale yellow to whitish, base slightly swollen, connected to ovary by a cylindrical structure which is narrower than ovary but same length as style. Cypselas homomorphic, oblong, 1.04 x 0.362 mm, ribbed, straight, pale yellow, pubescent. Pappus white, 14-18 no., uniseriate, 4.37 mm long, persistent.

Flowering & fruiting: November-March.

Distribution: India, Bangladesh, Jawa, Cambodia, Philippines, China, Laos, Thailand, Vietnam, Sri Lanka, Myanmar and Nepal. *B. virens* is widely distributed in all the states of Peninsular India.

Habitat & Ecology: Forest edges, roadsides, disturbed areas in forests.

Specimens Examined: **Andhra Pradesh**, Alluri Sitarama Raju district, Maredumalli, 21/02/1956, *S.K. Wagh* 1694 (BLAT). Kakinada district, Annavaram, 14/02/1956, *S.K. Wagh* 1434 (BLAT). Nandyal district, Velugode, 17/02/1957, *S.K. Wagh* 4943 (BLAT); Velugode, 17/02/1957, *S.K. Wagh* 4942 (BLAT). **Goa**, South Goa District, Colem along railway line, 08/05/1963, *K.C. Kanodia* 88489 (BSI). North Goa district, Mapusa and surrounding villages, 11/64, *J. Pallithanam* G10 (BSI); Mollem National Park Area, 02/02/2018, *M.V. Dilsha* 6906 (DEV). **Karnataka**, Chikkamagaluru district, Mudigere, 19/04/58, *S.D. Mahajan* 34589 (BSI). Dakshina Kannada district, Shiradi ghat, 26/02/2020, *M.V. Dilsha* 8648 (DEV). Hassan district, Bisle ghat, 700ft, 30/11/1927, *S.R. Raju & Nagarethan* 0182355 (MH). Kodagu district, Coorg, sampajee, 05/03/59, *B.M. Wadhwa* 49208 (BSI); Coorg, Makut, 09/03/58, *G.S. Puri* 32266 (BSI). Shimoga district, Agumbe, 15/05/60, *R.S. Raghavan* 62491 (BSI). Udupi district, Mookambika WLS, Arsenagudi falls, 18/03/07, *P.G. Divakar & R.K. Singh* 184234 (BSI); Kilandur, Hulikal, 21/03/1964, *R. Sundara Raghavan* 97047 (BSI). Uttara Kannada district, Godalli, 25/04/56, *G.S. Puri* 1143 (BSI); Kodkani, 07/03/60, *R.S. Rao* 61210 (BSI); Godalli forest, 25/04/56, *G.S. Puri* 1217 (BSI); Ghats near yellapore, 04/02/1884, *W.A. Talbot* 840 (BSI); Jog falls, Mavirguudi, 19/05/54, *H. Santapau*, 18630 (BLAT). **Kerala**, Ernakulam district, Ernakulam, 14/02/98, *S. Kumari Prameela* 40198 (TBGT); Neriamangalam, 15/12/2018, *M.V. Dilsha & V. Drishya* 6960 (DEV). Idukki district, HPC Camp shed, Pooyamkutty, 50 m, 22/12/1988, *P. Bhargavan* 70049 (MH). Kannur district, Pazhassi dam site, ± 150 m, 21/01/1979, *V.S. Ramachandran* 59075 (MH); Taliparamba, *s.d., s.coll.* 11889 (MH); Madayippara, 14/11/2018, *M.V. Dilsha & V. Drishya* 6941 (DEV). Kasargod district, Bekal, 100 m, 25/12/1980, *R. Ansari* 70002 (MH). Kollam district, Palaruvi

forests, Ariankavu range, 10/05/61, *K.N. Subramanian* 71568 (BSI); Villumalai, 17/02/61, *K.N. Subramanian* 70810 (BSI); Kallada river valley, 07/02/61, *K.N. Subramanian* 70361 (BSI); Thenmala, 28/02/2006, *Geethakumari* 58562 (TBGT); Ariankavu, 08/01/13, *M. Rama Rao* 101754 (TBGT). Kottayam district, Adukkam, ±50 m, 19/11/1984, *Rev.fr.Kadavil* 1006 (MH); Koruthode, 16/01, *Jomy Augustine* 13108 (CALD); on the way to Illikkal kallu, 09/12/2019, *M.V. Dilsha* 8603 (DEV). Kozhikode district, Calicut, 10/12/1931, *s.coll.* 6253 (MH); Kakkayam, 30/11/2018, *M.V. Dilsha & V. Drishya* 6947 (DEV). Wayanad Churam, 02/02/88, *C. Ramesan* 41327 (CALI); Kakkayam, 30/11/2020, *M.V. Dilsha* 8666 (DEV); *Ibid.*, 30/11/2020, *M.V. Dilsha* 8671 (DEV). Malappuram district, Nedumgayam & Meenmutty, 650 m, 13/03/1984, *N.C. Nair* 81222 (MH); Kodikuthimala, 24/11/2018, *M.V. Dilsha* 6945 (DEV); Nadukani Churam, 11/11/2020, *M.V. Dilsha* 8655 (DEV); Nilambur roadsides, 11/11/2020, *M.V. Dilsha* 8658 (DEV); *Ibid.*, 11/12/2020, *M.V. Dilsha* 8673 (DEV); Cheruppadimala, 02/01/2021, *M.V. Dilsha* 8682 (DEV). Palakkad district, Near Dhoni river, 150 m, 27/05/1964, *E. Vajravelu* 19100 (MH); Pothundy-Kaikatty, 03/02/96, *K. Radha Krishnan* 26584 (TBGT); Nelliampathy, 06/04/99, *K. Radha Krishnan* 33538 (TBGT); Dhoni, 01/12/1971, *A.A. Pushpamani* 555 (CALI); Attappady, 15/12/2020, *M.V. Dilsha* 8675 (DEV). Pathanamthitta district, Arampa, Achankovil, ±840 m, 17/01/1989, *N. AnilKumar* 1437 (MH); Moozhiar, ±800 m, 12/01/1988, *N. Anil Kumar* 352 (MH). Thiruvananthapuram district, On the way to Ponmudi from Kallar, 480 m, 24/03/1978, *M. Mohanan* 54771 (MH); Attayar, Agasthyamala, 21/12/2018, *M.V. Dilsha, V. Drishya & Manu Philip* 6973 (DEV); Ponmudi, 21/12/2019, *M.V. Dilsha* 8615 (DEV). Thrissur district, Park near Vazhachal water fall, 12/12/2019, *M.V. Dilsha & V. Drishya* 8612 (DEV). Wayanad district, near Pookkode lake, 05/03/2018, *M.V. Dilsha* 6924 (DEV). **Maharashtra**, Pune district, Parvati, 1900 ft, 25/11/55, *V.D. Vartak* 2451 (AHMA); *Ibid.*, 1900 ft, 25/11/55, *V.D. Vartak* 2447 (AHMA); Khireswar (Junnar), 30/11/02, *S.B. Nagarkar* 24327 (AHMA). Raigad district, Bansare village near tudal, 21/04/1963, *K.C. Kanodia* 88208 (BSI); First step of Rajgad, 3200 ft, 19/02/55, *V.D. Vartak* 441 (AHMA). Satara district, Satara, 4000 ft, 29/01/56, *V.D. Vartak* 2913 (AHMA). Sindhudurg district, Charatha, Savantwadi, 06/05/1978, *S.M. Almeida* 1445 (BLAT);

Amboli, 26/05/77, *S.M. Almeida* 224 (BLAT). Thane district, Mumbra, 23/12/1953, *K.V. Shenoy* 1780 (BLAT). **Tamil Nadu**, Coimbatore district, Puduthottam estate, Anamalai, 1050 m, 24/01/1963, *J. Joseph* 15595 (MH); Sholaiyar submergible area, 1040 m, 27/12/1963, *K. Ramamurthy* 18142 (MH). Chennai district, Kodambakkam hills, 03/1914, *s.coll.* 10270 (MH). Dindigul district, Karanthamalai, 366 m, 15/02/1958, *K. Subramanyam* 5325 (MH). Erode district, Vettaikaran koil, 880 m, 08/04/1970, *M.V. Viswanathan* 511 (MH). Ramanathapuram district, Sethur RF, ± 200 m, 25/02/1979, *N.C. Nair* 61447 (MH). Theni district, Suruli falls, 475 m, 24/04/1960, *B.V. Shetty* 10287 (MH). **Telengana**, Warangal district, Pakhal, ± 250 m, 24/03/1999, *R.K. Premanath* 108254 (MH).

Conservation status: Least Concern.

Notes: De Candolle (1834) described this species. In a revisionary study of the genus *Blumea*, Randeria (1960) cited Wight 1430 (E) as the type specimen. From the Royal Botanic Garden Edinburgh (E), we traced two sheets of Wight 1430. Therefore, according to ICN Article 7.11, Randeria's typification can be considered an efficient first phase lectotypification. As a result, sheet E00417360 is chosen as the lectotype for the second phase.

Blumea venkataramanii R.S. Rao & Hemadri, *Curr. Sci.*42 (19): 693. 1973; S. Kumar in Hajra *et al.*, *Fl. India* 13: 142. 1995; M R. Almeida, *Fl. Maharashtra*. 3A: 85. 2001. Type: Cultivated fields near Vadgaon on Poona-Bombay road, Maharashtra (Holotype CAL!; Isotype K!; Paratype CAL!, BSI!, MH!). **Fig. 48**

Erect, annual herb, aromatic, 0.2-1 m high. Root solitary or 2-10 in number. Stem erect, terete, striate, clothed by simple, gland tipped and eglandular hairs. Leaf lower ones larger, sometimes upto 20 x 5 cm, spatulate, hairy above and beneath, hairs tubercle based, both simple and gland-tipped, upper surface scabrid at maturity; laminae elliptic-obovate or oblanceolate in outline, narrower, at base, decurrent and fused with the stem thus forming a false, prominently winged stem, margin irregularly dentate or serrate with pointed apices, the uppermost leaves smaller, oblong-lanceolate or spatulate with decurrent base. Inflorescence terminal and lateral, pedunculate, solitary or in clustered heads. Capitula 0.6-1.2 cm long and ± 1

cm across; involucre bracts 3 to 4 seriate, outer 2 whorls green, 2-4 mm long, lanceolate, inner ones linear and tinged with purple at apex, outer surface clothed by bulbous-based glandular and eglandular hairs. Receptacle hemispheric, glabrous. Outer florets in about 5 rows, corolla yellow, ± 3 mm long, 0.1 mm broad at the mouth, female, lobes 3, minutely glandular along margins together with a few hyaline hairs, style longer than the corolla tube, arms 2, pappus about 6 in number, white, as long as the corolla tube and antrorsely, minutely barbellate, caduceus at maturity. Disc florets bisexual, corolla yellow, 4 mm long, ± 1 mm broad at apex, lobes 5, clothed by glandular and eglandular hairs, tube glabrous. Stamens 5, syngenesious, 2.5 mm long, protruding out of the tube at maturity, anthers tailed; style ± 4 mm long, arms 2, ± 1 mm long, ovary hairy, columnar, ± 0.6 mm long, pappus as long as the corolla, about 6 in number, white, antrorsely barbellate, caducous at maturity. Achenes minute, $\pm 1 \times 0.2$ mm, sub-cylindrical or 4-sided, minutely, sparsely hairy.

Flowering & Fruiting: December-February.

Distribution: Endemic to the state of Maharashtra.

Habitat & Ecology: Roadside and waste lands.

Specimens Examined: Paratype: Maharashtra, Pune District, Pavna dam site, Vadgaon, 20/12/1968, *K. Hemadri* 110794 (MH00000603, MH); Vadgaon on Poona-Bombay road, 05/01/1971, *K. Hemadri* 110794 (MH00000604, MH); Vadgaon on Poona Bombay road, 05/01/1971, *K. Hemadri* 108788A, (BSI0000000251, BSI); Vadgaon on Poona Bombay road, 05/01/1971, *K. Hemadri* 108788B (BSI0000000252, BSI); Vanewadi, 13 km west of Junnar, 05/02/1969, *K. Hemadri* 68588 B (BSI0000000247, BSI); Vanewadi, 13 km west of Junnar, 05/02/1969, *K. Hemadri* 68588 A (BSI0000000248, BSI); Vanewadi, 13 km west of Junnar, 05/02/1969, *K. Hemadri* 68588 C (BSI0000000249, BSI); Vanewadi, 13 km west of Junnar, 05/02/1969, *K. Hemadri* 68588 D (BSI0000000250, BSI); Ralegaon hills, 10km west of Junnar, 06/02/1969, *K. Hemadri* 68582 (BSI0000000263, BSI); Pavana dam site, Vadgaon, 20/12/1968, *K. Hemadri s.n.* (BSI0000000253, BSI); Vadgaon, on Poona-Bombay road, 05/01/1971, *K. Hemadri* 108788C (CAL0000016835, CAL).



Fig. 48. Type of *Blumea venkataramanii* R.S. Rao & Hemadri © Botanical Survey of India, Howrah.

Conservation status: Data Deficient.

Notes: Unfortunately, we couldn't collect this plant from field, eventhough visited the type locality several times. The study of this species was based on protologue information only. In protologue it is clearly written that to some extent it resembles *B. eriantha* and *B. obliqua* but differes from them in decurrent leaves forming two wings on stem. Almeida (2001) pointed out that this species is very much resembling *B. obliqua* or may be its variety *B. obliqua* var. *maritima*.

Laggera Sch. Bip. ex Benth. & Hook. f.

Laggera Sch. Bip. ex Benth. & Hook. f., Gen. Pl. 2: 290. 1873. Type: *Laggera pterodonta* (DC.) Sch. Bip. ex Oliv. in Trans. Linn. Soc. London 29: 94. 1873 ≡ *Blumea pterodonta* DC. in Wight, Contr. Bot. India: 16. 1834. Peninsula Ind. orientalis, *Wight 1437* (K!).

Annual or perennial, herbs or subshrubs. Roots taproot. Stem erect, base woody, terete or subterete, branched, distinctly winged, wings not toothed or deeply toothed, wings 1-3cm deep, tomentose or pubescent or puberulous. Leaves alternate, sessile or petiolate, laminae ovate or oblong or elliptic lanceolate, apex acute or acuminate, margins lightly serrated or serrulate or serrate dentate, pubescent or puberulous or tomentose. Inflorescence large panicle or narrow panicle. Capitula cernous, widely campanulate or cylindrical, pedunculate, peduncle curved or straight. Involucral scales 6-7 seriate; outer phyllaries spreading outwards, apex acuminate or acute, ovate lanceolate, glandular pubescent or densely tomentose; inner phyllaries linear lanceolate or linear, apex acute, tomentose or puberulous at apex. Receptacle concave, areolate or fimbriate or scrobiculate, glabrous. Female floret filiform, corolla tube glabrous, corolla light pink or white at apex, whitish to base. Bisexual floret tubular, corolla pink or purple; lobes 5, linear lanceolate or triangular or lanceolate, papillate with glands. Stamens 5, anther pale pink, apical appendages of same or different length, obtuse or acute, tails absent; filament whitish. Style bifid, arms equal, sweeping hairs reach beyond bifurcation, style base slightly swollen. Cypselas homomorphic, linear oblong, dark brown, smooth, straight or curved, pilose or pubescent. Pappus white, uniseriate, persistent or easily detachable.

Key to the species

1. Stem bearing entire herbaceous wings upto 5mm deep.....*L. alata*
 1. Stems bearing narrow uneven herbaceous teeth upto 16mm deep, usually joined by a narrow wing*L. crispata*

Laggera alata (D. Don) Sch.-Bip. ex Oliver, Trans. Linn. Soc. London 29: 94. 1873; Gamble, Fl. Pres. Madras 485. 1921; S. Kumar in Hajra *et al.*, Fl. India 13: 148. 1995. ***Erigeron alatum*** D. Don, Prodr. Fl. Nep. 171. 1825. ***Blumea alata*** (D. Don) DC., Prodr. 5: 488. 1836; Wight, Ic. t. 1101. 1846; Fyson, Fl. Nilgiri Pulney Hill-tops 1:226. 1915; P.F. Fyson, Fl. South Indian Hill Stations 1: 325.1932; Manilal, Fl. Silent Valley 150. 1988; Sasidh., Fl. Periyar Tiger Reserve 195. 1998; Mohanan & Sivad., Fl. Agasthyamala 370. 2002; N. Anilkumar *et al.*, Fl. Pathanamthitta. 278. 2005; Ratheesh Narayanan, Fl. Stud. Wayanad Dist. 408. 2009. Type: Nepal, Narainhetty (BM!). **Figs. 49, 50**

Vernonia alata B. Heyne, Wall. Numer. List, no 3039 A, C. 1831. nom. nud. Type: G-DC!, K!.

Ethulia divergens Russ., Wall. Numer. List, no 3039 B. 1831. nom. nud. Type: 3039 B (K!).

Blumea salviifolia DC., Prodr. 5: 448. 1836. ***Conyza salviifolia*** Bory, Voy. Iles Afrique 3: 176. 1804. Type: Mascareignes Islands, Anon, *s.n* (G-DC!).

Annual, herbs, 80 cm. Stem stout, branched, striated, branches and inflorescence axes subterete, erect, tomentose with long multicellular hairs and glandular hairs, distinctly winged, pubescent, stem wings not toothed, wings 1-5 mm deep. Leaves alternate, elliptic lanceolate, acute, decurrent on the wing of stem, serrate-dentate, tomentose. Inflorescence as axillary to the leaf of the main branch an inflorescence branch arises from inflorescence leaf axils flower arise, narrow panicle. Capitula widely campanulate, 9.29 x 3.84 mm, cernuos (face turned towards the earth), pedunculate, peduncle 8.05 mm long, pale green to yellowish, tomentose with long multicellular hairs and short capitate glandular hairs. Involucral scales squarrose, tip acuminate, 6 seriate, slightly shorter than florets; first phyllary 2.96 x 0.938 mm,

ovate lanceolate, entire surface densely tomentose, spreading; second phyllary 3.86 x 1.16 mm, lower margin ciliated, tip densely pubescent, lower scarious to green, tip rusty, purple tinged margin at apex, ovate lanceolate, spreading; third phyllary 4.12 x 0.924 mm, light green, upper margins purple tinged, scarious margins from center to base, ovate lanceolate; fourth phyllary 5.61 x 0.769 mm, light green, tip brownish pink, linear lanceolate, purple tinged margin at apex, tomentose at apex, others almost glabrous; fifth phyllary 7.137 x 0.567 mm, tip glandular hairs and multicellular hairs scarcely, linear, green through center, others almost scarious, linear lanceolate; sixth phyllary scarious, 7.702 mm, linear, glabrous. Receptacle concave, areolate or fimbriate, glabrous, 3.00 mm wide, epaleaceous. Floret ± 290 no, peripheral female florets, central bisexual florets. Female floret ± 275 no., filiform, corolla tube 7.22 mm, glabrous, pink to whitish, corolla 4 lobes, glabrous, style bifid, arms equal, pink, pappus longer than corolla, caducous or easily detachable. Bisexual floret ± 15 no., tubular, corolla tube 6.76 mm, glabrous, 16 pappus hairs, reach upto the starting of corolla lobe, white, caducous or easily detachable; corolla pale pink at apex, whitish to base, lobes 5, linear lanceolate, papillate, 0.760 mm. Stamen 5, syngenesious; anther 1.67 mm, pink, apical appendages of same length, obtuse, base with no tails, base bidentate, lobes appressed to filament; filament 1.78 mm, whitish. Style bifid, arms equal, 0.640 mm lobe, dark pink, sweepings hairs reach below the bifurcation, light pink from bifurcation to end of sweeping hairs, base whitish, style base slightly swollen, attached to ovary by a structure which is wider to the upper. Cypselas homomorphic, linear oblong, 1.14 x 0.261 mm, smooth, dark brown, straight, pilose with long multicellular hairs. Pappus white, uniseriate, length, caducous or easily detachable.

Flowering & Fruiting: November-April.

Distribution: India, China, Nepal, Cambodia, Jawa, Bangladesh, Madagascar, Botswana, Burundi, Ethiopia, Mali, Pakistan, Myanmar, Swaziland, Laos, Sri Lanka, Thailand, Philippines, Cape Provinces, Vietnam, Chad, Congo, Taiwan, Yemen, Togo. This species is distributed in all the states of Peninsular India.

Habitat & Ecology: Grasslands.

Specimens examined: **Andhra Pradesh**, Kurnool district, Way to Ramanapenta, Nallamalais, 31/03/1965, *J.L. Ellis* 23806 (MH). **Karnataka**, Chikkaballapur district, Nandi hills, 01/03/57, *E.K. Janaki Ammal* 7346 (MH); *Ibid.*, 31/03/1933, *H.C. Govinda s.n.* (MH!); *Ibid.*, 10/01/1958, *S.K. Jain* 31153 (CAL). Mysore district, Bandipur, 950 m, 23/01/1965, *B.D. Naithani* 23104 (MH); Nupu camp site, 13/02/1980, *S. Karthikeyan* 161386 (BSI); Mysore, 09/01/1958, *S.K. Jain* 30972 (CAL); Bedguli, 15/04/1962, *A.S. Rao* 79948 (CAL). Udupi district, Meghanvalley, Mookambika WLS, 20/12/07, *P.G. Diwakar & R.K. Singh* 193749 (BSI). Bellari district, Budgurdu SF, Sandur, 13/01/1976, *N.P. Singh* 142394 (BSI); Sogi RF, Hodgall, 31/12/1975, *N.P. Singh* 141907 (BSI). Uthara Kannada district, North Kanara, 1883, *W.A. Talbot* 830 (BSI, CAL); Vincholi, 10/03/57, *S.K.J* 16267 (BSI). Belgavi district, North Belgaum, Sutgarthi, *S.D. Mahajan* 29134A (BSI). Chamarajanagar district, BRT WLS Karnataka, Jodigere end point, 01/04/2015, *J. Jayanthi* 202820 (BSI). **Kerala**, Kannur district, Brahmagiri, 900 m, 04/03/1979, *V.S. Ramachandran* 62110 (MH, CAL); Chandanathode, ±875 m, 20/12/1979, *V.S. Ramachandran* 65343 (MH, CAL); Idukki district, Meenmutty, 600 m, 14/02/1982, *C.N. Mohanan* 73223 (MH); Lock heart gap, 1675 m, 23/01/64, *K.M. Sebastine* 18414 (MH); Kuttikkanam, Peerumade, 1000 m, 21/01/1965, *K. Vivekananthan* 22924 (MH); Peermade, 15/02/1957, *G.S. Puri* 15310 (BSI); *Ibid.*, 18/02/1957, *G.S. Puri* 5353 (BSI); Meenmutti, 14/02/1982, *C.N. Mohanan* 73223 (CAL); Devicolam, 6000m, 12/1910, *A. Meebold* 535 (CAL); On the way to Mangala Devi Temple, Periyar Tiger Reserve, 25/12/2020, *M.V. Dilsha* 8678 (DEV). Kottayam district, Elaveezhapunchira, ±1000 m, 11/12/1985, *Rev Fr. Kadavil* 1329 (MH); Illikkal Kallu, 09/12/2019, *M.V. Dilsha* 8604 (DEV). Pathanamthitta district, Pampa, ±1100 m, 25/12/1988, *N. Anilkumar* 1314 (MH, CAL). Thiruvananthapuram district, Ponmudi, ±30 cm, 08/03/1980, *M Mohanan* 66610 (MH, CAL); High range, Travancore, 18/02/1901, *s.coll.* 6 (CAL); Athirumala, Agasthyamala, 20/12/2018, *M.V. Dilsha, V. Drishya & Manu Philip*, 6970 (DEV); Ponmudi, 21/12/2019, *M.V. Dilsha* 8614 (DEV). **Maharashtra**, Pune district, Dharkill slopes, 18-19 miles west of Junnar, 13/01/1965, *K. Hemadri* 104447 (BSI); Dhak forest Junnar, 21/01/1966, *K. Hemadri* 108230 (BSI). **Tamil Nadu**, Coimbatore district, *s.l., s.d., C.E.C.*

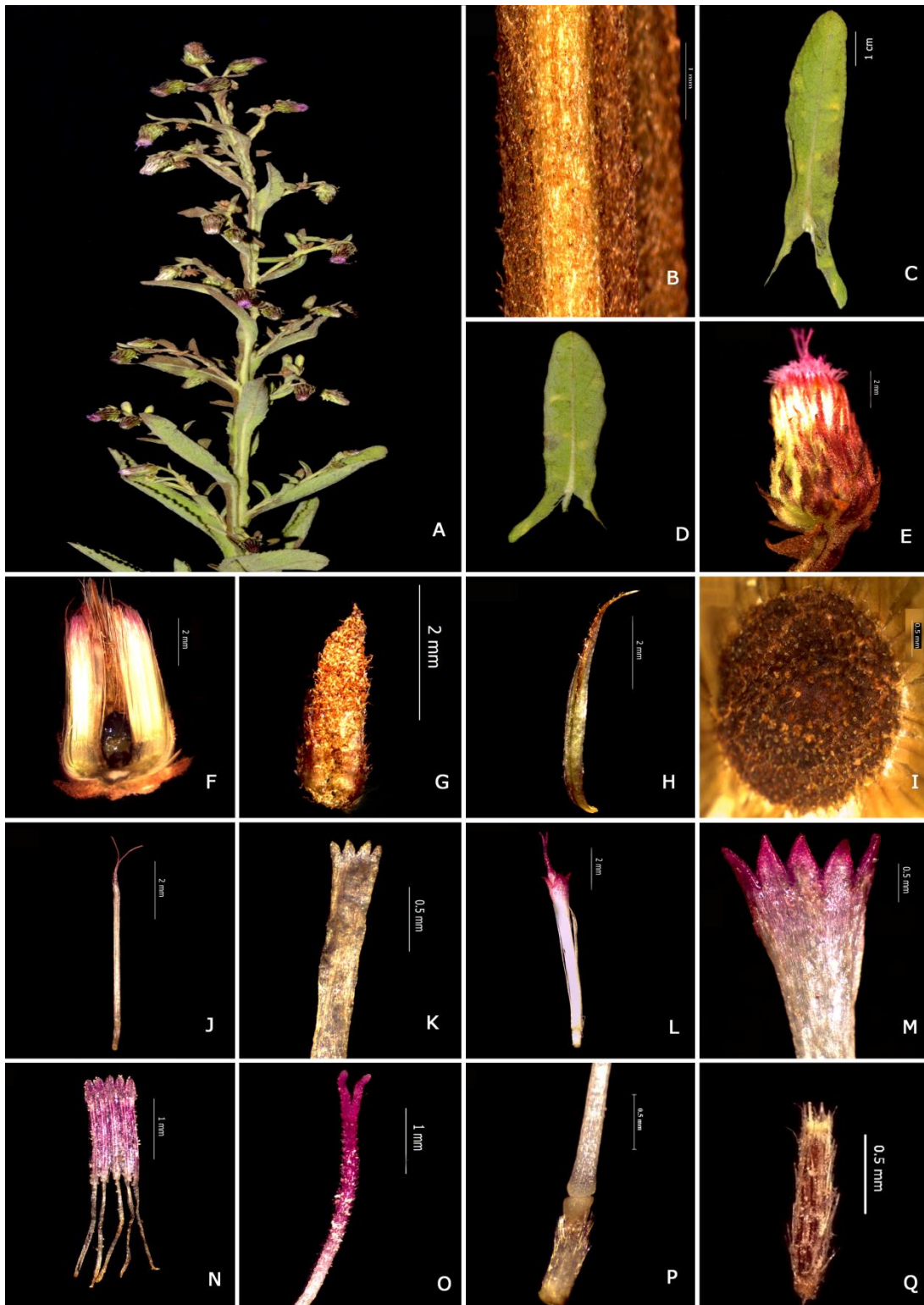


Fig. 49. *Laggera alata* (D. Don) Sch.-Bip. Ex Oliver: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 50. Type of *Lagera alata* (D. Don) Sch.-Bip. ex Oliver © The Natural History Museum, London.

Fischer 722a (CAL); Thekkumalai, 667 m, 14/02/1957, *K.M. Sebastine* 2286 (CAL). Nilgiris district, Nilgiri, 1890, *G. King* 1381 (CAL); Pandalur, 11/01/1903, *s.coll.* 5572 (MH); Benne forest, 1125 m, 20/01/1961, *B.V. Shetty* 11952 (CAL); Needle view point, Ooty, 24/02/2018, *M.V. Dilsha, V. Drishya & P. Soumya* 6917 (DEV). Ramanathapuram district, Mudaliaruttu to virusadi, ±1000 m, 18/02/1979, *N.C. Nair* 60965 (CAL). **Telangana**, NSTR (Nagarjunsagar-Srisailam Tiger Reserve), Farahabad, 01/03/2014, *L. Rasingam* 004646 (BSID).

Conservation status: Least Concern.

Notes: *L. alata* is distinguished from *L. crispata* mainly by the character of its wings. Stem bearing entire herbaceous wings in *L. alata* but narrow, uneven herbaceous wings in *L. crispata*.

Laggera crispata (Vahl) Hepper & J.R.I. Wood, Kew Bull. 38 (1): 83. 1983; S. Kumar in Hajra *et al.*, Fl. India 13: 151. 1995; Sasidh., Fl. Periyar Tiger Reserve 203. 1998; Sasidh., Fl. Chinnar WLS 167. 1999; Vajr., Fl. Palghat Dist. 254. 1990; Sasidh., Fl. Parambikulam WLS 171. 2002; Ratheesh Narayanan, Fl. Stud. Wayanad Dist. 474. 2009. *Conyza crispata* Vahl, Symb. Bot. 1:71. 1790. Type: Yemen, Hadie, Forsskal *s.n.* (Holotype C!).

Figs. 51, 52

Blumea purpurascens, A. Rich., Tent. Fl. Abyss. 1: 395. 1848. *Laggera purpurascens* Sch.Bip. ex Hochst., Flora 24: 26. 1841. nom. nud. Type: Ethiopia, near Adwa [Adua] and Genuia, Schimper 153 (K!, P!, TUB!, NY!).

Laggera pterodonta (DC) Sch. Bip.ex Oliv., Trans. Linn. Soc. London 29(2): 94. 1873. Gamble, Fl. Pres. Madras 485. 1921; Fyson, Fl. South Indian Hill Stations 1: 326.1932; Fyson, Fl. Nilgiri Pulney Hill-tops 1:227. 1915. *Blumea pterodonta* DC., Contr. Bot.India (Wight) 15 (1834); Grierson in Dassan. & Fosbery, Revis. Handb. Fl. Ceylon 1:167. 1980; Type: India, Wight 1437 (E!, Lectotype, designated by Dilsha & Satheesh, 2021).

Perennial herb, 180 cm. Taproot. Stem erect, woody, branched from base, profusely branched or several stemmed, distinctly winged with deeply toothed wings all of the plant including inflorescence branches, wings upto 3 cm, pubescent or puberulous

with short numerous yellowish capitate glandular hairs and sparsely distributed multicellular hairs. Leaves alternate, upper and lower leaves different; lower leaves petiolate, petiol upto 3 cm, laminae ovate-lanceolate or oblong-obovate, prolonged tapering to the base, 4-25 x 0.7-12 cm, margins lightly serrated or serrulate, apex acute or acuminate, both surface pubescent or puberulous with numerous short capitate glandular hairs and sparsely distributed multicellular hairs, both surface bright green; upper leaves sessile, narrower, laminae linear oblong or elliptic lanceolate, base narrowing gradually and becomes decurrent, 5-10 x 0.5-5 cm, margins entire, bright green on both surface. Inflorescence large panicle, axillary or terminal to leaf base forming a large loose panicle, upto 30 cm. Capitula cylindrical, cernuous, 10.92 x 4.87 mm, pecunculate, peduncle curved, 0.5-4 cm, green, pubescent with short capitate glandular hair. Involucral scales 7 seriate; outer phyllaries spreading outwards, reflexed at maturity, apex acuminate, glandular pubescent, base almost glabrous, 3.43-6.17 x 0.637- 0.347 mm, green with margin scarious or hyaline with a tinge of purple, hyaline margine increases in subsequent phyllaries, linear lanceolate; inner phyllaries linear lanceolate or linear, apex acute, reflexed but not same as outer, glandular pubescent or puberulous at center to completely glabrous, center to base glabrous, 7.144 mm long, pale green to white and papery, last phyllary completely hyaline. Receptacle slightly concave, scrobiculate or areolate, glabrous, 6.80 mm width, epaleaceous. Florets ± 643 no., peripheral female florets, central bisexual florets. Female floret ± 620 no., filiform, corolla tube 6.60 mm, corolla style arms unequal, corolla light pink at apex, whitish to base, lobes 3-4, glabrous, style bifid, arms equal, 1.04 mm, ovary yellowish or white, linear, 0.641 mm long, hairy, pappus slightly shorter than corolla. Bisexual floret ± 23 no., tubular, corolla tube 8.75 mm, pappus only at the half of corolla, pappus persistent; corolla pink or purple on lobes, whitish to base, 5 lobes, 0.422 mm long, papillate, triangular or lanceolate, glandular hairs on lobes, corolla tube glabrous. Stamens 5, syngenesious; anther 2.17 mm, purple or pink at apex, whitish to base, anther apical appendages of different length, acute or obtuse, absence of tails on base, base bidentated; filament whitish, 3.68 mm. Style bifid, arms equal, 0.626 mm long, sweeping hairs reach beyond bifurcation almost upto center, light



Fig. 51. *Laggera crispata* (Vahl) Hepper & J.R.I. Wood: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.



Fig. 52. Type of *Laggera crispata* (Vahl) Hepper & J.R.I. Wood © Natural History Museum of Denmark, University of Copenhagen.

pink upto sweeping hairs, whitish to base, style base slightly swollen, attached to ovary by a cylindrical structure which is slightly narrower than ovary, ovary linear oblong, yellowish or white, pubescent with multicellular hairs. Cypselas homomorphic, linear oblong, 0.908 x 0.106 mm, smooth, dark brown, curved, pubescent with white hairs. Pappus white, uniseriate, 10-13 no, 5.94 mm, persistent.

Flowering & Fruiting: December-April.

Distribution: India, Nigeria, Namibia, Ghana, Angola, Zambia, Bangladesh, Thailand, Benin, Senegal, Botswana, Ethiopia, Burkina, Guinea-Bissau, Ivory Coast, Cambodia, Cameroon, Chad, China, Laos, Comoros, Gabon, Kenya, Liberia, Sierra Leone, Mozambique, Myanmar, Tibet, Sudan, Togo, Tanzania, Uganda, Zimbabwe and Vietnam. Andhra Pradesh, Kerala, Karnataka and Tamil Nadu are the states where this species is distributed in Peninsular India.

Habitat & Ecology: Waste lands, roadsides, grasslands near forest margins, streamsides etc.

Specimens Examined: **Andhra Pradesh**, Cuddapah district, Cuddapah hills, 1881, *R.H. Beddome s.n.* (MH). Visakapatanam district, Kilagada, 900 m, 09/03/1965, *G.V. Subbarao* 22575 (MH); Minumuluru, 1000 m, 23/12/1967, *G.V. Subbarao* 29620 (MH); Araku, 15/01/2020, *M.V. Dilsha* 8630 (DEV). **Karnataka**, Chikmagalur district, Chikmagalur, 4000 ft, 20/01/1867, *R.K. Arora* 5714 (CAL); Bababudan Hills, 6000 ft, 10/1908, *A. Meebold* 9636 (CAL). Hassan district, Yettinahalla, 07/01/1970, *C. Saldanha* 15965 (CAL). Kodagu district, Coorg, 10/03/58, *G.S. Puri* 32461 (BSI); Naggarhole, 01/03/63, *A.S. Rao* 86639 (BSI). Mysore district: Vasudeva devasthanakadu, 11/02/1980, *S. Karthikeyan* 161349 (BSI); Mysore, 3500 ft, 02/1908, *A. Meebold* 8289 (CAL). Uttara Kannada district, Dandelli, 09/03/57, *S.K. Jain* 16111 (BSI). **Kerala**, Idukki district, Munnar, 19/02/1957, *G.S. Puri* 15544 (BSI); Mullakudy, 850 m, 14/03/1973, *B.D. Sharma* 43861 (MH); Devikulam, 1500m, 27/01/1964, *K.M. Sebastine* 18478 (MH); Thekkadi, 875 m, 27/01/1965, *K. Vivekananthan* 23007 (MH). Palakkad district, Below dam site, silent valley, 10/04/1978, *N.C. Nair* 56742 (CAL); Below dam site silent valley, 850 m, 10/04/1978, *N.C. Nair* 58742 (MH); Bhavani river side, 550 m,

09/03/1975, *E. Vajravelu* 46251 (MH). Wayanad district, Sulthan Bathery, 900 m, 14/02/1964, *J.L. Ellis* 18698 (MH). **Tamil Nadu**, Dindigul district, Maechur, lower pulneys, 05/11/1877, *Bourne* 1560 (MH). Erode district, Hassanur, 10/03/1931, *K. Cherian Jacob*, 226 (MH). Nilgiris District, Nilgiris, 5000, 15/03/1870, *s.coll.* 10879B (CAL); Gudallur-Naduvattam road, 31/01/1961, *B.V. Shetty* 11976 (CAL); Pykara, 05/02/2020, *M.V. Dilsha* 8638 (DEV).

Conservation status: Least Concern.

Notes: De Candolle (1834) used Wight 1437 for describing this species. After extensive searching in several herbaria, we located two sheets in K, one at E and P. These are all syntypes according to Art.9.6 of Shenzhen code. The sheet in E has a handwritten annotation on the species and it exactly matches with the protologue. So, we chose the sheet from E as the lectotype of *B. pterodonta*, synonym of *L. crispata*.

Pseudoconyza Cuatrec., *Ciencia (Mexico)* 21: 30. 1961.

Pseudoconyza viscosa (Mill.) D'Arcy, *Phytologia* 25: 281. 1973. *Conyza viscosa* Mill., *Gard. Dict.*, ed.8: n. 8. 1768. *Blumea viscosa* (Mill.) V.M. Badillo, *Revista Fac. Agron. (Maracay)* 7: 9. 1974. *Laggera viscosa* (Mill.) Zareh, *Feddes Repert.* 116: 44. 2005. Type: Veracruz, Houston (BM!). **Fig. 53**

Pseudoconyza lyrata (Kunth) Cuatrec., *Ciencia (Mexico)* 21: 31. 1961. *Conyza lyrata* Kunth in F.W.H. von Humboldt, A.J.A. Bonpland & C.S. Kunth, *Nov. Gen. Sp.*, ed. Fol., 4: 55. 1818. *Blumea lyrata* (Kunth) V.M. Badillo, *Bol. Soc. Venez. Ci. Nat.* 10: 257. 1946. *Laggera lyrata* (Kunth) Leins, *Mitt. Bot. Staatssamml, Munchen* 6: 107. 1971. Type: Not traced.

Conyza aurita L.f., *Suppl. Pl.* 367. 1782. *Blumea aurita* (L.f.) DC. in Wight, *Contr. Bot. India.* 16. 1834; Manilal, *Fl. Silent Valley* 150. 1988; Grierson in Dassanayake, *Revis. Handb. Fl. Ceylon*, 1: 168. 1980; K. Gopalakrishna Bhat, *Fl. Udupi* 303. 2003. *Laggera aurita* (L. f.) Sch. Bip. *Tent. Fl. Abyss.*: 393. 1848; Gamble, *Fl. Pres. Madras* 485. 1921; S. Kumar in Hajra *et al.*, *Fl. India* 13: 150. 1995. Type: A cultivated plant grown from seed obtained from India, *Horto Upsaliensis*, Linnaeus, 993.34 (LINN!).

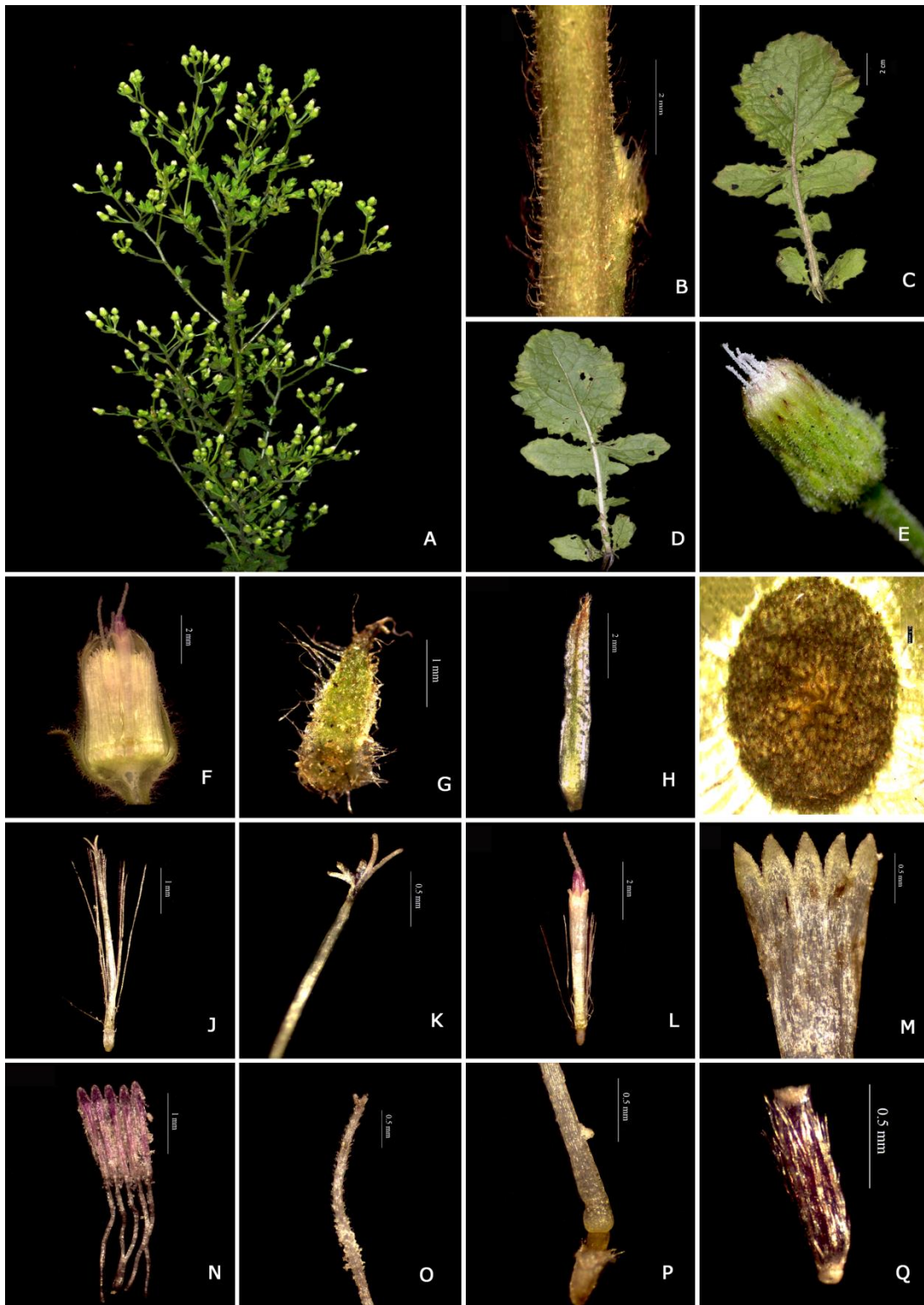


Fig. 53. *Pseudoconyza viscosa* (Mill) D'Arcy: A. Habit; B. Stem; C. Leaf adaxial side; D. Leaf abaxial side; E. Capitula; F. LS of capitula; G. Outer phyllary; H. Inner phyllary; I. Receptacle; J. Female floret; K. Female floret corolla; L. Bisexual floret; M. Bisexual floret corolla; N. Stamens; O. Bisexual floret style; P. Bisexual floret ovary attached to style; Q. Cypsela.

Annual, 120 cm. Tap root. Stem Erect, simple or branched from base or branched on the upper part only, terete or striated; base woody, upto 2 cm, yellowish brown, sparsely hairy; other portion dark brown from lower to middle, green at tip, wing like projections distantly placed not continuous one like *Laggera*, more wing like projections where inflorescence branches arising, pilose or villous with long multicellular hairs and short capitate glandular hairs. Leaves alternate, upper and lower or main stem leaves and branch leaves different; lower leaves sessile or petiolate; if petiolate, petioles winged, 2-5 cm; laminae lyrate lobed or obovate, lanceolate; if lyrate lobed terminal lobe obovate, ovate or lanceolate or broadly elliptic, 2-3 pair of different sized ovate-linear lateral lobes, 16 x 7 cm long, base cuneate to attenuate or auriculate with small narrowly ovate auricles, margins irregularly serrate or biserrate, apex acute, both surfaces pilose with long white or yellowish multicellular and capitate glandular hairs, both surface bright green; upper leaves sessile, laminae oblong or obovate or linear lanceolate, 5-3 cm long, base interruptedly decurrent with 2-3 linear lobes on each side of stem, margin dentate or distantly irregularly biserrate, apex acute, both surface villous with long white multicellular and capitate glandular hairs. Inflorescence large spreading terminal and axillary corymbose panicle, 2-40 cm. Capitula hourglass or campanulate, 7.44 x 5.52 mm, pedunculate, peduncle green, 14.24 mm long, pilose or villous with long white multicellular hairs and short capitate glandular hairs, tip of glandular hair yellowish. Involucral scales 5-7 seriate, apex acute or acuminate, margins and/or apex purplish tinged or green; outer phyllaries 2.50-4.18 x 0.824-0.908 mm, margin slightly pale yellowish in first phyllary, others hyaline or scarious margin, hyaline margin increases in subsequent phyllaries, green, pilose or villous with long whitish multicellular hairs at margins and base, short capitate glandular hairs in surface, base becomes less hairy in subsequent phyllaries; inner phyllaries linear lanceolate to linear, 5.58-6.00 x 0.673-0.618 mm, tip ciliated, margin hyaline or scarious, scarious margin increases in subsequent phyllaries, in last phyllary central small line of green only, other portions fully hyaline, hairiness decreases, sparsely hairy to glabrous. Receptacle concave, areolate, glabrous, 3.38 mm wide, epaleaceous. Florets ± 392 no., peripheral female florets, central bisexual florets. Female floret ± 390 no.,

filiform, corolla tube 5.72 mm long, yellowish white at apex, corolla lobes 3-4, whitish to base, glabrous, style bifid, arms equal, 0.356 mm, ovary linear oblong, 0.461 x 0.189 mm, whitish or pale yellow, hairy, pappus length larger than corolla. Bisexual floret ± 11 no., tubular, corolla tube 5.30-6.22 mm long, length of pappus slightly larger than center of corolla not reach the starting of corolla lobe; corolla pale yellow at apex, whitish to base, 5 lobes, papillate, glandular, elliptic lanceolate, 0.457 mm long. Stamen 5, syngenesious; anther pale yellow or purple or pinkish, whitish to base, 1.49 mm, apical appendages of almost same length, obtuse or rounded, base with unbranched tails, tail 0.0944 mm, not reach upto the thickened portion of filament or anther collar; filament 1.05 mm, whitish. Style bifid, arms equal, 0.249 mm, yellowish or light pink or whitish, translucent to base, sweeping hairs reach beyond bifurcation and reach center of style, style base slightly swollen, attached to ovary by a cylindrical structure which is narrower than style and ovary; ovary pale yellow or whitish, oblong, 0.483 x 0.213 mm long, hairy. Cypselas homomorphic, oblong, 0.939 x 0.251 mm, smooth, dark brown or straight, pilose with long multicellular hairs. Pappus white, uniseriate, 14 no., 4.52 mm long, caducous or easily detachable.

Flowering & Fruiting: December-May.

Distribution: India, Angola, Bangladesh, Bolivia, Bahamas, Mali, Guatemala, Benin, Cambodia, Cameroon, Burkina, Cape Verde, Ivory Coast, Kenya, Egypt, Botswana, Ecuador, Central African Repu, Laos, Chad, Honduras, Madagascar, Mauritania, Colombia, Costa Rica, Cuba, El Salvador, Eritrea, Ethiopia, Mexico, Guinea-Bissau, Mexican Pacific Is., Myanmar, Nicaragua, Namibia, Oman, Peru, Sri Lanka, Panamá, Pakistan, Saudi Arabia, Senegal, Somalia, Tanzania, Sudan, Uganda, Thailand, Togo, Venezuela, Yemen, Vietnam, Zambia and Zimbabwe.

Habitat & Ecology: Grasslands and wastelands.

Specimens Examined: **Andhra Pradesh**, Chittoor district, Chandragiri, 23/02/1914, *s.coll.* 10004 (MH). YSR district, Cuddapah near airport, 26/12/2021, *M.V. Dilsha* 9115 (DEV). **Karnataka**, Bangalore district, Indian Institute of Bangalore, 24/03/1980, *Dhawan* 11136 (CAL). Dakshina Kannada district, Shiradi ghat,

26/02/2020, *M.V. Dilsha* 8651 (DEV); *Ibid.*, 22/02/2021, *M.V. Dilsha* 8696 (DEV). Mysore district, Near st. Philomeno's college, 725m, 10/03/1964, *K.M. Sebastine* 18717 (MH). Udupi district, Hayagreeva Nagar, Udupi, 25/02/2020, *M.V. Dilsha* 8647 (DEV). **Kerala**, Malappuram district, Nadukani, 09/02/2021, *M.V. Dilsha* 8688 (DEV). Palakkad district, Mukkali, 23/03/2021, *M.V. Dilsha* 9104 (DEV). **Maharashtra**, Ahmednagar district, Khandgaon, 12/1986, *Rajendra Shinde* 899 (BLAT). Mumbai district, Marve road, Malad, 24/12/55, *G.L. Shah* 6644 (BLAT); *Ibid.*, 06/01/57, *G.L. Shah* 8387 (BLAT); *Ibid.*, 24/12/55, *G.L. Shah* 6645 (BLAT); Bombay, 01/1925, *R.D. Acland* 562 (BLAT); Sewri-Bombay, 20/12/1956, *R.R. Fernandez* 3453 (BLAT); Bombay, 19/04/44, *s.coll.* 3945 (BLAT!); Marve road, Malad, 24/12/55, *G.L. Shah* 6646 (BLAT). Pune district, Karla Caves, 09/01/2022, *M.V. Dilsha* 9122 (DEV). Raigad district, Alibhag, 29/03/1960, *B. Balaswami* 641 (BLAT!); Cultivated fields, Kharghar, 28/12/2019, *M.V. Dilsha* 8628 (DEV). **Puducherry UT**, Karaikal, 11/04/2022, *M.V. Dilsha* 9132 (DEV). **Tamil Nadu**, Chennai district, Adyar, 07/ 1886, *J.S. Gamble* 17634 (CAL). Coimbatore district, Kolathur, 17/01/1906, *C.E.C. Fischer* 845 (CAL); Maharajapuram, 18/12/1905, *C.E.C. Fischer* 665 (CAL); Coimbatore, 1000m, 05/04/1870, *C.B. Clarke* 115374 (CAL). Godavari district, Jaddavgi, 27/01/1916, *J.S. Gamble* 12651 (MH). Nilgiri district, Way to TR Bazaar, 2000m, 24/02/78, *D.K. Hore* 519 (CAL). Tiruchirappalli district, Kudamurutti water works, 15-09-1984, *Jeganathan* 30276 (RHT). **Telangana**, Hyderabad district, Hyderabad, Deccan, 02/1905, *A. Meebold*, 1061, 232311 (CAL), Nalconda district, Krishna river bank, 16/02/1959, *K.M. Sebastine* 9809 (CAL); Krishna river bank, sea level, 16/12/1959, *K.M. Sebastine* 9809 (MH).

Conservation status: Least Concern.

Notes: The genus *Pseudoconyza* have a complicated nomenclature history. It was shuttled from *Blumea*, *Laggera* and *Conyza*. *Pseudoconyza* shows a combination of characters from *Blumea* and *Laggera*.

ANALYSIS AND DISCUSSION

Morphology

Vegetative Morphology

Habitat

All species of *Blumea*, *Laggera*, and *Pseudoconyza* are mesophytes. The majority of taxa in *Blumea* thrive in disturbed areas such as roadsides, wastelands, bunds of fields, and along railway lines. But some other taxa, such as *B. hieraciifolia* var. *hamiltonii*, *B. hieraciifolia* var. *hieraciifolia*, *B. hieraciifolia* var. *flexuosa*, *B. hirsuta*, and *B. lanceolaria*, are restricted to the edges of evergreen forests. According to Randeria (1960), the species that live in disturbed regions are weedy and exhibit the greatest degree of variability along with the greatest degree of environmental adaptability. This study supports the findings of Randeria (1960) in this regard and found maximum variability in the species that occupy disturbed areas. *Laggera crispata* and *Pseudoconyza* thrive well in disturbed areas. But *L. alata* is found mostly in grasslands.

Habit

The majority of Asteraceae species are herbaceous, but there are also some shrubs, vines, and trees. In a similar way, the majority of *Blumea* species are herbs, with a few being undershrubs. *B. lanceolaria* is an example of undershrub. A few of the members are perennials, but the majority are annuals. Perennials include the taxa *B. lanceolaria*, *B. hieraciifolia* var. *flexuosa*, and *B. hirsuta*. Despite some habit modification, the majority of the members are erect. *B. oxydonta* is prostrate except for its inflorescence branches. *B. bifoliata*, *B. obliqua*, and *B. malcolmii* being procumbent or erect. These members are often branched from rootstocks. *B. lacera* var. *lacera* also branched from the base. Dichotomous kinds of branching are observed in *B. eriantha* and *B. obliqua*. Most of the species show extreme size variation. *B. virens*, *B. paniculata*, *B. obliqua*, *B. bifoliata*, *B. lacera*, etc. are examples. Stems are terete, subterete, or ridged. Stem ridged in *B. barbata*, *B.*

fistulosa, *B. sinuata*, *B. paniculata* var. *paniculata*, *B. paniculata* var. *gardneri*, *B. paniculata* var. *jacquemontii*, *B. sessiliflora*, and *B. virens*. The hair pattern shows much variation, from glabrous or sparsely hairy (*B. virens*) to pubescent, pilose, villous, tomentose, lanate, etc. There isn't much habit variation in perennial species. *B. hieraciifolia* var. *flexuosa* is a straggling herb. In most of the species, the stem base is woody.

The species of *Laggera* are large herbs or undershrubs. *Laggera alata* is annual, whereas *L. crispata* is perennial. Both species are branched, but *L. crispata* shows more profuse branching compared to *L. alata*. The hair pattern is glandular pubescent to velutinous. Stems are winged in both species. But in *L. alata*, the wings are entire, whereas in *L. crispata*, the stem wings have irregular, deeply toothed lobes.

The genus *Pseudoconyza* is an herb or undershrub. Simple forms to profusely branched forms can be seen depending on the ecological conditions. The presence of wing-like projections and that they are distantly placed, not continuous ones like *Laggera*, but more wing-like projections where inflorescence branches are arising.

Figs. 54-57

Leaves

Leaves of *Blumea* are generally simple and alternate. The leaves are cauline in all the species except *B. hieraciifolia* var. *hieaciifolia*, whose leaves form a basal rosette. Hooker (1882) noted that the foliage is exceptionally variable in his description. Randeria (1960) also lends support to the idea that this claim is not exaggerated in the case of a genus like *Blumea*. Leaves are very variable in their shape, size, incision, margin, base, pubescence, etc. Lower leaves are petiolate in most of the taxa. In the majority of taxa studied, the upper leaves and inflorescence leaves are sessile. Leaves are sessile in *B. obliqua* and *B. hieraciifolia* var. *hamiltonii*, and subsessile to sessile in *B. hirsuta* and *B. barbata*. All other taxa in *Blumea* have petiolate leaves. Leaves are lyrate lobed in *B. paniculata* var. *jacquemontii*, *B. paniculata* var. *gardneri*, *B. paniculata* var. *paniculata*, *B. sessiliflora*, and *B. virens*. The leaves of some variable species of *B. virens* and

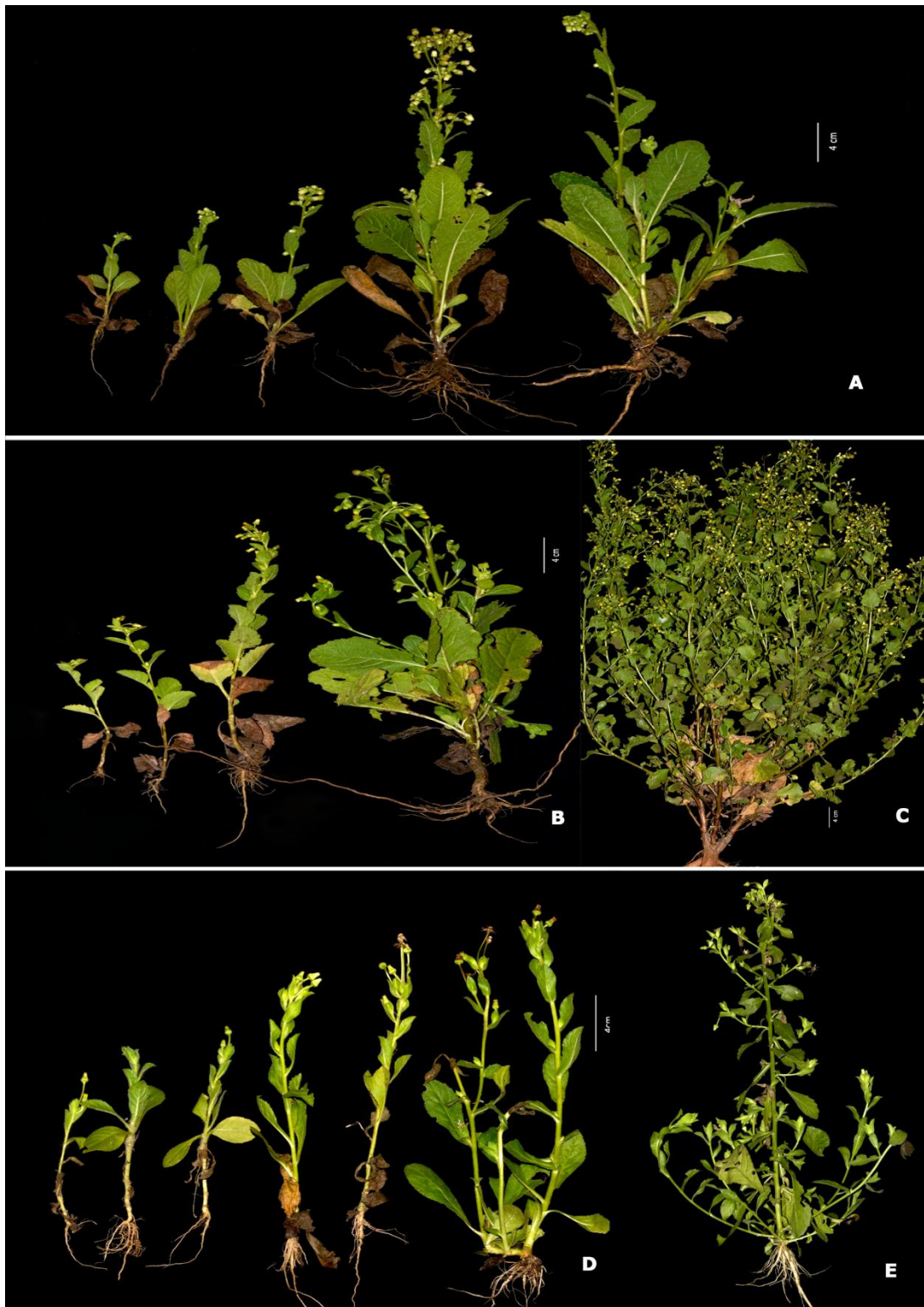


Fig. 54. Habit Variations. A: *Blumea axillaris* (Lam.) DC.; B: *B. lacera* var. *glandulosa* Hook.f.; C: *B. bifoliata* (L) DC.

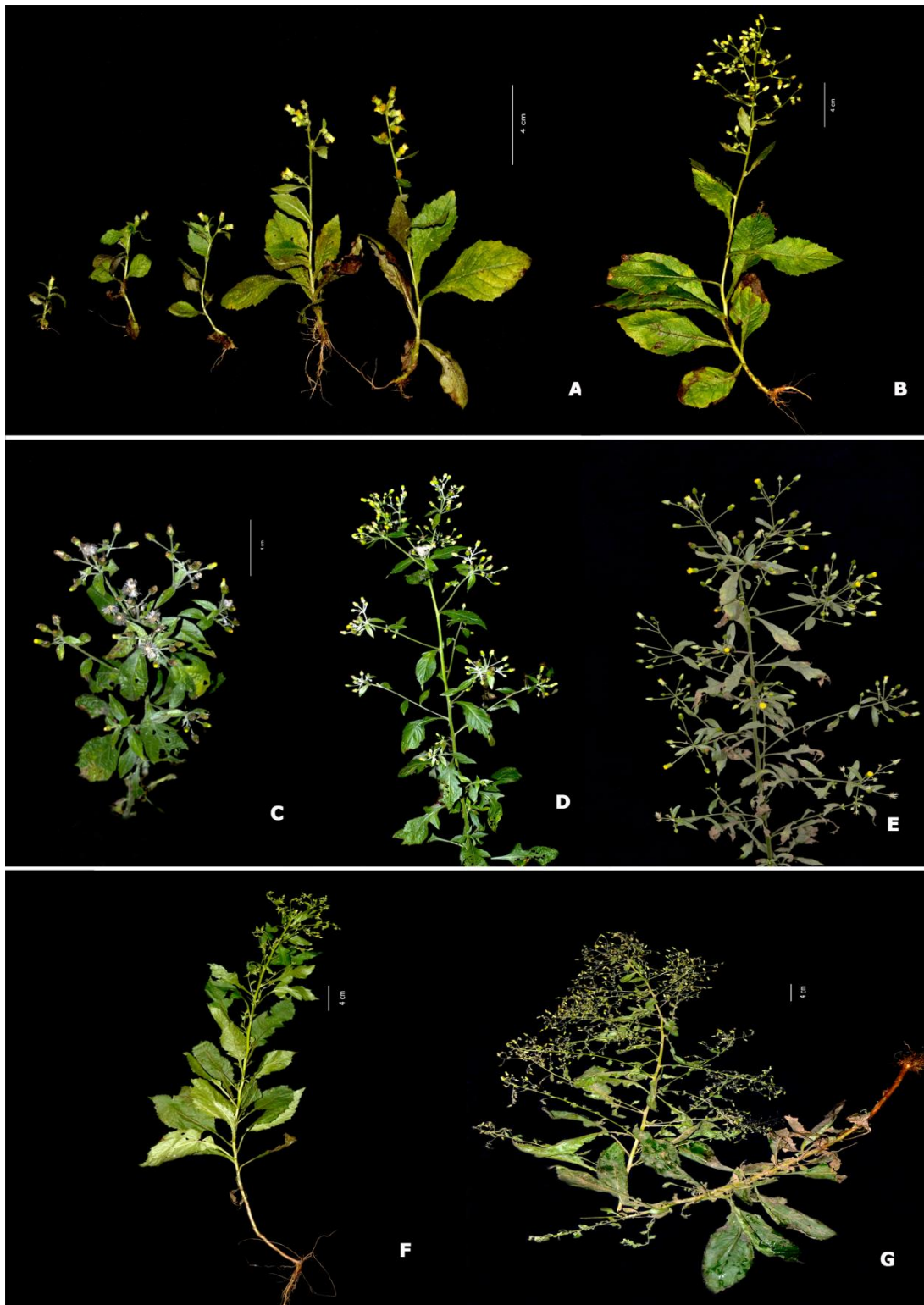


Fig. 55. Habit Variations. A & B: *Blumea paniculata* (Willd.) M. R. Almeida; C, D & E: *B. paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George; F & G: *B. paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida.

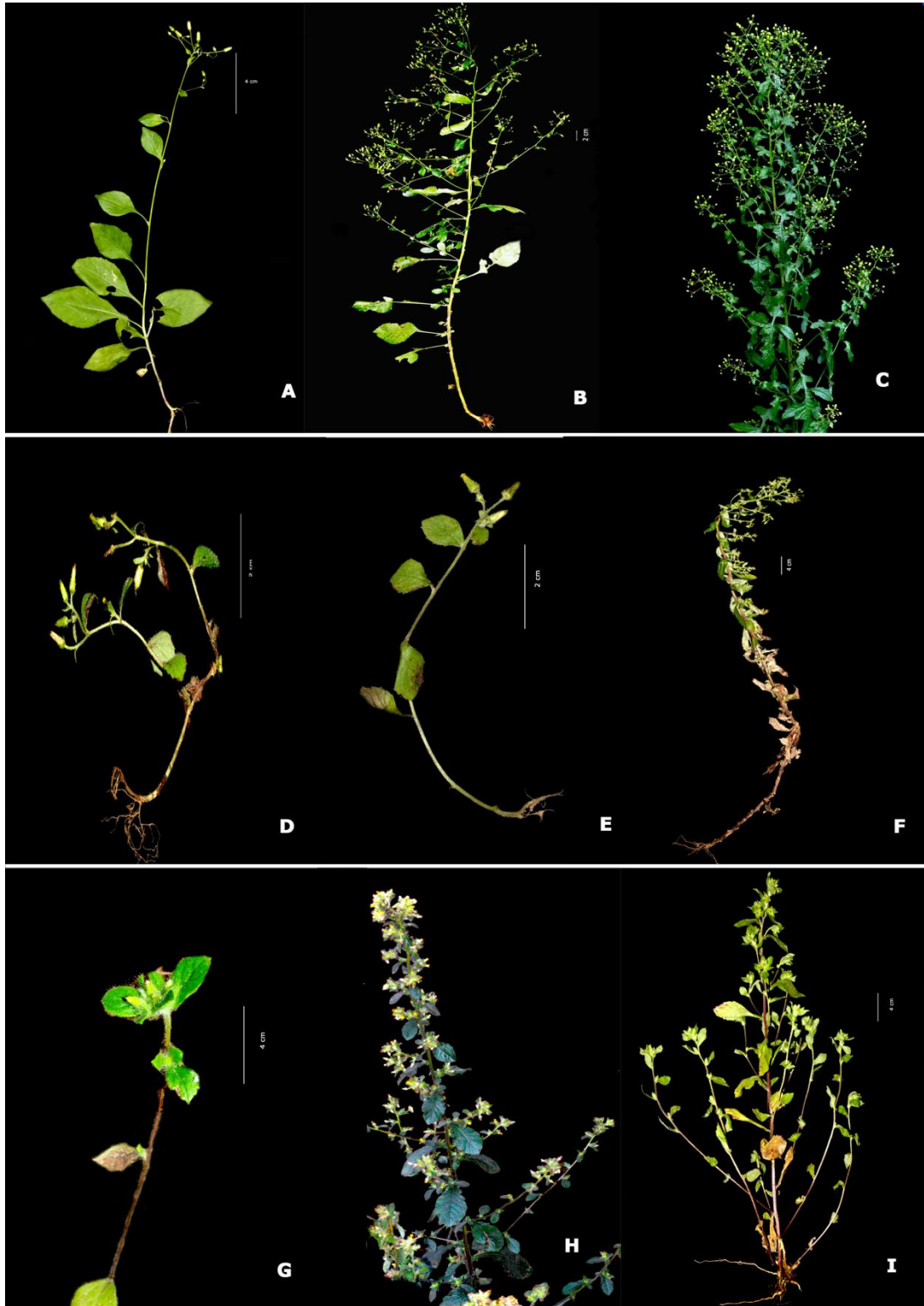


Fig. 56. Habit Variations. A, B & C: *Blumea virens* DC.; D, E & F: *B. barbata* DC.; G, H & I: *B. belangeriana* DC.



Fig. 57. Habit Variations. A, B, C & D: *Blumea sessiliflora* Decne.; E: *B. obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra; F & G: *Pseudoconyza viscosa* (Mill.) D'Arcy.

B. paniculata, however, lack lyrate lobes. All of a plant's leaves are not lyrate lobed in the aforementioned situations. 3 or 4 lower leaves are obovate-lanceolate in *B. paniculata* var. *jacquemontii* and *B. paniculata* var. *gardneri*. But it is lanceolate to ovate-lanceolate in *B. paniculata* var. *paniculata*. And the lamina shape is much more variable in all the other taxa studied. It varies from lanceolate to ovate lanceolate to elliptic lanceolate to obovate to oblanceolate or ovate or obovate or orbicular to spatulate.

In most of the taxa, the leaf base is acute to acuminate. But in *B. lacera* var. *glandulosa*, the apex is rounded, and in *B. lacera* and some variable forms of *B. axillaris*, the apex is obtuse. Majority of the members of *Blumea* have an attenuate or cuneate base, and also the base prolonged tapering to the petiole. But the base is cordate in *B. obliqua* and cuneate to cordate in *B. barbata*. Base attenuate or semiamplexicaul in *B. sessiliflora*. The leaf base is decurrent and fused with the stem, thus forming a false, prominently winged stem in *B. venkataramanii*.

The margins are entire in some variable form of *B. obliqua* only. In other taxa, it varies from being irregularly serrate-dentate, serrulate, denticulate, biserrate, or spinous-toothed (*B. malcolmii*). The leaves' texture ranges from membranous to thick, coriaceous, and rugose. The indumentum of leaves ranges from glabrate, lanate, puberulous, tomentose, pubescent, pilose, villous, scabrous, and woolly villous. The leaves of *Laggera* are simple, alternate, and have a decurrent leaf base. Elliptic or ovate lanceolate, with pubescent or puberulous hairs in *L. crispata* and tomentose in *L. alata*. The lower leaves of *Pseudoconyza* are lyrate lobed. Upper leaves are sessile, and the base is interruptedly decurrent with 2–3 linear lobes on each side of the stem. Leaves are pilose or villous with long multicellular and capitate glandular hairs.

Figs. 58, 59

Floral Morphology

Inflorescence

The inflorescence (capitulum arrangement) has traditionally been regarded as a key characteristic for classifying the genus *Blumea*. Inflorescence characteristics

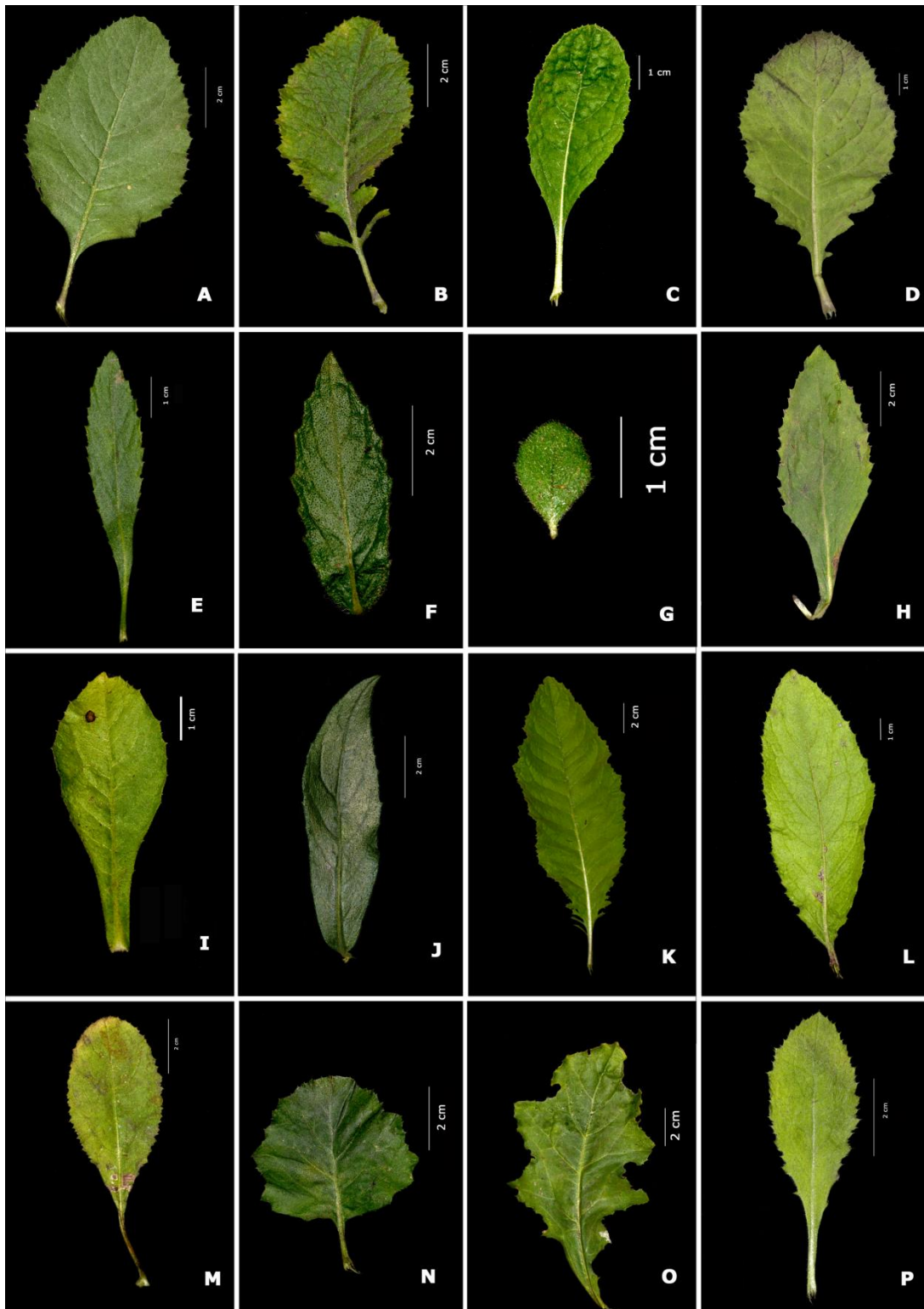


Fig. 58. Leaf. A, B, C, D & E: *Blumea axillaris* (Lam.) DC.; F & G: *B. barbata* DC.; H: *B. belangeriana* DC.; I: *B. bifoliata* (L) DC.; J: *B. hirsuta* (Less.) M. R. Almeida; K: *B. eriantha* DC.; L: *B. hieraciifolia* var. *flexuosa* (C.B.Clarke) Randeria; M: *B. lacera* (Burm. f.) DC.; N: *B. lacera* var. *glandulosa* Hook.f.; O: *B. sinuata* (Lour.) Merr.; P: *B. malcolmii* (Clarke) Hook. f.

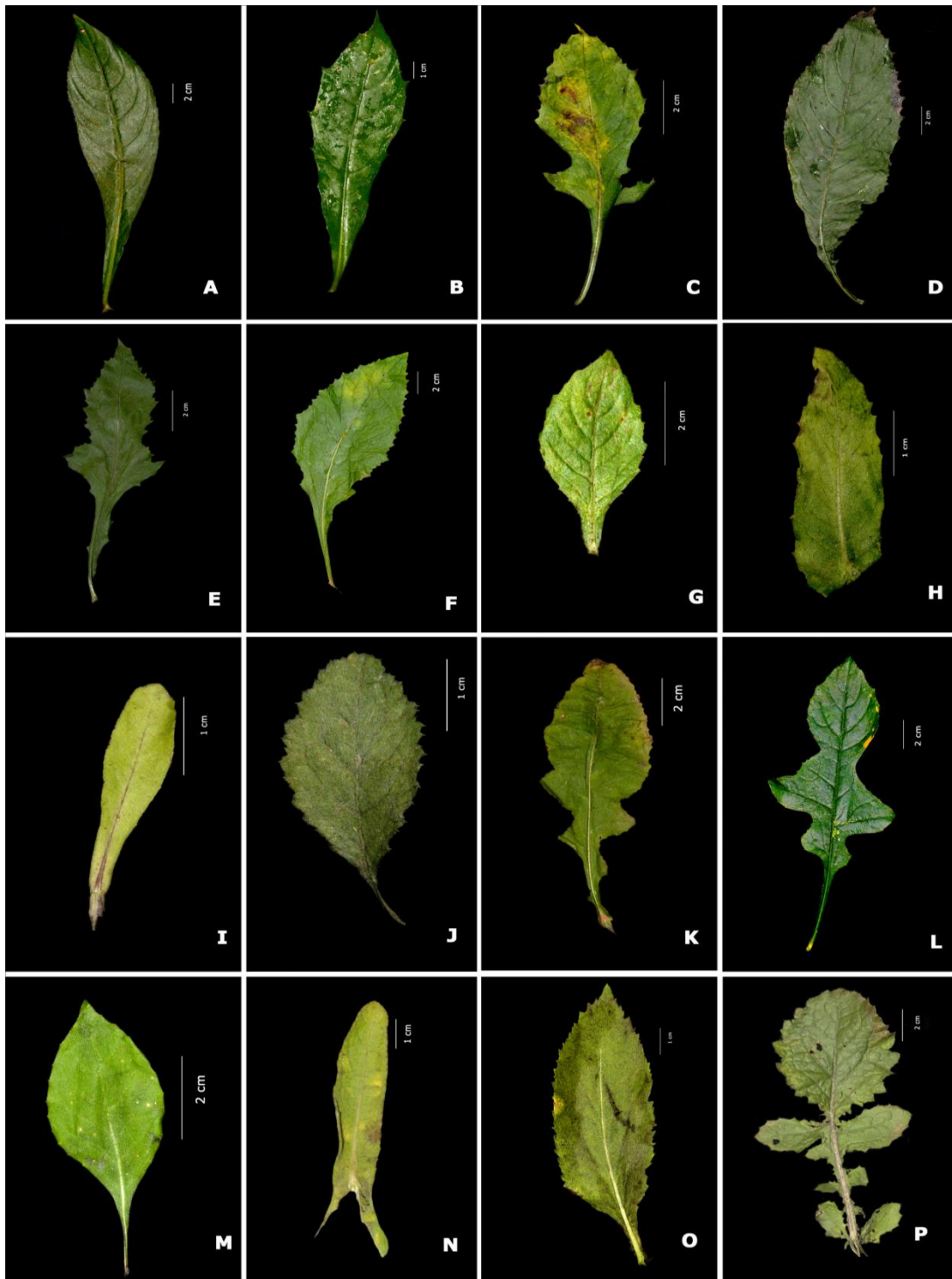


Fig. 59. Leaf. A & B: *Blumea lanceolaria* (Roxb.) Druce; C: *B. paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George; D & E: *B. paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida; F & G: *B. paniculata* (Willd.) M. R. Almeida; H: *B. obliqua* (L.) Druce; I: *B. obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra; J: *B. oxydonta* DC.; K: *B. sessiliflora* Decne.; L & M: *B. virens* DC.; N: *Laggera alata* (D. Don) Sch.-Bip. ex Oliver; O: *L. crispata* (Vahl) Hepper & J.R.I. Wood; P: *Pseudoconyza viscosa* (Mill.) D'Arcy.

were employed by De Candolle (1836), Clarke (1876), Hooker (1882), and Randeria (1960) for sectional classification. Different types of paniculate inflorescence were observed in this genus. Randeria (1960) noted that, with the exception of paniculate forms, the inflorescence type offers a reliable taxonomic criterion. The panicle, in its shape and degree of laxity, swings in form frequently within a species and even within the same population. This study were also observed the same trend in the case of paniculate inflorescence. *B. paniculata*, *B. sinuata*, *B. lacera*, *B. hieraciifolia* var. *flexuosa*, *B. lacera*, *B. eriantha*, *B. virens*, etc. showing different types of paniculate inflorescence. In all these taxa, the panicle varied from a few flowered (even a single flower was observed in the same population) to a much-branched panicle.

Interrupted spiciform panicles were observed in *B. fistulosa* and in one common form of *B. sessiliflora*. Capitula are arranged as solitary in *B. bifoliata* and *B. obliqua*. But in the *B. malcolmii* inflorescence, flower heads are borne in branch-end fascicles, sometimes solitary or clustered in the axils of the upper leaves, 3-6 in one cluster. A narrow panicle was observed in *B. hirsuta*. In *B. belangeriana*, the capitula are arranged as terminal or axillary leafy clusters at the ends of branches. Axillary or terminal large loose panicle in both *L. alata* and *L. crispata*. Instead, *Pseudoconyza* has large, spreading terminal and axillary corymboses.

Capitula

The capitula of *Blumea* are polygamo-heterogamous, i.e., both bisexual and female florets are in the same capitulum (Randeria, 1960). Although all the florets are tubular, they are also disciform. Capitula is variable in its size, shape, and number of florets. But this cannot be considered a reliable character for the classification of the genus *Blumea*. The characteristics such as size, shape, and number differ in each population studied and also within the same population. The shape of the capitulum varied from campanulate to cylindrical to hourglass. The number of florets in a capitulum varies from a few to many, and it is correlated with the shape of the capitulum. Comparatively large capitula were observed in *B. hirsuta*, *B. lanceolaria*, and *B. paniculata* var. *gardneri*.

Individual capitula may be pedunculate or sessile. Sessile capitula were observed in *B. fistulosa*, *B. hieraciifolia* var. *hieraciifolia*, *B. hieraciifolia* var. *hamiltonii*, and in some variable forms of *B. sessiliflora* and *B. hirsuta*. Long pedunculate capitula in *B. obliqua*, *B. bifoliata*, and *B. oxyodonta*. The indumentum of the peduncle ranges from sparsely hairy to pilose, pubescent, puberulent, and tomentose. In the majority, the peduncle is covered with long multicellular hairs and stipitate glandular hairs. But only long multicellular hairs were observed in *B. hirsuta*, *B. hieraciifolia* var. *flexuosa*, *B. lanceolaria*, and *B. obliqua*. But the hairiness is more glandular in *B. lacera* var. *glandulosa* and *B. paniculata* var. *gardneri*. The colour of the peduncle ranges from green to reddish brown. The bracteoles in the peduncle resemble the outer phyllary of involucre bracts.

Capitula cernous and pedunculate in *Laggera*. Peduncle lanate or tomentose with long multicellular and short stipitate glandular hairs. Capitula pedunculate in *Pseudoconyza*. Peduncle villous with long multicellular and short stipitate glandular hairs.

Figs. 60-62

Involucre Bracts

In the tribe Inuleae, involucre bracts or phyllaries are typically imbricately arranged in a few to many series (Anderberg, 2009). This also applies to the genus *Blumea*. The phyllaries are multiseriately organised. In the majority of the taxa studied, the first phyllary is comparatively shorter than other phyllaries, but in *B. obliqua* and some variable forms of *B. axillaris*, it is longer than other phyllaries or longer than the next phyllary. Involucre bracts 3-4 seriate in *B. axillaris*, *B. obliqua*, *B. oxyodonta*, and *B. venkataramanii*; in others, they are 5-7 seriate.

The outer series of bracts show variation in shape, size, colour, and pubescence. The shape may vary from linear lanceolate to lanceolate to elliptic lanceolate to ovate lanceolate to oblong lanceolate. Ovate-lanceolate in *B. fistulosa* and *B. lanceolaria*; oblong in *B. hieraciifolia* var. *hieraciifolia* and *B. hieraciifolia* var. *hamiltonii*. However, the inner series of phyllaries are always linear, with scarious or hyaline margins. Sometimes outer phyllaries also exhibit hyaline margins, but they are smaller; it increases in inner phyllaries.

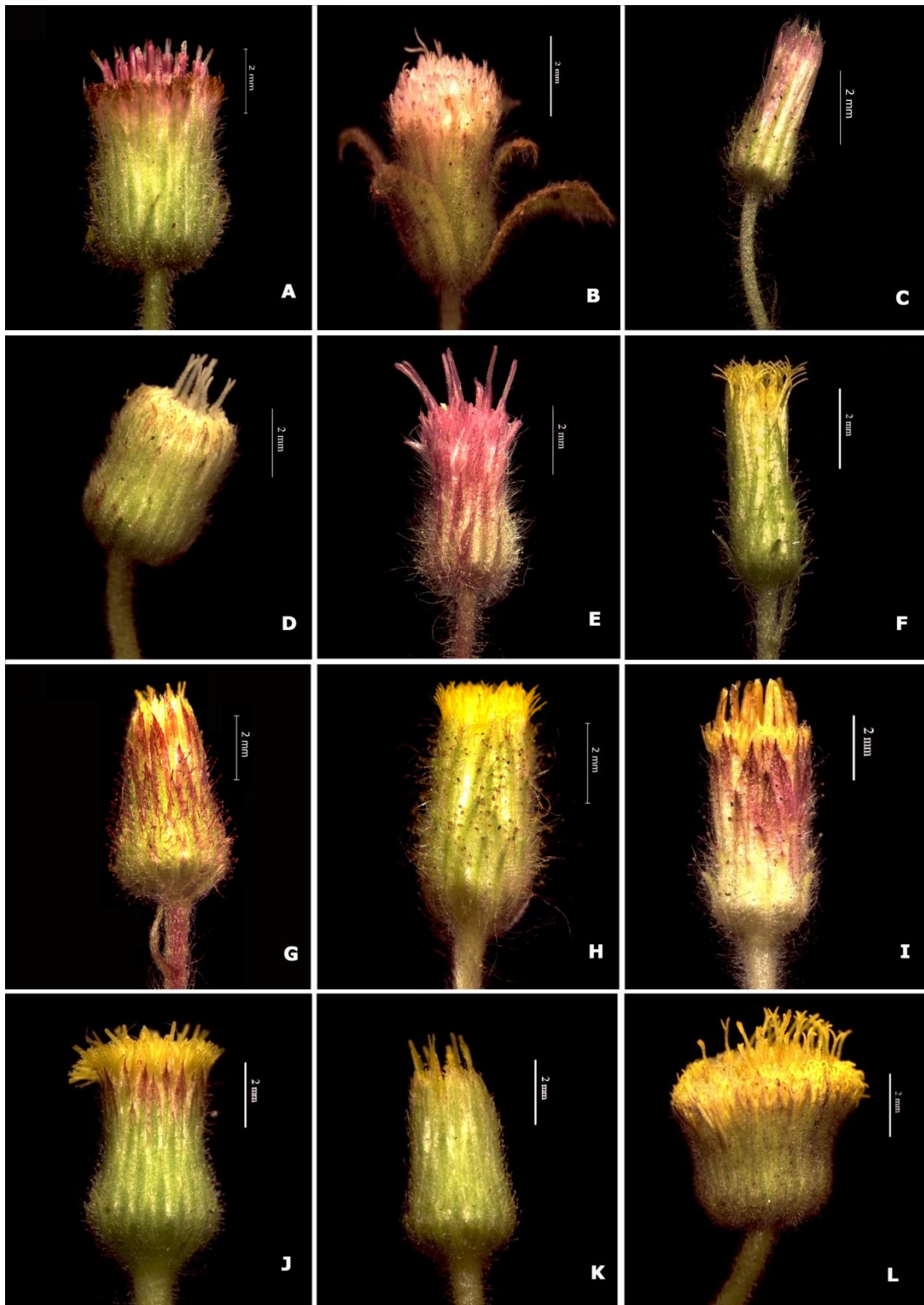


Fig. 60. Capitula. A, B, C, D & E: *Blumea axillaris* (Lam.) DC.; F & G: *B. barbata* DC.; H & I: *B. belangeriana* DC.; J & K: *B. bifoliata* (L) DC.; L: *B. eriantha* DC.

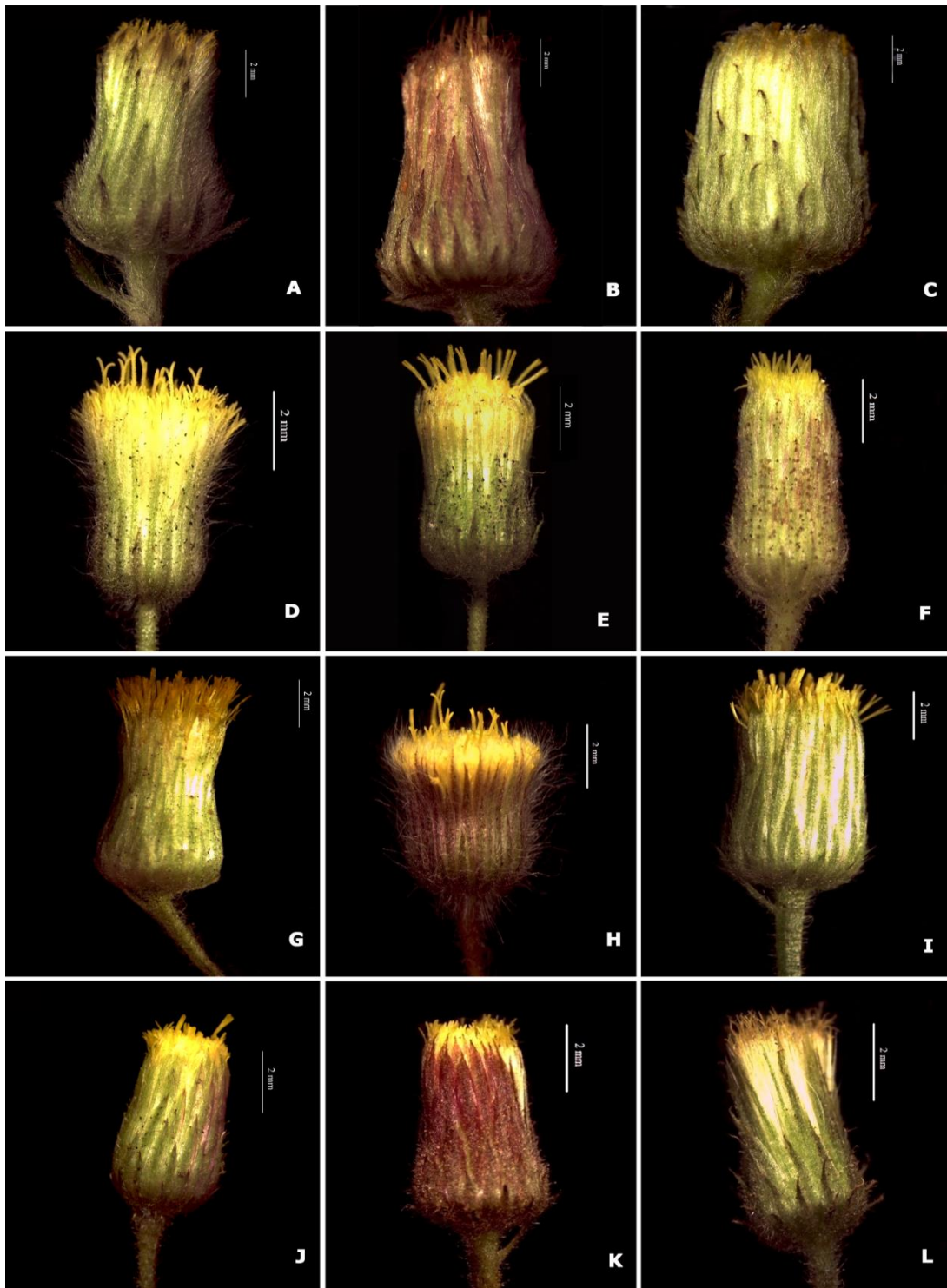


Fig. 61. Capitula. A & B: *Blumea hirsuta* (Less.) M. R. Almeida; C: *B. hieraciifolia* var. *flexuosa* (C.B.Clarke) Randeria; D: *B. lacera* (Burm. f.) DC.; E: *B. lacera* var. *glandulosa* Hook.f.; F: *B. sinuata* (Lour.) Merr.; G: *B. lanceolaria* (Roxb.) Druce; H: *B. malcolmii* (Clarke) Hook. f.; I & J: *B. paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George; K & L: *B. paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida.

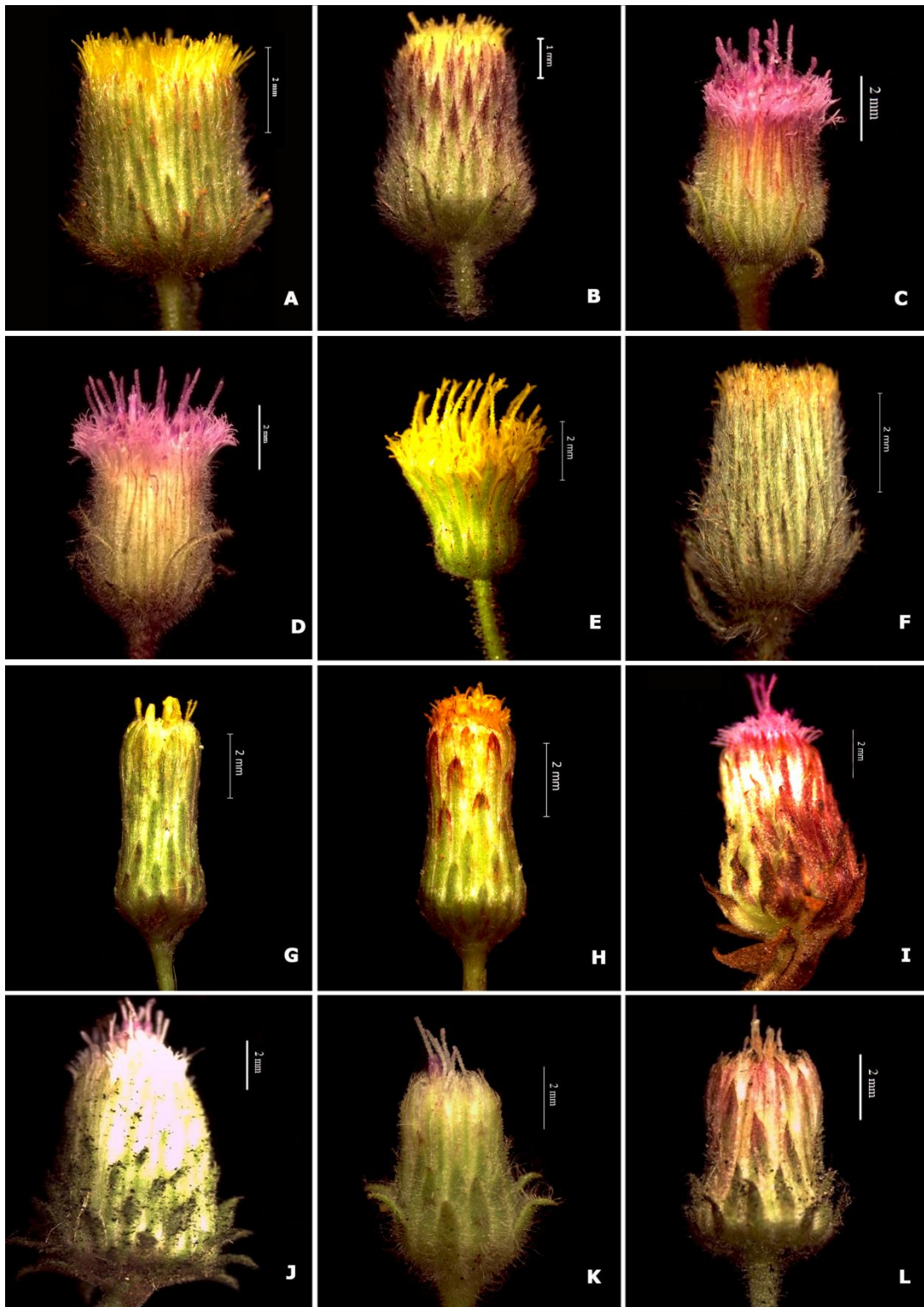


Fig. 62. Capitula. A: *Blumea paniculata* (Willd.) M. R. Almeida; B: *B. fistulosa* Kurz.; C: *B. obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra; D: *B. obliqua* (L.) Druce; E: *B. oxyodonta* DC.; F: *B. sessiliflora* Decne.; G & H: *B. virens* DC.; I: *Laggera alata* (D. Don) Sch.-Bip. ex Oliver; J: *L. crispata* (Vahl) Hepper & J.R.I. Wood; K & L: *Pseudoconyza viscosa* (Mill.) D'Arcy.

Only the dorsal surface of phyllaries exhibit pubescence. From the outer to the inner phyllary, the degree of hairiness gradually decreases. Randeria (1960) made the observation that the trichomes on the phyllaries typically resemble those on the peduncles and inflorescence axes. Similar to the peduncle, no glandular hairs were observed in *B. hirsuta*, *B. hieraciifolia* var. *flexuosa*, *B. lanceolaria*, and *B. obliqua*.

Both green and purple-tipped phyllaries were observed. It is observed in the different capitula of the same plant, the same capitula, or the different populations of the same taxon collected from different localities. The plants growing in dry areas tend to have purple-tipped phyllaries, whereas the plants growing in shade or moist habitats tend to have green phyllaries. The tips of all phyllaries of *B. barbata* and *B. belangeriana* end in a stipitate glandular hair. The involucrel phyllaries are generally reflexed at maturity. Sometimes, the innermost series of phyllaries have the same size as those of the florets, but this is a variable character.

The first phyllaries of *Laggera* and *Pseudoconyza* are spreading outward. The tips of the phyllaries of *Laggera* are acuminate and lanate with multicellular hairs. Outer phyllaries are ovate or lanceolate in *Laggera*. In *Pseudoconyza* phyllaries with long spreading multicellular hairs mostly at margins and short capitate glandular hairs in the dorsal surface. It is pale green with scarious margins and purplish-tinged in some.

Figs. 63, 64

Receptacle

The receptacle varies from flat to a little concave to clearly concave to convex. Concave in *B. sinuata*, *B. obliqua* var. *obliqua*, and *B. obliqua* var. *arenaria*. Clearly convex in *B. hirsuta*, *B. eriantha*, *B. hieraciifolia* var. *flexuosa*, *B. lacera* var. *lacera*, *B. lacera* var. *glandulosa*, *B. venkataramanii*, *B. lanceolaria*, *B. malcolmii*, *B. sessiliflora*, *B. paniculata* var. *paniculata*. It is glabrous in the majority of the species studied, but densely villous or pilose with long white hairs in *B. hirsuta* and *B. fistulosa*. The receptacle of *B. lanceolaria* is pilose with long hairs. Instead, *B. sinuata* is pubescent with short hairs. Pubescent or sparsely hairy in *B. paniculata* var. *jacquemontii*. *B. paniculata* var. *paniculata* and *B. paniculata* var.

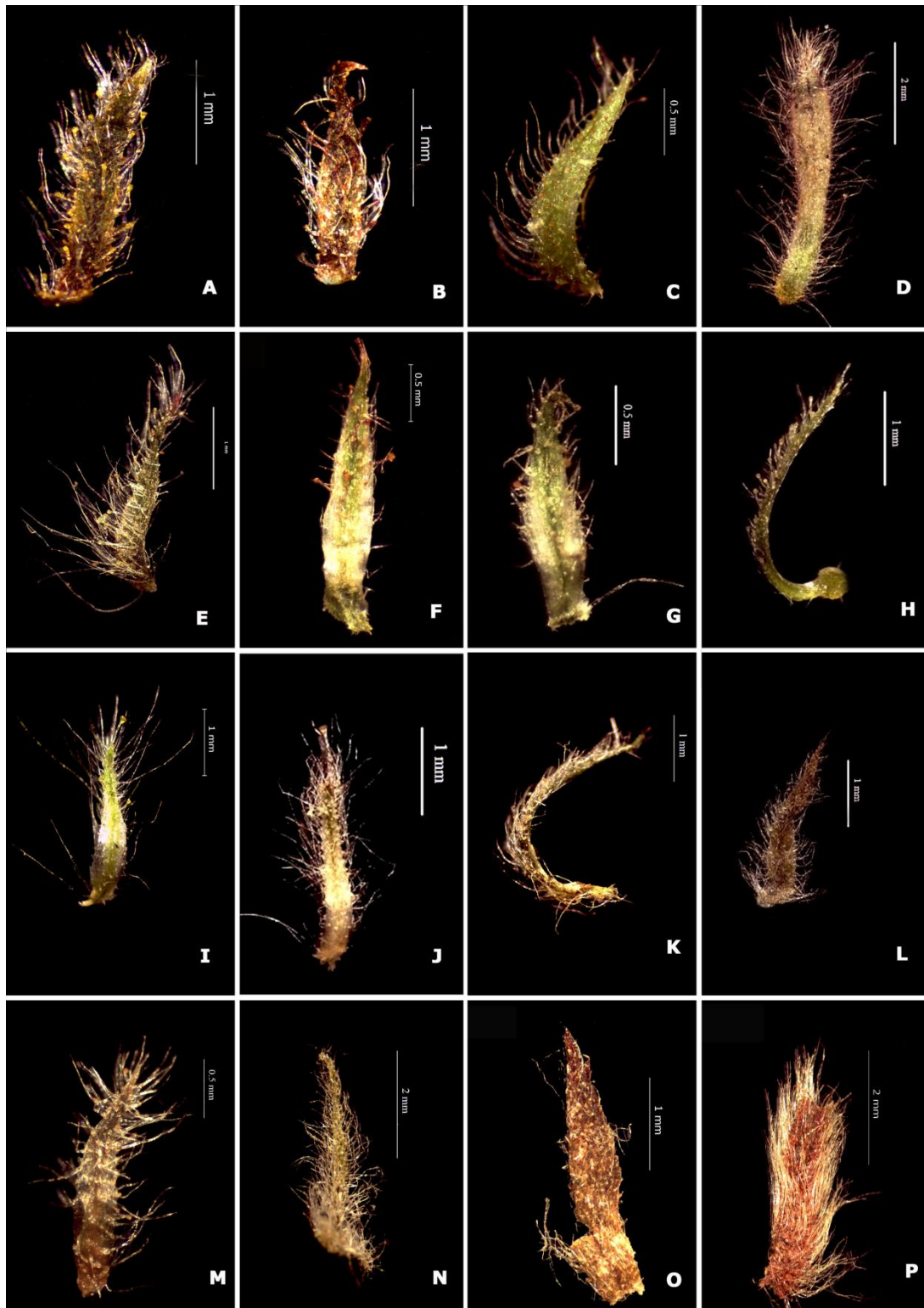


Fig. 63. Involucral Bracts. A, B, C, D & E: *Blumea axillaris* (Lam.) DC.; F & G: *B. barbata* DC.; H: *B. bifoliata* (L) DC.; I & J: *B. belangeriana* DC.; K: *B. hirsuta* (Less.) M. R. Almeida; L: *B. eriantha* DC.; M: *B. fistulosa* Kurz.; N: *B. hieraciifolia* var. *flexuosa* (C.B. Clarke) Randeria; O: *B. hieraciifolia* var. *hamiltonii* (DC) Clarke; P: *B. hieraciifolia* var. *hieraciifolia* (D. Don) DC.



Fig. 64. Involucral Bracts. A: *Blumea lacera* (Burm. f.) DC.; B: *B. lacera* var. *glandulosa* Hook.f.; C: *B. sinuata* (Lour.) Merr.; D: *B. lanceolaria* (Roxb.) Druce; E: *B. malcolmii* (Clarke) Hook. f.; F: *B. paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George; G: *B. paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida; H: *B. paniculata* (Willd.) M. R. Almeida; I: *B. obliqua* (L.) Druce; J: *B. obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra; K: *B. oxyodonta* DC.; L: *B. sessiliflora* Decne.; M: *B. virens* DC.; N: *Laggera alata* (D. Don) Sch.-Bip. ex Oliver; O: *L. crispata* (Vahl) Hepper & J.R.I. Wood; P: *Pseudoconyza viscosa* (Mill.) D’Arcy.

gardneri are with 2 or 3 hairs in the middle or glabrous. Interesting differences can be seen on the surface of the receptacle. The receptacle can be areolate, foveolate, fibrillate, or scrobiculate. Scrobiculate in *B. lacera* var. *lacera*, *B. lacera* var. *glandulosa* and *B. sessiliflora*. Fimbrillate in *B. belangeriana*, *B. eriantha*, *B. hieraciifolia* var. *flexuosa*, *B. virens*, *B. malcolmii*, *B. paniculata* var. *jacquemontii*, and *B. paniculata* var. *paniculata*. The receptacle is completely smooth in some variable form of *B. barbata*. The width of the receptacle is correlated with the size of the capitula.

In *Laggera*, the receptacle is glabrous, concave, areolate, scrobiculate, or fimbriate. Like *Laggera*, the receptacle of *Pseudoconyza* is concave, glabrous, and areolate.

Figs. 65, 66

Florets

Each capitulum contains two different kinds of florets. The central florets are structurally bisexual even though they sometimes function as only female because of the reduction of stamens to staminodes. The central florets are fewer in number than the peripheral florets. Female florets are located at the periphery. They are numerous, female, and multiseriate.

Female Floret

The corollas of the female florets of *Blumea* are incredibly thin and filiform. Corolla is 3–4 lobed in most of the taxa. where it is 3-5 in *B. lacera* var. *glandulosa* and *B. paniculata* var. *gardneri*. Compared to other taxa, *Blumea obliqua* has deep, linear, lanceolate lobes. The highest number of female florets is recorded in *B. lacera* var. *glandulosa* (± 390) and *Blumea obliqua* var. *arenaria* (± 350). The number of female florets is not always constant; it's variable with respect to the size of the capitula. The number of female florets is low in the short forms of the same taxa collected. For example, in *B. barbata*, 210 female florets were observed, but the shortest form collected had only 92 female florets. The same with respect to *B. lacera* var. *glandulosa*, whose shortest form has only 91. The corolla lobes are yellowish at the lobes and pale yellow or whitish to the base in most of the taxa, but

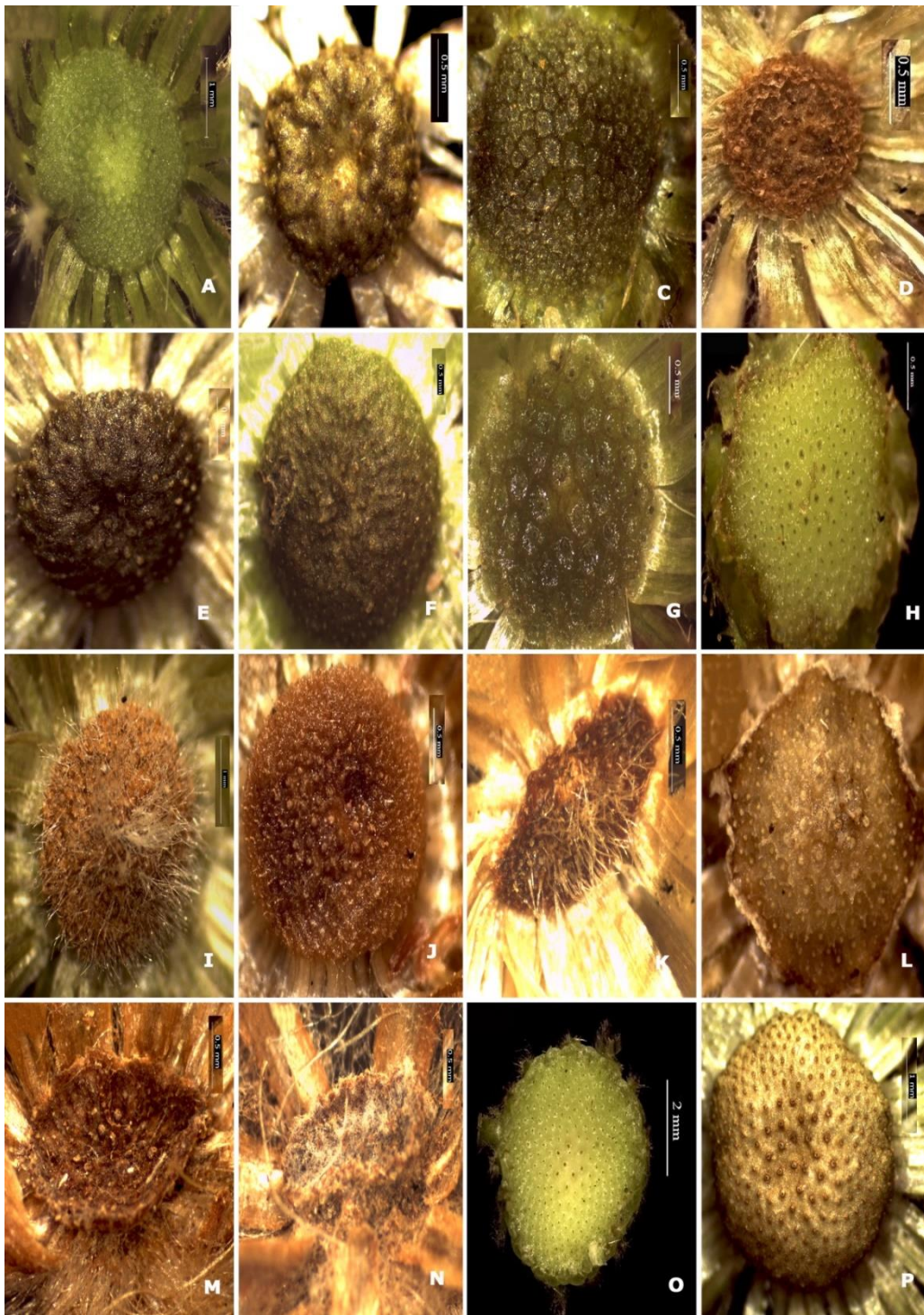


Fig. 65. Receptacle. A, B, C, D & E: *Blumea axillaris* (Lam.) DC.; F: *B. barbata* DC.; G: *B. belangeriana* DC.; H: *B. bifoliata* (L) DC.; I: *B. hirsuta* (Less.) M. R. Almeida; J: *B. eriantha* DC.; K: *B. fistulosa* Kurz.; L: *B. hieraciifolia* var. *flexuosa* (C.B.Clarke) Randeria; M: *B. hieraciifolia* var. *hamiltonii* (DC) Clarke; N: *B. hieraciifolia* (D. Don) DC.; O: *B. lacera* (Burm. f.) DC.; P: *B. lacera* var. *glandulosa* Hook.f.

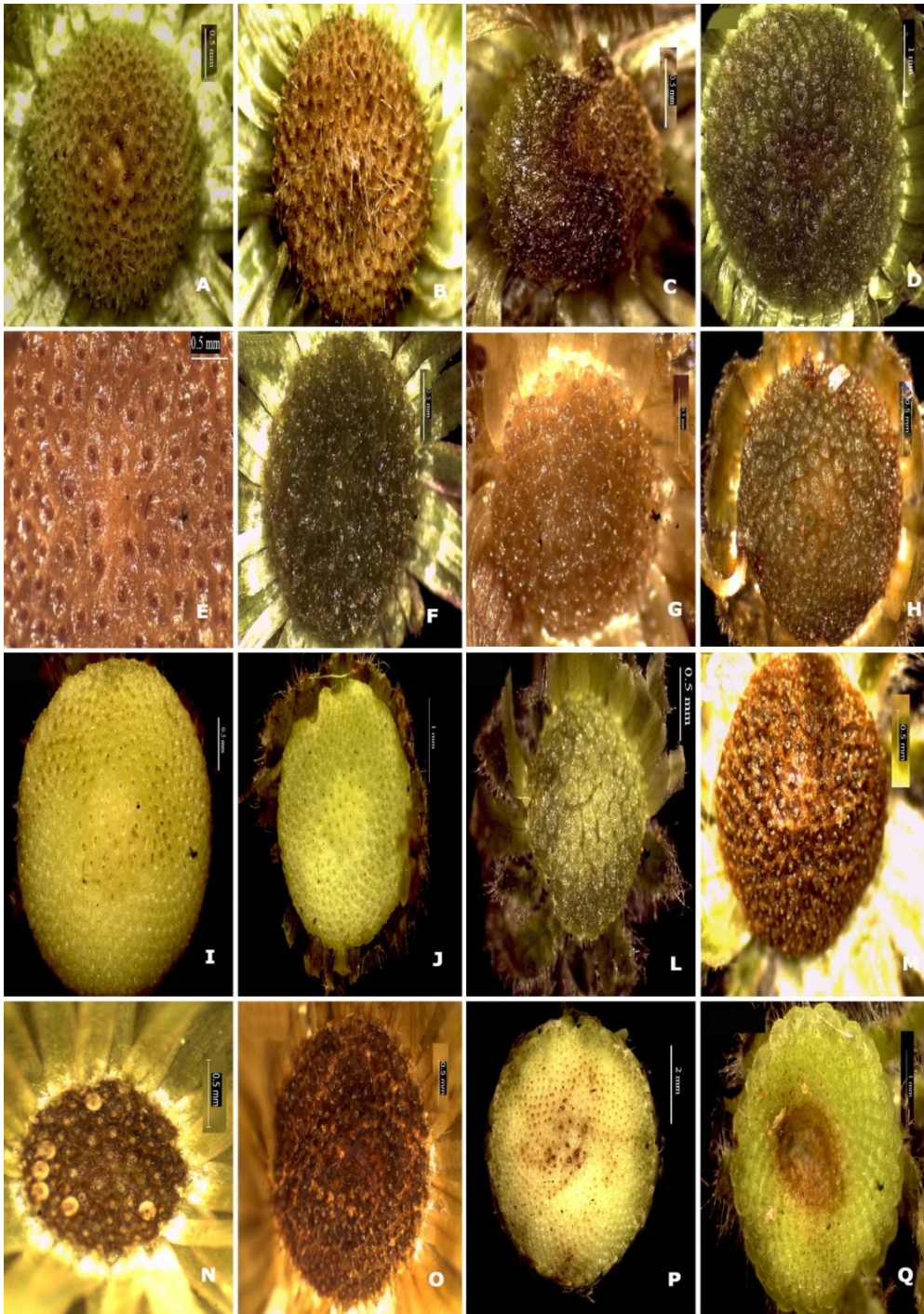


Fig. 66. Receptacle. A: *Blumea sinuata* (Lour.) Merr.; B: *B. lanceolaria* (Roxb.) Druce; C: *B. malcolmii* (Clarke) Hook. f.; D & E: *B. paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George; F & G: *B. paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida; H: *B. paniculata* (Willd.) M. R. Almeida; I: *B. obliqua* (L.) Druce; J: *B. obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra; K: *B. oxyodonta* DC.; L: *B. sessiliflora* Decne.; M: *B. virens* DC.; N: *Laggera alata* (D. Don) Sch.-Bip. ex Oliver; O: *L. crispata* (Vahl) Hepper & J.R.I. Wood; P: *Pseudoconyza viscosa* (Mill.) D'Arcy.

they are pink or white at the lobes in *B. axillaris* and purple in *B. obliqua*. The corollas of female florets are usually glabrous, according to Randeria (1960). However, she mentioned that it has occasionally been used as an additional criterion when they are equipped with hair, either on the lobes or the complete surface. Long hairs in lobes were observed in *B. eriantha*, *B. malcolmii*, and *B. lacera* var. *lacera*. The majority of the taxa are glandular.

Like *Blumea*, the female florets of *Laggera* are delicate and filiform. The corollas are 3 or 4 lobed and glabrous. The number of female florets in *Laggera crispata* is ± 620 and ± 275 in *Laggera alata*. Pink or light pink at lobes and whitish to the base. In *Pseudoconyza*, ± 372 female florets were observed. The corolla lobes are pale yellowish and glabrous.

Bisexual Floret

The greatest number of bisexual florets is observed in *B. eriantha* and *B. malcolmii*, with ± 53 and ± 46 respectively. Lowest numbers are observed in *B. sinuata* (± 6), *B. belangeriana*, *B. bifoliata* (± 8) and *B. virens* (± 9) as well as some variable forms of *B. axillaris* and *B. barbata*. The bisexual florets have tubular corollas that progressively enlarge from the base upward. Corollas are 5-lobed in most cases, but in some variable forms of *B. axillaris* and *B. barbata*, they have 4 lobes. The corolla is yellow in most of the taxa. But pink, purple, or white in *B. axillaris*, and pink or purple in *B. obliqua*. The margins of the lobes are papillate and with glandular hairs. Most of the taxa studied have short unicellular hairs on lobes, but long multicellular hairs are present in *B. bifoliata*, *B. hieraciifolia* var. *hieraciifolia*, and *B. obliqua* var. *arenaria*. In *B. malcolmii* and *B. eriantha*, the whole corolla is hairy, and in some forms of *B. oxyodonta*, hairs were observed in the base of the corolla too. The shape of corolla lobes ranges from lanceolate to linear lanceolate, triangular, or ovate.

Figs. 67, 68

The number of bisexual florets in *L. alata* is ± 15 and in *L. crispata* is about 23. Corolla is 5-lobed, with linear lanceolate lobes in *L. alata* and triangular or lanceolate lobes in *L. crispata*. Corolla lobes are glandular and pink or purple in

both species. *Pseudoconyza* has ± 10 bisexual florets. Lobes 5 are pale yellow and glabrous.

Stamen

Anthers 5, syngenesious, yellow in most of the species, purple, pink, or white in *B. axillaris*, and purple or pink in *B. obliqua*. According to Randeria (1960), the length of the tail of anthers in relation to anther collars is consistent in each species. But when the overall number of variations is considered, Dakshini and Prithipalsingh (1977; 1978) note this character breakdown. The apical appendages are almost the same length in most of the taxa studied. The apical appendages are truncate in *B. axillaris*, *B. barbata*, *B. belangeriana*, *B. bifoliata*, *B. lacera* var. *glandulosa*, *B. lacera* var. *lacera*, and *B. lanceolaria*; acuminate in *B. hieraciifolia* var. *hamiltonii*, *B. hieraciifolia* var. *hieraciifolia*, *B. obliqua* var. *obliqua* and *B. obliqua* var. *arenaria*; acute in *B. virens*; obtuse in others.

In *Laggera*, anthers are pink, the tail is absent, and the apical appendages are acute or obtuse. In *Pseudoconyza*, anthers are pale yellow, small tails are present, and the anther apical appendages are obtuse. **Figs. 69, 70**

Bisexual floret Style and Ovary

Generally, styles are bifid and extend beyond the corolla at maturity. In most of the taxa, the sweeping hairs reach only up to bifurcation. But in *B. axillaris*, *B. eriantha*, *B. malcolmii*, *B. obliqua* var. *obliqua*, *B. obliqua* var. *arenaria*, and *B. oxyodonta*, sweeping hairs reach up to the centre of the style. The style is attached to the ovary by a cylindrical structure that is narrower than both the style and the ovary in majorities. But in *B. obliqua* var. *obliqua*, it has the same diameter as the ovary. In *B. virens*, *B. eriantha*, *B. bifoliata*, *B. lanceolaria*, *B. malcolmii*, and *B. obliqua* var. *arenaria*, the cylindrical structure is of the same thickness as the style. In *B. hirsuta*, the attachment is a ridged structure. The base of the style is swollen in most of the taxa.

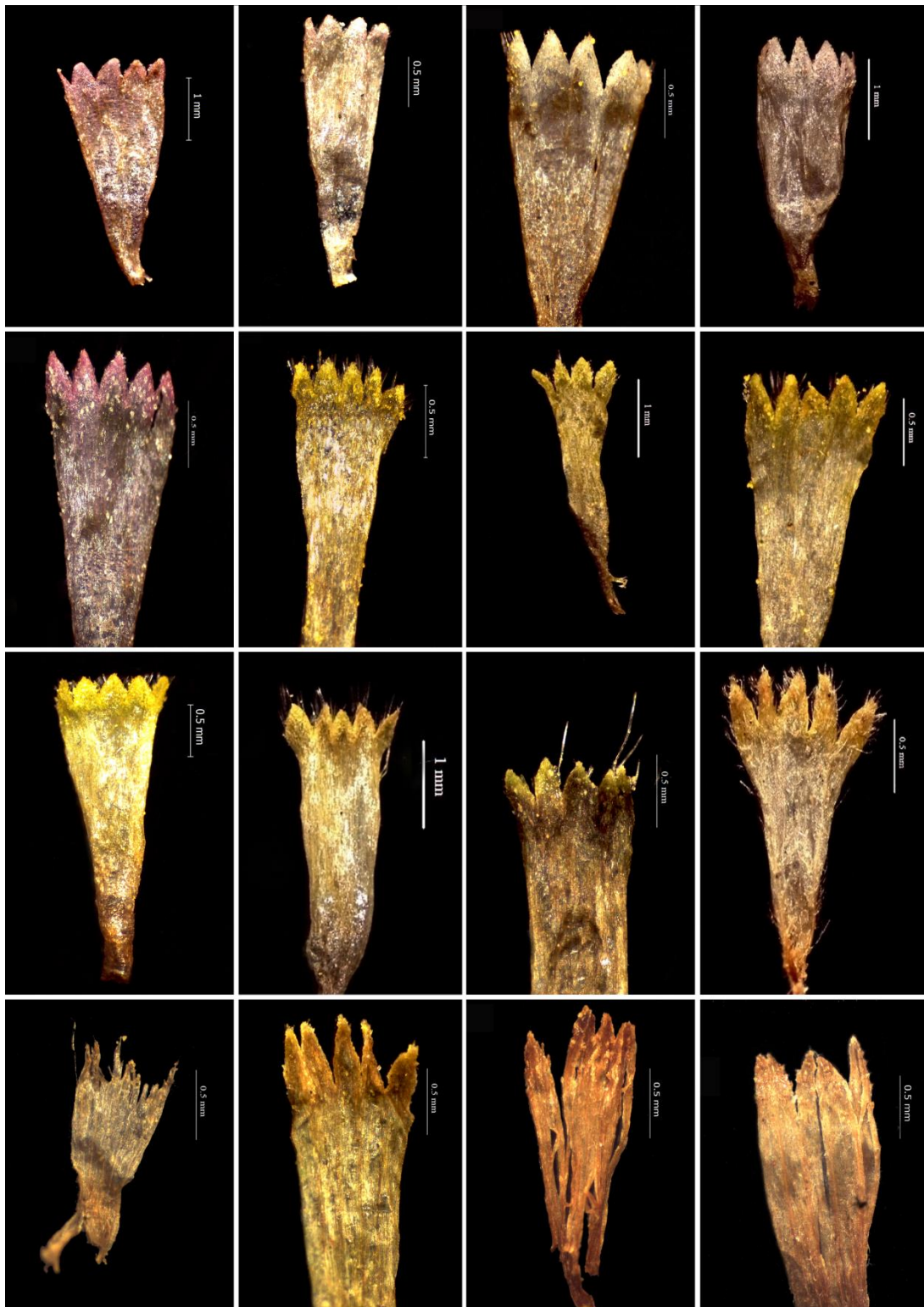


Fig. 67. Bisexual corolla. A, B, C, D & E: *Blumea axillaris* (Lam.) DC.; F & G: *B. barbata* DC.; H: *B. bifoliata* (L) DC.; I & J: *B. belangeriana* DC.; K: *B. hirsuta* (Less.) M. R. Almeida; L: *B. eriantha* DC.; M: *B. fistulosa* Kurz.; N: *B. hieraciifolia* var. *flexuosa* (C.B. Clarke) Randeria; O: *B. hieraciifolia* var. *hamiltonii* (DC) Clarke; P: *B. hieraciifolia* (D. Don) DC.



Fig. 68. Bisexual corolla. A: *Blumea lacera* (Burm. f.) DC.; B: *B. lacera* var. *glandulosa* Hook.f.; C: *B. sinuata* (Lour.) Merr.; D: *B. lanceolaria* (Roxb.) Druce; E: *B. malcolmii* (Clarke) Hook. f.; F: *B. paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George; G: *B. paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida; H: *B. paniculata* (Willd.) M. R. Almeida; I: *B. obliqua* (L.) Druce; J: *B. obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra; K: *B. oxyodonta* DC.; L: *B. sessiliflora* Decne.; M: *B. virens* DC.; N: *Laggera alata* (D. Don) Sch.-Bip. ex Oliver; O: *L. crispata* (Vahl) Hepper & J.R.I. Wood; P: *Pseudoconyza viscosa* (Mill.) D'Arcy.



Fig. 69. Stamen. A, B, C, D & E: *Blumea axillaris* (Lam.) DC.; F & G: *B. barbata* DC.; H: *B. bifoliata* (L) DC.; I: *B. belangeriana* DC.; J & K: *B. hirsuta* (Less.) M. R. Almeida; L: *B. eriantha* DC.; M: *B. fistulosa* Kurz.; N: *B. hieraciifolia* var. *flexuosa* (C.B.Clarke) Randeria; O: *B. hieraciifolia* var. *hamiltonii* (DC) Clarke; P: *B. hieraciifolia* (D. Don) DC.

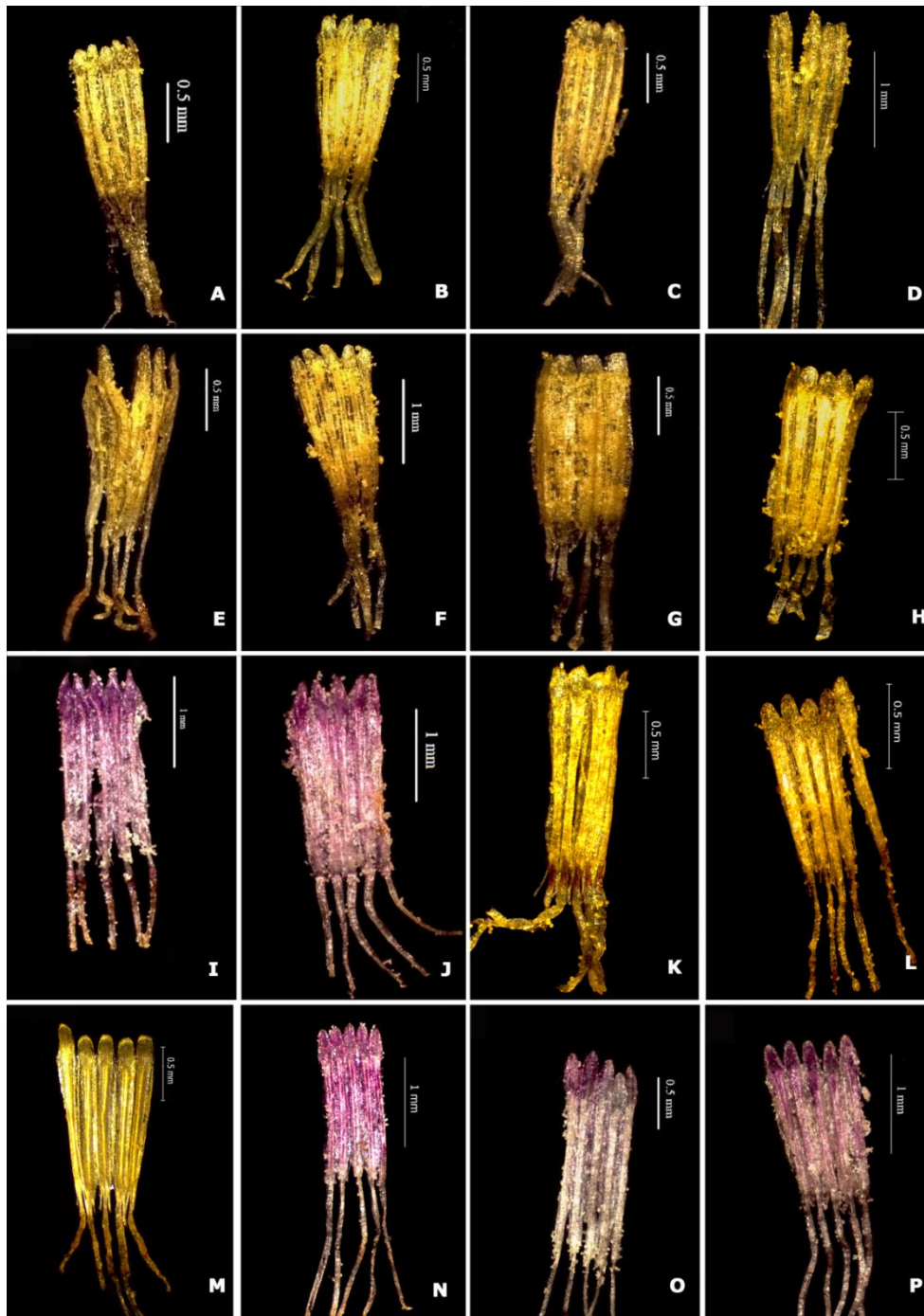


Fig. 70. Stamen. A: *Blumea lacera* (Burm. f.) DC.; B: *B. lacera* var. *glandulosa* Hook.f.; C: *B. sinuata* (Lour.) Merr.; D: *B. lanceolaria* (Roxb.) Druce; E: *B. malcolmii* (Clarke) Hook. f.; F: *B. paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George; G: *B. paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida; H: *B. paniculata* (Willd.) M. R. Almeida; I: *B. obliqua* (L.) Druce; J: *B. obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra; K: *B. oxyodonta* DC.; L: *B. sessiliflora* Decne.; M: *B. virens* DC.; N: *Laggera alata* (D. Don) Sch.-Bip. ex Oliver; O: *L. crispata* (Vahl) Hepper & J.R.I. Wood; P: *Pseudoconyza viscosa* (Mill.) D'Arcy.

In *Laggera crispata*, *L. alata*, and *Pseudoconyza viscosa*, the sweeping hairs reach beyond bifurcation. The style attached to ovary by a structure which is wider to apex in *L. alata*, it is slightly narrower than ovary in *L. crispata* but in *Pseudoconyza* which is narrower than style and ovary. **Figs. 71, 72**

Cypsela

According to Randeria (1960), the cypselas of *Blumea* are surprisingly uniform, in contrast to other Asteraceae taxa where they provide a wealth of useful taxonomic characters. She claims that the only difference is the presence of ribs or an angular state, and even this distinction is not always obvious in some species. Due to its nearly consistent character set, the genus *Blumea* exemplifies this claim. There are typically 6–10 ribs on cypselas when they are clearly ribbed, and these ribs are lighter in colour than the remainder of the surface. The cypselas are smooth in *B. obliqua* var. *obliqua*, *B. obliqua* var. *arenaria*, and *B. oxyodonta*; sub-cylindrical or 4-sided in *B. venkataramanii*. All Cypselas are hairy, and the pubescence ranges from sparsely to densely hairy. Sometimes the apex is densely hairy, and other portions are sparsely hairy. Pale yellow or light brown in most of the taxa studied, but dark brown in *B. oxyodonta*, *B. obliqua* var. *obliqua*, and *B. obliqua* var. *arenaria*. Additionally, Randeria (1960) noted that cypselas never have glandular trichomes. However, we observed glandular hairs in cypselae of *B. lanceolaria*. The shape of cypselas is linear-oblong or oblong.

The Cypselas of *Laggera alata* and *Laggera crispata* are almost identical. The differences are in the hairiness and straight or curved condition. In *L. alata*, long hairs are present, but in *L. crispata*, hairs are of a shorter form. Cypselas are straight in *L. alata* and curved in *L. crispata*. The surface is smooth and dark brown. Like *Laggera alata*, the cypselas of *Pseudoconyza* has long hairs. It is smooth and dark brown. There is a considerable similarity in the cypselae of *B. obliqua* var. *obliqua*, *B. obliqua* var. *arenaria*, *B. oxyodonta*, *L. alata*, *L. crispata*, and *Pseudoconyza viscosa*. **Figs. 73, 74**



Fig. 71. Style of Bisexual Floret. A, B, C, D & E: *Blumea axillaris* (Lam.) DC.; F & G: *B. barbata* DC.; H: *B. bifoliata* (L) DC.; I: *B. belangeriana* DC.; J & K: *B. hirsuta* (Less.) M. R. Almeida; L: *B. eriantha* DC.; M: *B. fistulosa* Kurz.; N: *B. hieraciifolia* var. *flexuosa* (C.B. Clarke) Randeria; O: *B. hieraciifolia* var. *hamiltonii* (DC) Clarke; P: *B. hieraciifolia* (D. Don) DC.

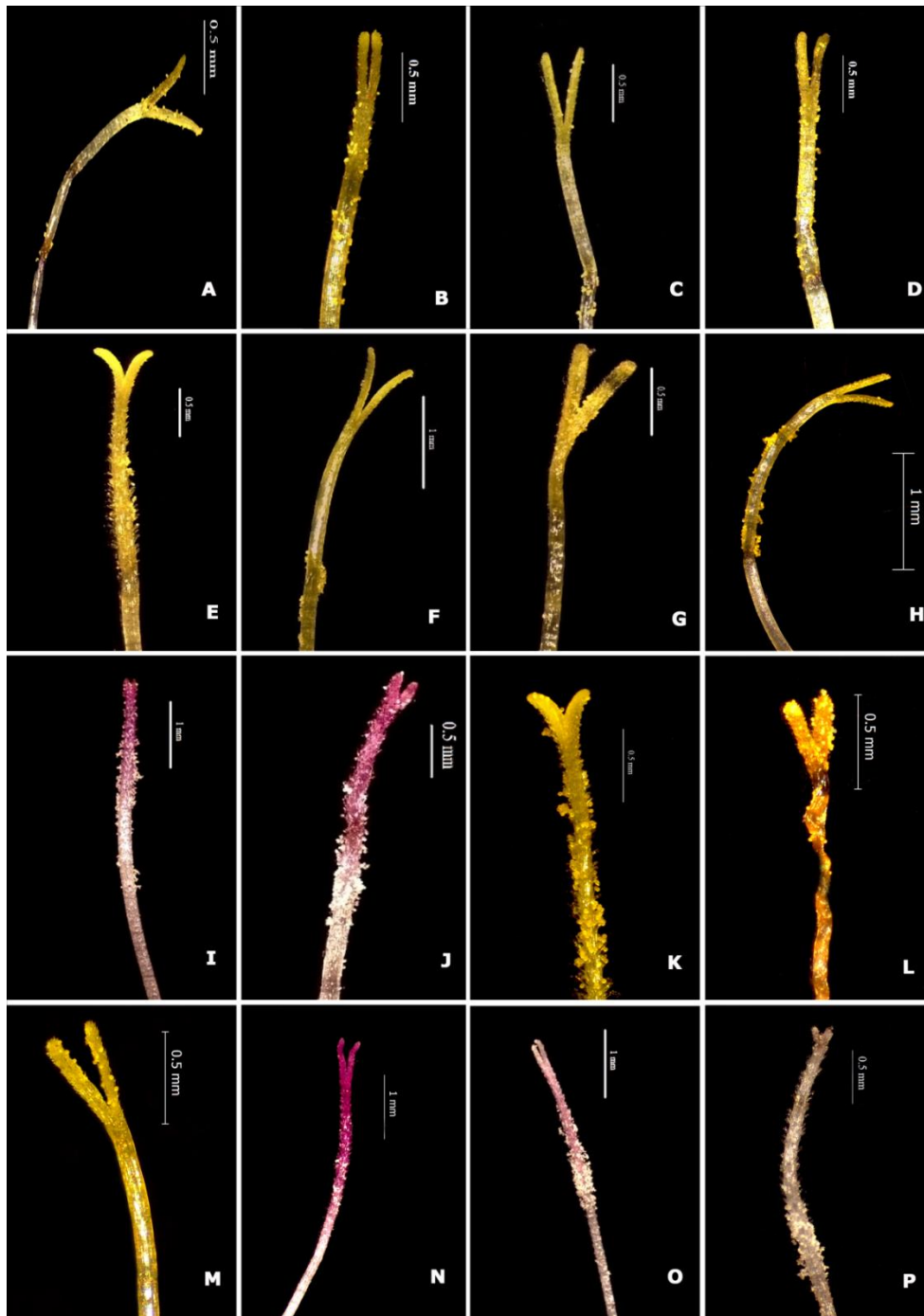


Fig. 72. Style of Bisexual floret. A: *Blumea lacera* (Burm. f.) DC.; B: *B. lacera* var. *glandulosa* Hook.f.; C: *B. sinuata* (Lour.) Merr.; D: *B. lanceolaria* (Roxb.) Druce; E: *B. malcolmii* (Clarke) Hook. f.; F: *B. paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George; G: *B. paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida; H: *B. paniculata* (Willd.) M. R. Almeida; I: *B. obliqua* (L.) Druce; J: *B. obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra; K: *B. oxyodonta* DC.; L: *B. sessiliflora* Decne.; M: *B. virens* DC.; N: *Laggera alata* (D. Don) Sch.-Bip. ex Oliver; O: *L. crispata* (Vahl) Hepper & J.R.I. Wood; P: *Pseudoconyza viscosa* (Mill.) D'Arcy.



Fig. 73. Cypselas. A, B, C, D & E: *Blumea axillaris* (Lam.) DC.; F & G: *B. barbata* DC.; H: *B. bifoliata* (L) DC.; I: *B. belangeriana* DC.; J & K: *B. hirsuta* (Less.) M. R. Almeida; L: *B. eriantha* DC.; M: *B. fistulosa* Kurz.; N: *B. hieraciifolia* var. *flexuosa* (C.B.Clarke) Randeria; O: *B. hieraciifolia* var. *hamiltonii* (DC) Clarke; P: *B. hieraciifolia* (D. Don) DC.



Fig. 74. Cypselas. A: *Blumea lacera* (Burm. f.) DC.; B: *B. lacera* var. *glandulosa* Hook.f.; C: *B. sinuata* (Lour.) Merr.; D: *B. lanceolaria* (Roxb.) Druce; E: *B. malcolmii* (Clarke) Hook. f.; F: *B. paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George; G: *B. paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida; H: *B. paniculata* (Willd.) M. R. Almeida; I: *B. obliqua* (L.) Druce; J: *B. obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra; K: *B. oxyodonta* DC.; L: *B. sessiliflora* Decne.; M: *B. virens* DC.; N: *Laggera alata* (D. Don) Sch.-Bip. ex Oliver; O: *L. crispata* (Vahl) Hepper & J.R.I. Wood; P: *Pseudoconyza viscosa* (Mill.) D'Arcy.

Pappus

The pappus in *Blumea*, *Laggera*, and *Pseudoconyza* is uniseriate with many soft barbellulate hairs. The majority of taxa are white or pale yellowish in colour. In *B. lanceolaria*, the pappus is pale yellowish or white, changing to pale red on drying. It may be persistent or easily detachable. Persistent pappus is seen in *B. sessiliflora*, *B. paniculata* var. *paniculata*, *B. paniculata* var. *gardneri*, *B. paniculata* var. *jacquemontii*, *B. sinuata*, *B. hirsuta*, *B. belangeriana*, *B. lanceolaria*, and *B. fistulosa*. Pappus is persistent in *L. alata* but easily detachable or caducous in *L. alata*. Persistent pappus is seen in *Pseudoconyza*.

ANATOMICAL STUDIES

The anatomical characters of *Blumea*, *Laggera*, and *Pseudoconyza* have been assessed here. The anatomy of the leaf and stem of 24 taxa has been examined. Due to the unavailability of vegetative parts of three specimens (*B. hieraciifolia* var. *hamiltonii*, *B. hieraciifolia* var. *hieraciifolia*, and *B. venkataramanii*), the vegetative anatomy of 24 taxa was attempted.

***Blumea* Leaf Anatomy**

The epidermis is made up of single-layered, small, thick-walled cells with a thick cuticle. Upper epidermal cells of the leaf blade are larger than lower epidermal cells in the majority of the taxa studied. Whereas in *B. bifoliata*, *B. obliqua* var. *obliqua*, *B. obliqua* var. *arenaria*, *B. eriantha*, *B. virens*, *B. barbata*, and *B. sinuata*, both epidermis are of the same size. Multicellular epidermal trichomes are present on the leaves. Only non-glandular multicellular uniseriate trichomes are present in *B. barbata*, *B. sinuata*, *B. paniculata* var. *paniculata*, *B. virens*, *B. bifoliata*, *B. hirsuta*, and *B. lanceolaria*. Glandular trichomes are of two types: capitate and peltate. Two types of capitate glandular hairs are observed. Type 1 has a cup-like head cell and a stalk of uniseriate or biseriate basal cells, whereas Type 2 has an oval or pear-like head cell and a short or long stalk. Peltate glandular trichomes with round head cells and a short stalk. Non-glandular and type 2 glandular trichomes with a pear-shaped head and short stalk are present in *B. lacera* var. *lacera*, *B. belangeriana*, *B. hieraciifolia* var. *flexuosa*, *B. obliqua* var. *arenaria*, *B. eriantha*, *B. obliqua* var. *obliqua*, *B. malcolmii*, *B. axillaris*, *B. fistulosa*, *B. lacera*, and *B. sessiliflora*. But in *B. paniculata* var. *jacquemontii*, non-glandular and type 1 glandular hairs are present.

Mesophyll is differentiated into palisade tissue and spongy tissue. Spongy cells are made up of 1–4 small, spherical, irregularly arranged cells with chloroplasts. Palisade tissue is two-layered in most of the taxa, but only one is observed in *B. eriantha*, *B. hirsuta*, *B. obliqua* var. *arenaria*, *B. paniculata* var.

gardneri, *B. paniculata* var. *jacquemontii*, *B. paniculata* var. *paniculata*, *B. lacera*, *B. barbata*, and *B. sinuata*. The stomatal chamber is seen on both surfaces. Numerous vascular bundle traces are present in the leaf lamina.

Non-glandular and peltate glandular trichomes are present in *B. lacera* var. *lacera*, *B. belangeriana*, *B. eriantha*, *B. obliqua* var. *obliqua*, *B. malcolmii*, and *B. axillaris*. Non-glandular and type 2 glandular trichomes in *B. hieraciifolia* var. *flexuosa*, *B. obliqua* var. *arenaria*, *B. lacera* var. *glandulosa*, and *B. sessiliflora*. Non-glandular and type 1 glandular hairs were observed in *B. paniculata* var. *jacquemontii* only. Only non-glandular trichomes were observed in *B. fistulosa*, *B. bifoliata*, *B. hirsuta*, *B. lanceolaria*, *B. paniculata* var. *gardneri*, *B. barbata*, *B. sinuata*, *B. paniculata*, and *B. virens*.

Midrib is elevated on both sides. The middle portion of midrib in adaxial side is elevated and slightly concave at apex in *B. lacera* var. *lacera*, *B. paniculata* var. *jacquemontii* and *B. bifoliata*; acute at apex in *B. belangeriana*, *B. hieraciifolia* var. *flexuosa*, *B. paniculata* var. *gardneri*; obtuse at apex in *B. virens*, *B. hirsuta*, *B. obliqua* var. *arenaria*, *B. lanceolaria*, *B. oxyodonta*, *B. axillaris*; slight lobes to lateral sides of apex in *B. sessiliflora*, *B. paniculata* var. *paniculata*. The adaxial surface is slightly elevated (not only at the middle) in *B. obliqua* var. *obliqua*, *B. fistulosa*, and *B. lacera*. The adaxial portion is semicircular in *B. eriantha* and only slightly elevated in *B. barbata* and *B. sinuata*.

The abaxial surface is mostly in an inverted arc shape. It is lobed in *B. sessiliflora*, *B. barbata*, *B. sinuata*, *B. paniculata* var. *paniculata*, *B. virens*, and *B. paniculata* var. *gardneri*, and slightly lobed in *B. lacera* var. *lacera* and *B. bifoliata*. Forming a globular-like structure in *B. belangeriana* and *B. malcolmii*.

Subepidermal collenchyma is single-layered in *B. lacera* var. *lacera*, *B. eriantha*, *B. malcolmii*, and *B. paniculata* var. *gardneri*. All others with more than one layer were observed. The number of collenchyma layers in the adaxial and abaxial surfaces is almost similar, but in *B. paniculata* var. *jacquemontii*, *B. lacera* var. *glandulosa*, *B. sessiliflora*, *B. paniculata* var. *paniculata*, and *B. virens*, it is highest in the adaxial surface.

Chlorophyllous parenchyma extends to the lateral sides of the midrib in most of the taxa. It is greater on the adaxial side than on the abaxial side. But on the adaxial surface of *B. belangeriana* and *B. lanceolaria*, it forms a continuous layer. In *B. eriantha* and *B. malcolmii*, the proportion is almost the same on both surfaces. Ground tissue is made up of large, irregularly shaped parenchymatous cells with intercellular spaces. Vascular bundles are few in the midrib portion.

Five vascular bundles were observed in the midrib of *B. paniculata*, *B. sessiliflora*, *B. sinuata* and *B. lacera*, *B. barbata*, *B. axillaris*; 3 in *B. fistulosa*, *B. virens*, *B. oxyodonta*, *B. paniculata* var *jacquemontii*, *B. lacera* var *lacera*, *B. bifoliata*, *B. hirsuta*, *B. hieraciifolia* var *flexuosa*, *B. lanceolaria*; only one large vascular bundle in *B. malcolmii* and *B. belangeriana*; 2 in *B. eriantha*, *B. obliqua* var *obliqua*, *B. obliqua* var *arenaria*, *B. paniculata* var *gardnerii* and *B. fistulosa*. Vascular bundles are composed of xylem and phloem. Phloem is oriented towards the lower epidermis, and xylem is oriented towards the upper epidermis. Xylem is differentiated into metaxylem vessels and protoxylem vessels. Tracheary elements are also present. Sclerenchymatous cells are present just above the xylem and just below the phloem.

Secretory epithelial canals were present in most of the investigated taxa. But it is absent in *B. axillaris*, *B. barbata*, *B. virens*, *B. lacera* var. *lacera*, *B. belangeriana*, *B. eriantha*, *B. obliqua* var. *obliqua*, *B. obliqua* var. *arenaria*, *B. malcolmii*, and *B. oxyodonta*.

Figs. 75-85 (A,B,C,D)

Laggera Leaf Anatomy

Single-layered epidermis, which is surrounded by thick cuticle on both the adaxial and abaxial surfaces of the leaf. In terms of size, upper epidermal cells are larger than those of the abaxial ones in *L. alata*, but in *L. crispata*, both epidermis cells are of almost the same length. In *L. alata*, the upper epidermis has large ovate to oblong cells but small linear oblong cells in the lower epidermis. Instead, both epidermal cells are linear-ovate in *L. crispata*. Curly multicellular uniseriate non-glandular trichomes and peltate branched and unbranched glandular trichomes with short stalks were observed in *L. alata*. Numerous type 2 capitate glandular trichomes

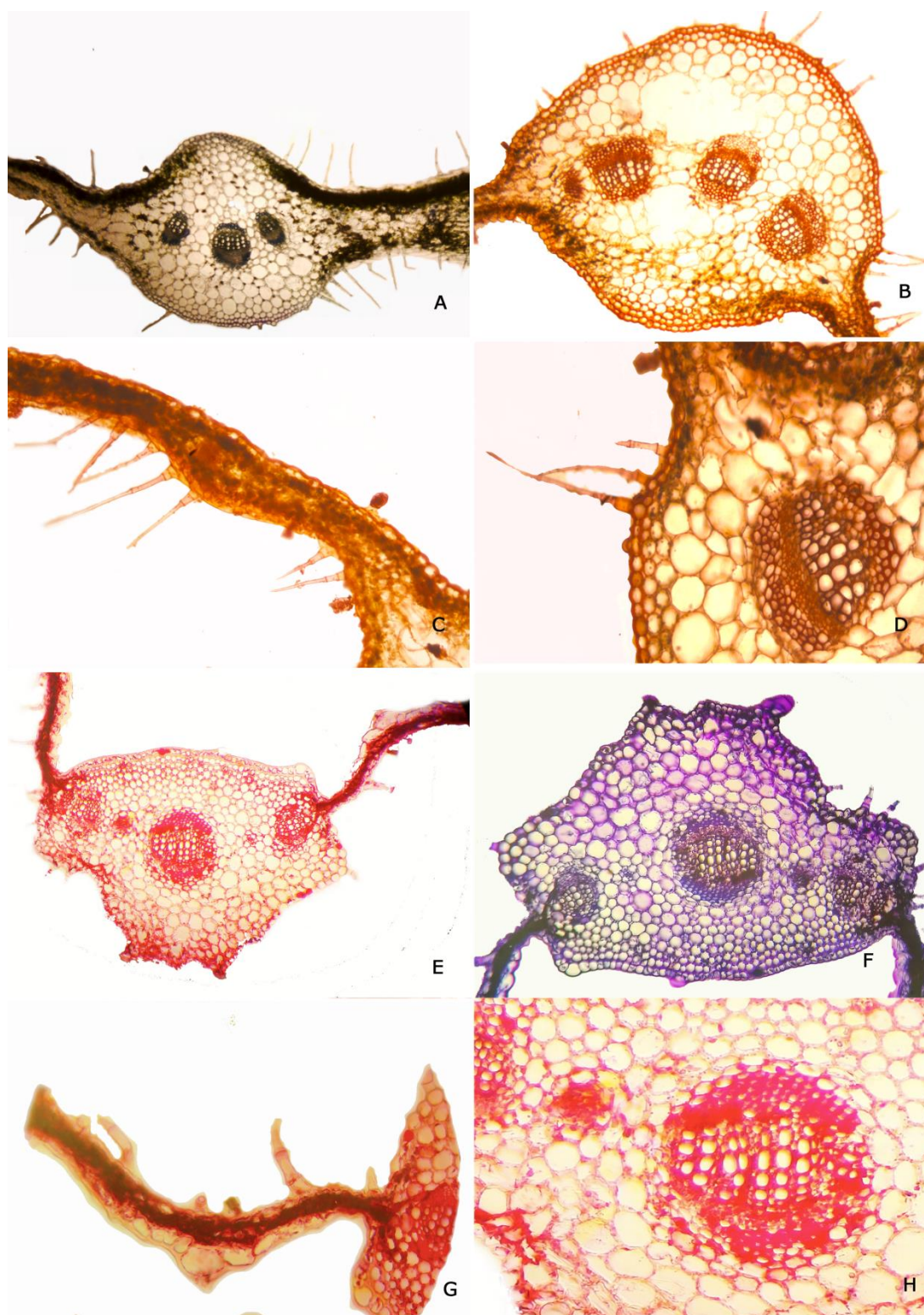


Fig. 75. Anatomical study of Leaf of *Blumea axillaris* (Lam.) DC. (A,B,C,D) and *Blumea barbata* DC. (E, F,G, H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

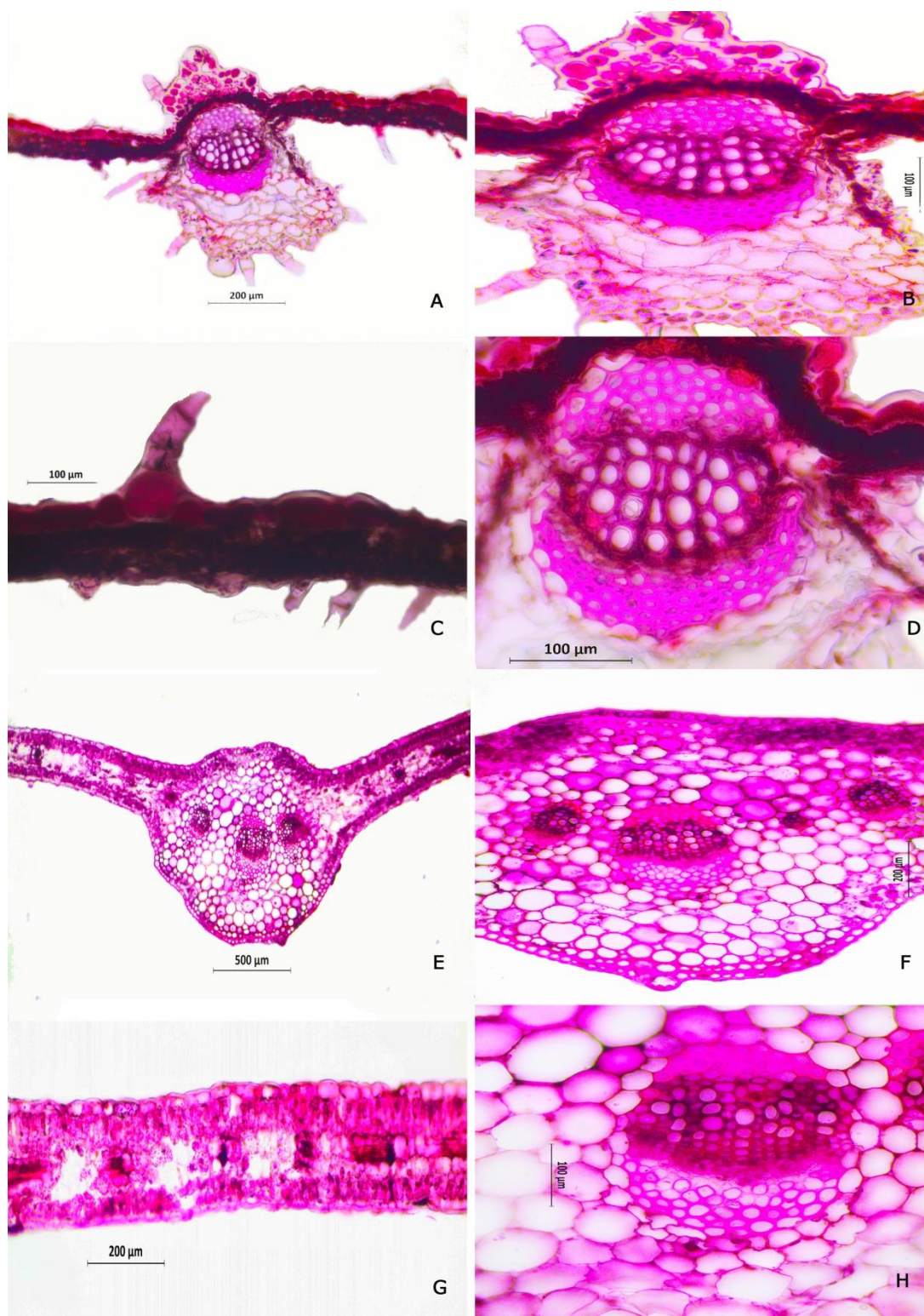


Fig. 76. Anatomical study of Leaf of *Blumea belangeriana* DC. (A,B,C,D) and *Blumea bifoliata* (L) DC. (E, F, G, H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

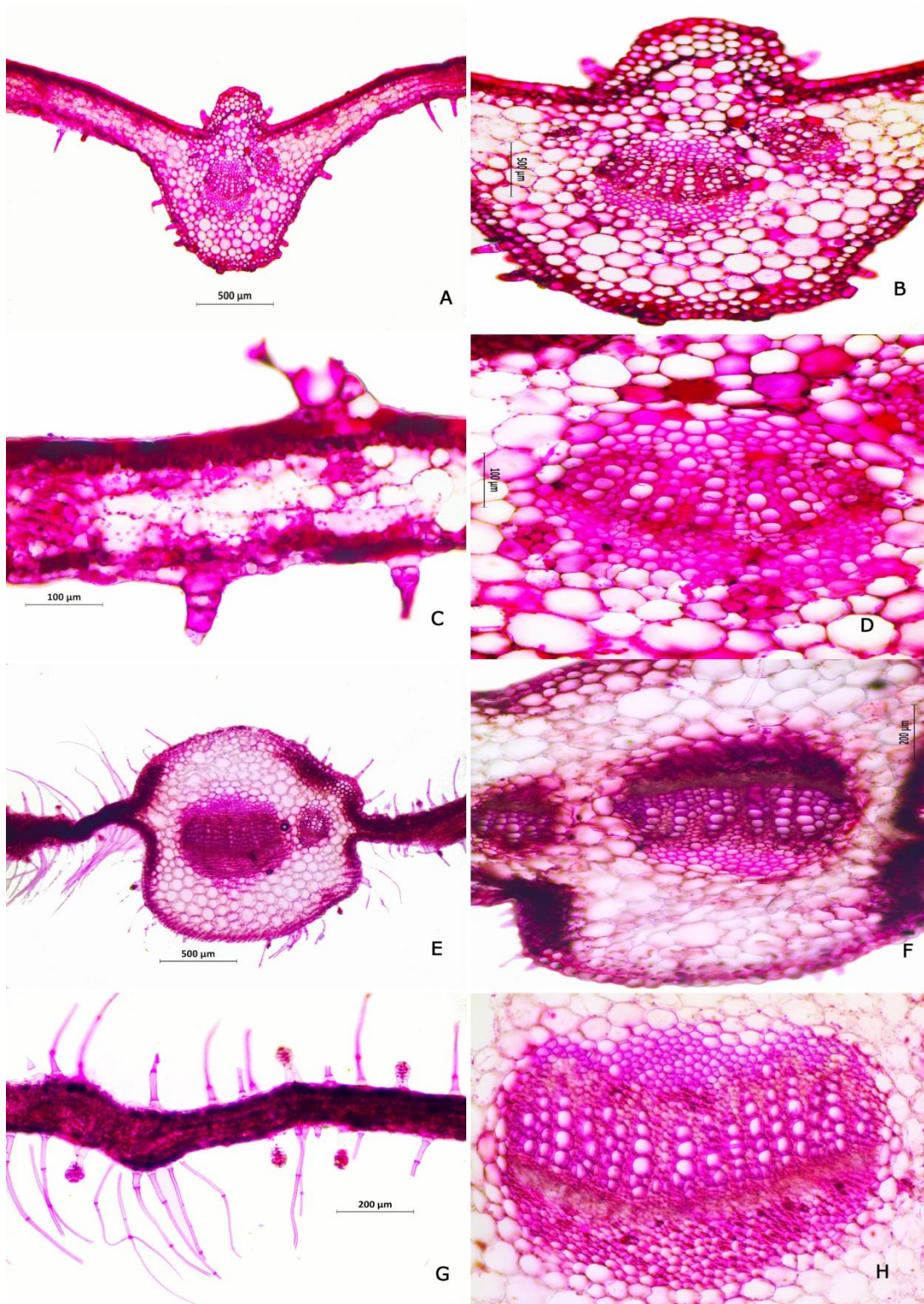


Fig. 77. Anatomical study of Leaf of *Blumea hirsuta* (Less.) M. R. Almeida (A,B,C,D) and *Blumea eriantha* DC. (E, F,G, H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

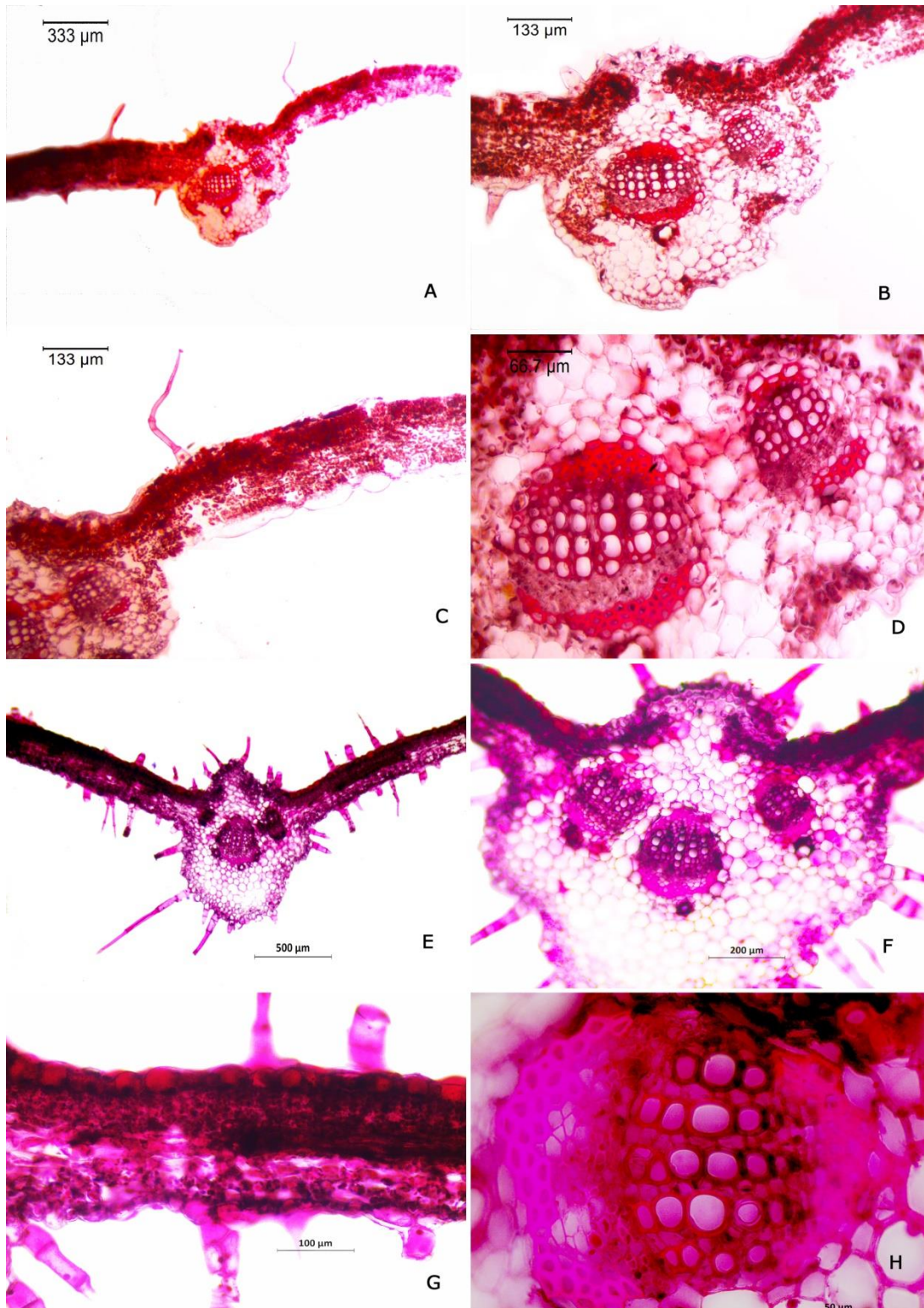


Fig. 78. Anatomical study of Leaf of *Blumea fistulosa* Kurz. (A,B,C,D) and *Blumea hieraciifolia* var. *flexuosa* (C.B.Clarke) Randeria (E, F,G, H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

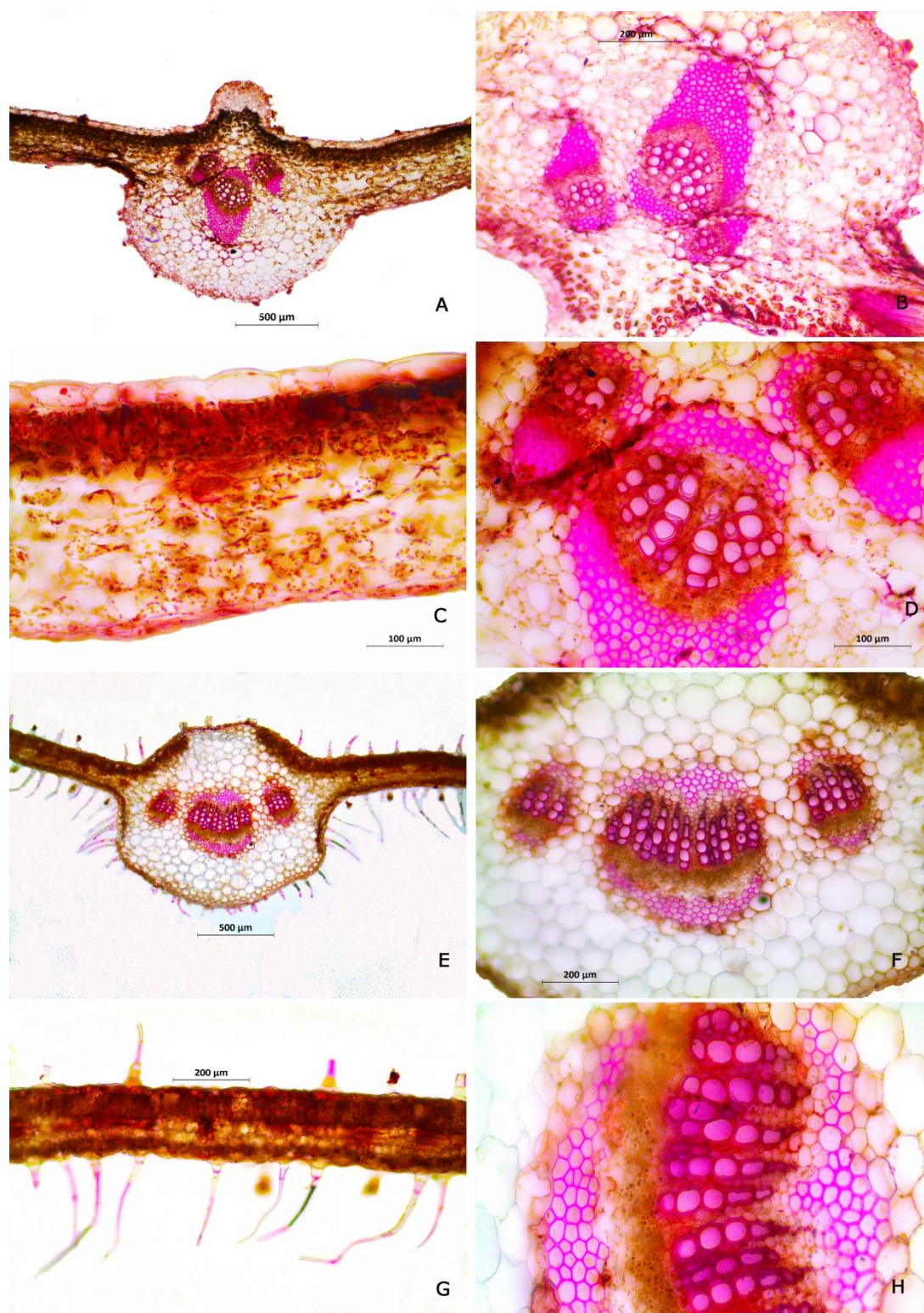


Fig. 79. Anatomical study of Leaf of *Blumea lanceolaria* (Roxb.) Druce (A,B,C,D) and *Blumea lacera* (Burm. f.) DC. (E, F,G, H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

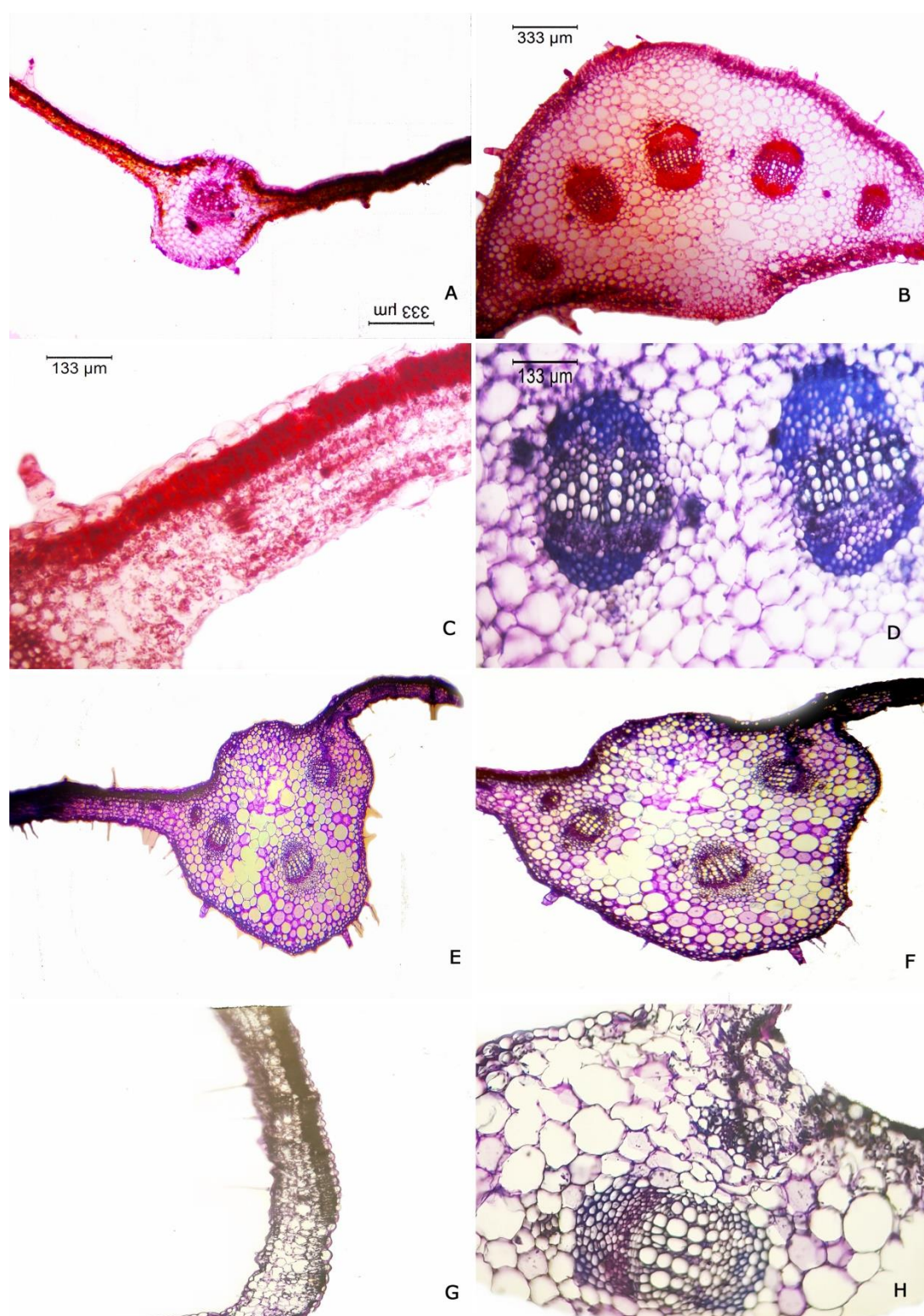


Fig. 80. Anatomical study of Leaf of *Blumea lacera* var. *glandulosa* Hook.f. (A,B,C,D) and *Blumea sinuata* (Lour.) Merr.(E,F,G,H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

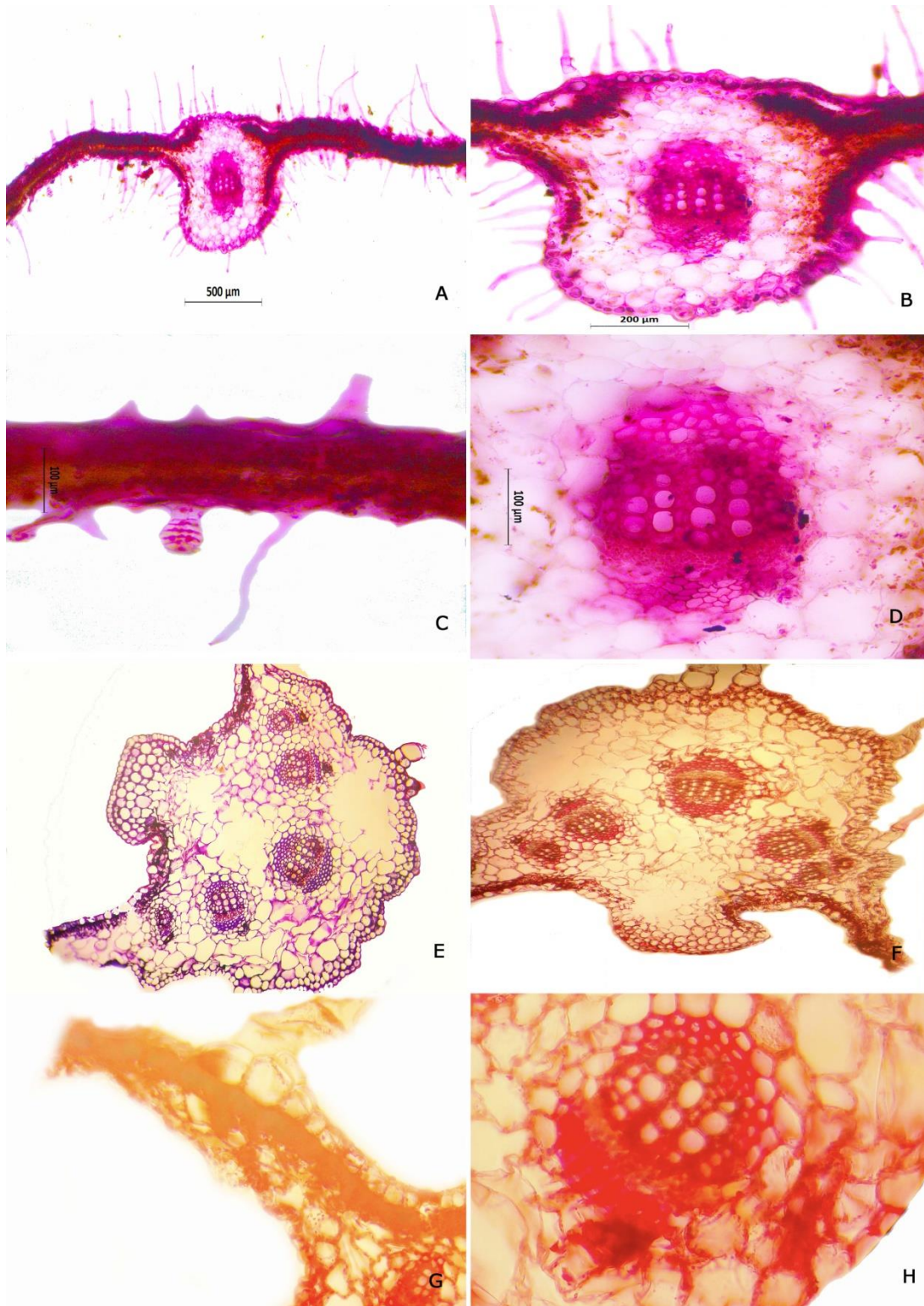


Fig. 81. Anatomical study of Leaf of *Blumea malcolmii* (A,B,C,D) and *Blumea paniculata* (Willd.) M. R. Almeida (E,F,G,H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

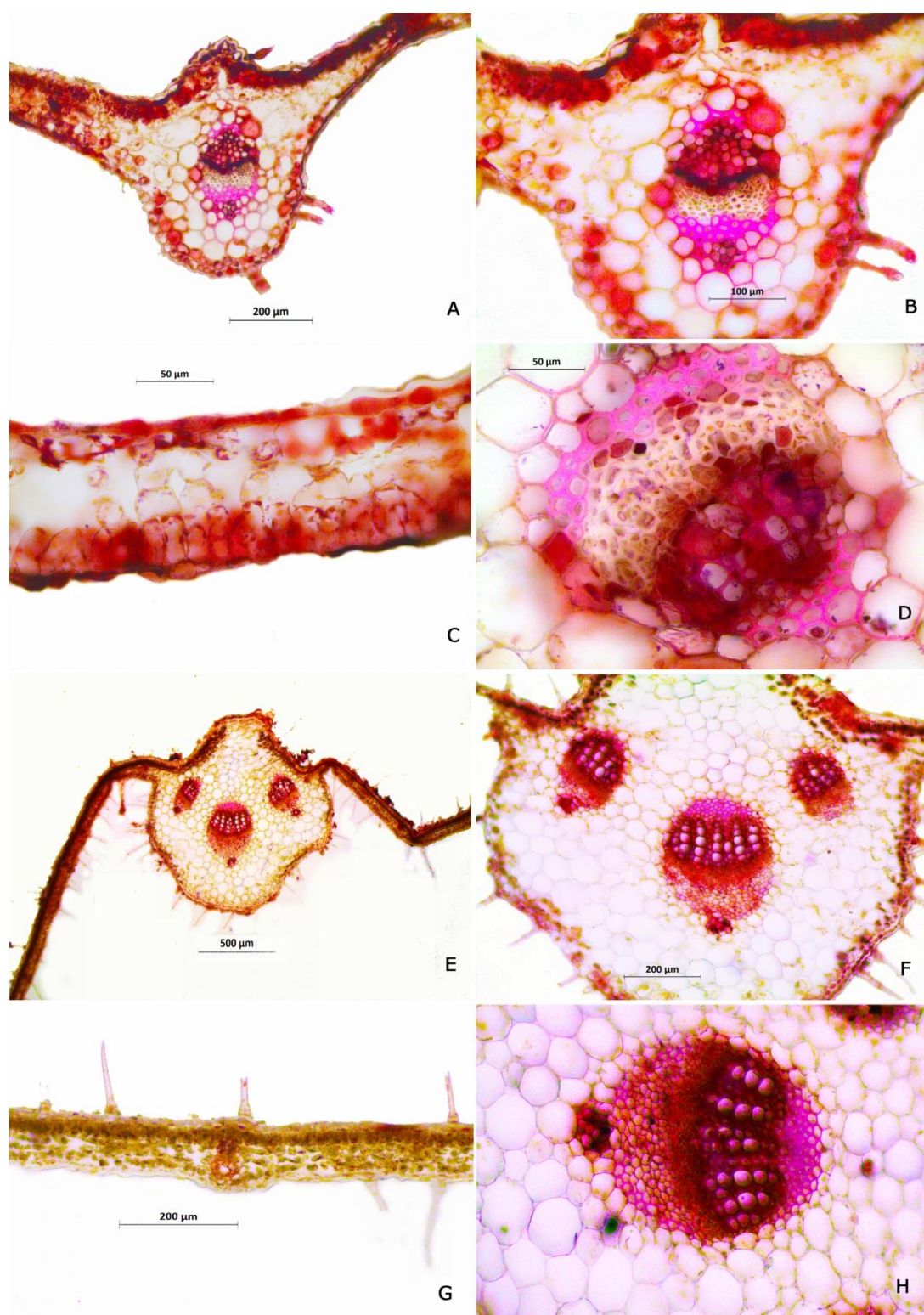


Fig. 82. Anatomical study of Leaf of *Blumea paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George (A,B,C,D) and *Blumea paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida (E,F,G,H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

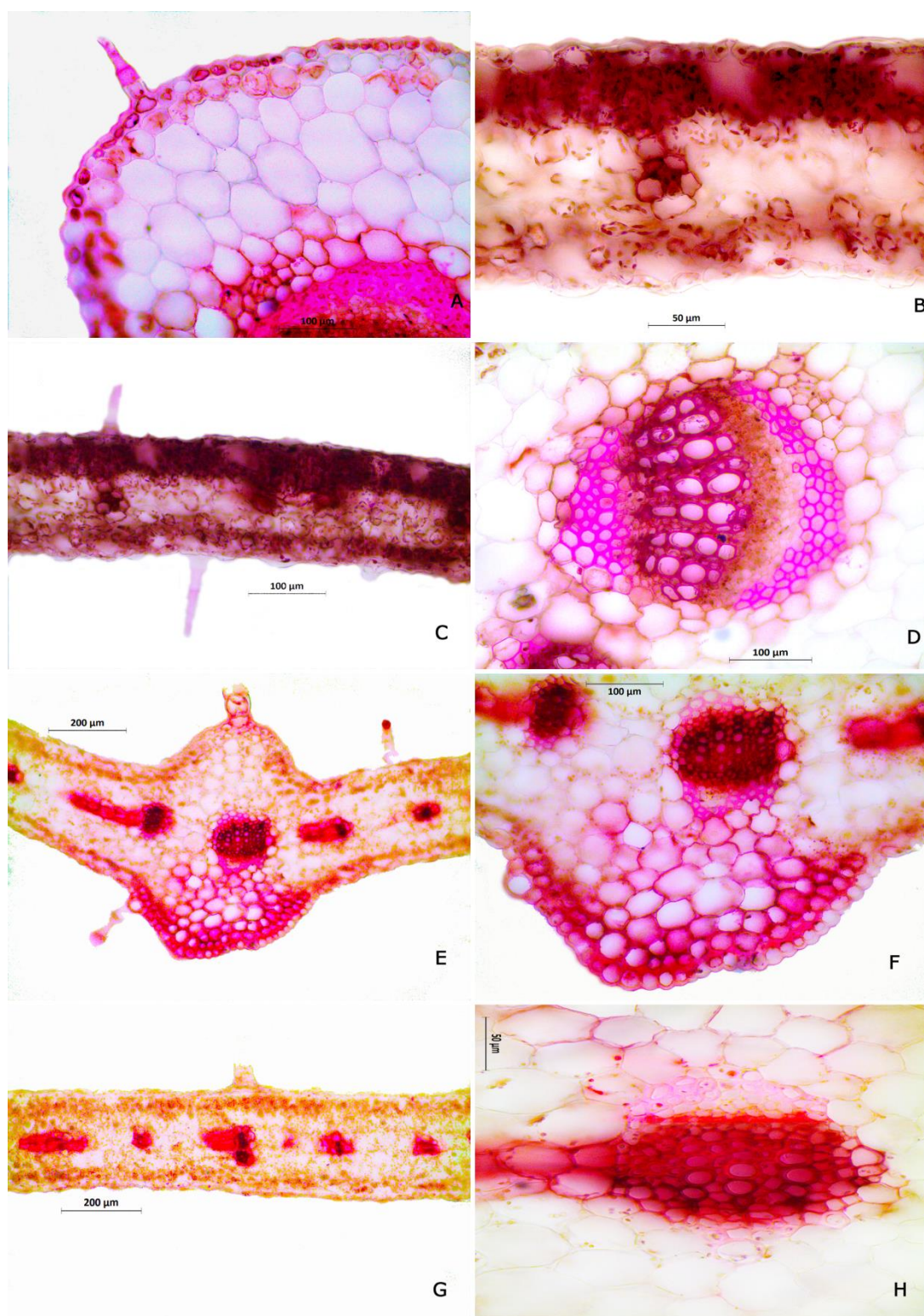


Fig. 83. Anatomical study of Leaf of *Blumea obliqua* (L.) Druce (A,B,C,D) and *Blumea obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra (E,F,G,H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

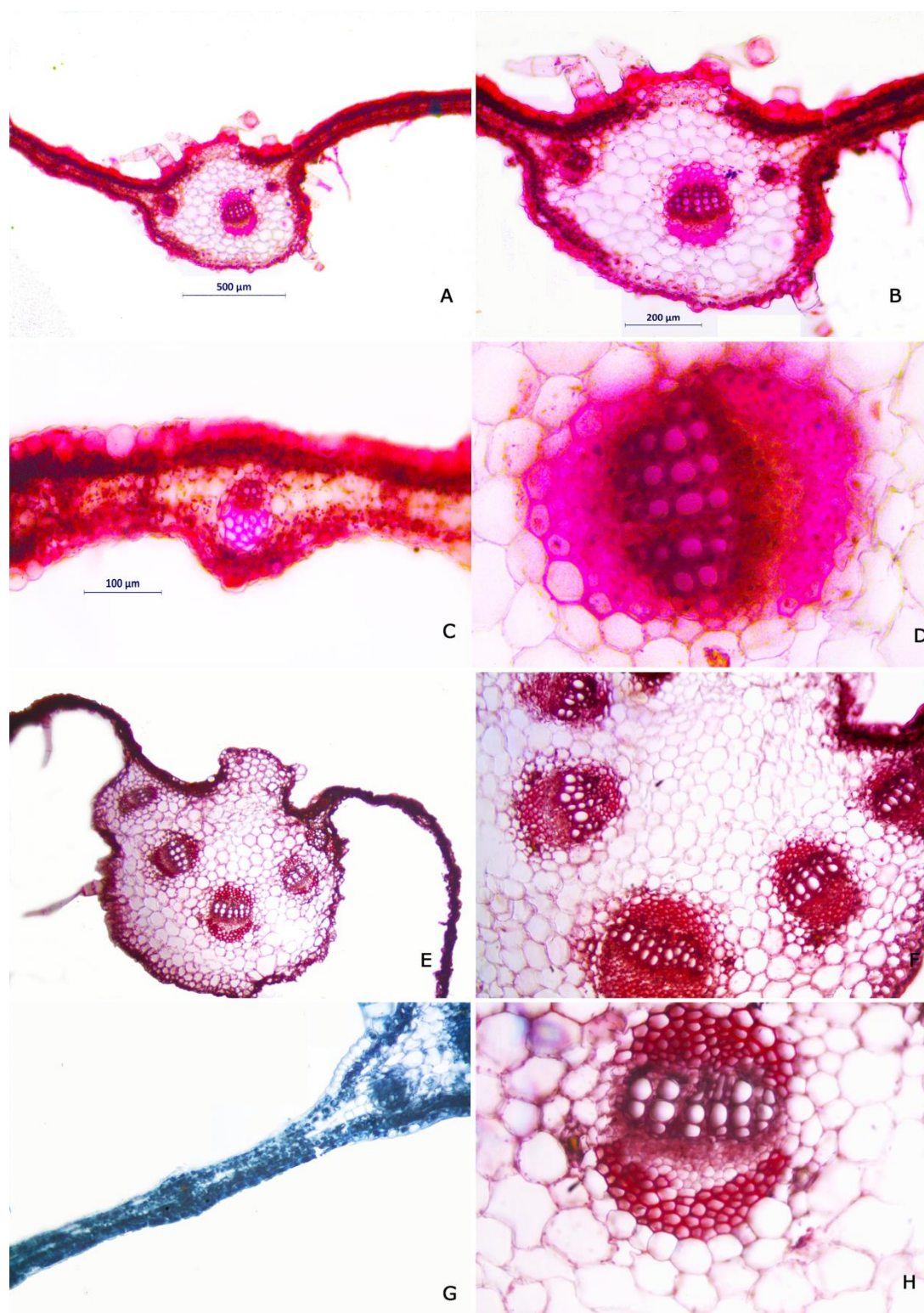


Fig. 84. Anatomical study of Leaf of *Blumea oxyodonta* DC. (A, B,C,D) and *Blumea sessiliflora* Decne. (E,F,G,H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

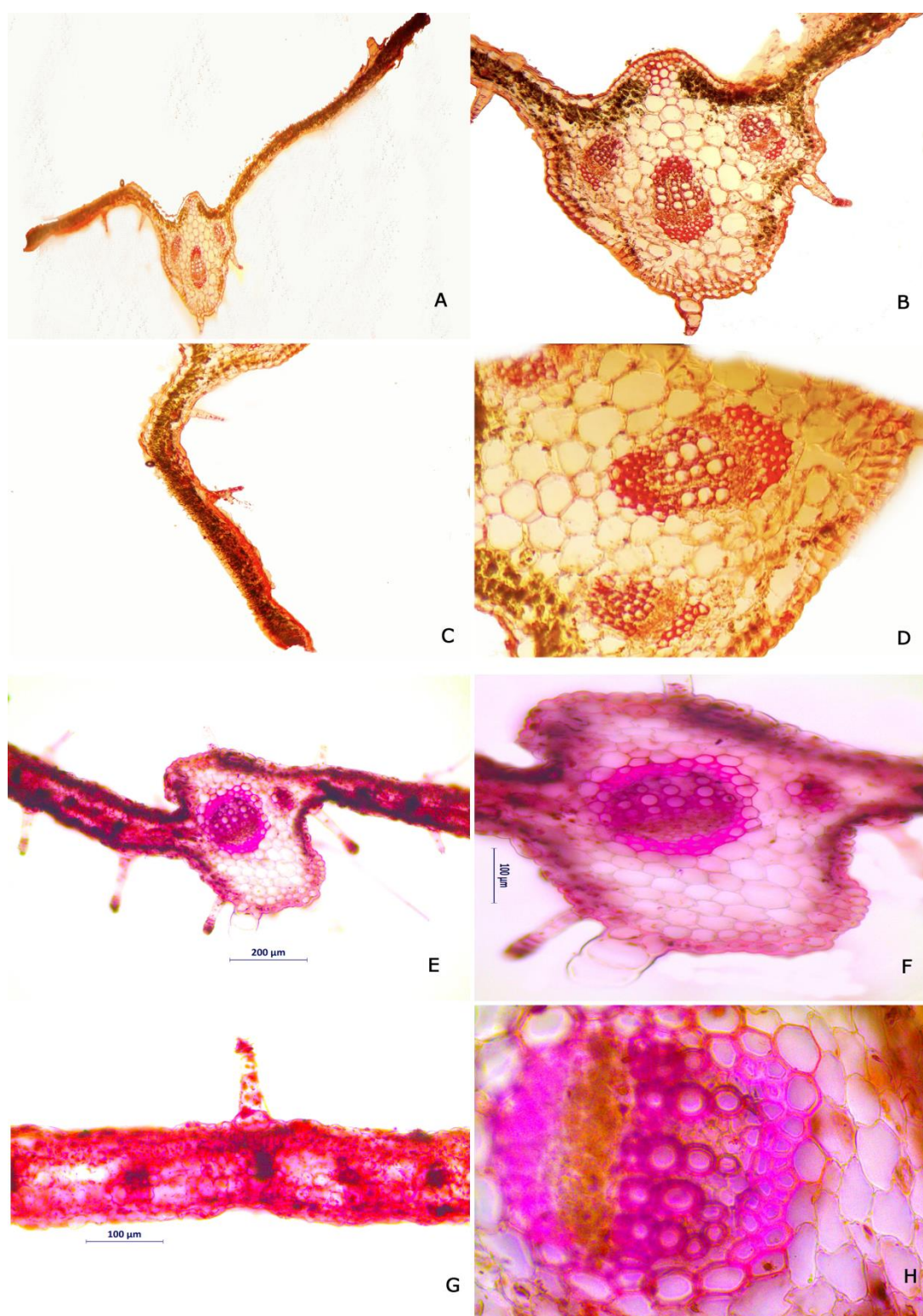


Fig. 85. Anatomical study of Leaf of *Blumea virens* DC. (A,B,C,D) and *Pseudoconyza viscosa* (Mill.) D'Arcy (E,F,G,H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

with short stalks and rarely large stalked type 2 glandular trichomes were observed in *L. crispata*. Mesophyll is composed of a compactly arranged single layer of palisade parenchyma and 4-5 layers of spongy parenchyma. *L. crispata* is amphistomatous; both surfaces have stomatal chambers. However, in *L. alata*, the stomatal chamber is present on the abaxial side only.

Midrib is elevated on both sides. Adaxial is slightly concave in *L. alata*, but instead it is flattened or slightly concave in *L. crispata*. 2-4 layers of angular collenchyma are located below both the epidermis in the midrib region. Compared to *L. alata*, collenchymatous cells are smaller in *L. crispata*. The amount of collenchyma in the adaxial epidermis is comparatively lower in *L. crispata* than in *L. alata*. Chlorophyllous parenchyma extends to both the upper and lower lateral sides. Three vascular bundles, with the central one larger or all the same size. There are no sclerenchymatous cells in the lower side of phloem or the upper side of xylem in *L. crispata*. But it is present in *L. alata*. Calcium oxalate crystals are present in some parenchyma cells in *L. crispata*; they are absent in *L. alata*. Schizogenous secretory canals are present in the parenchyma cells surrounding vascular bundles in *L. crispata*, but only 1 or 2 in *L. alata*.

Fig. 86

***Pseudoconyza* Leaf Anatomy**

The epidermis is uniseriate, with ovate to spherical, irregularly sized cells, and a thick cuticle. Both adaxial and abaxial epidermal cells are the same size. Both non-glandular and glandular trichomes were observed. Type 2 short-stalked capitate glandular hairs and long non-glandular hairs. Mesophyll is differentiated into palisade and spongy parenchyma. A single layer of palisade parenchyma and 3-4 layers of spongy parenchyma. Spongy parenchymatous cells are traversed by vascular strands. The stomatal chamber is observed on the abaxial side only.

Midrib is convexly protruding or with small ridges on both sides. 1-2 layers of collenchymatous tissue lie beneath both the epidermis. Vascular bundles 1-3, with sclerenchymatous cells present below the phloem and above the xylem, are of almost the same thickness. Large, isodiametric parenchymatous cells with intercellular spaces in the pith.

Fig. 85 (E,F,G,H).

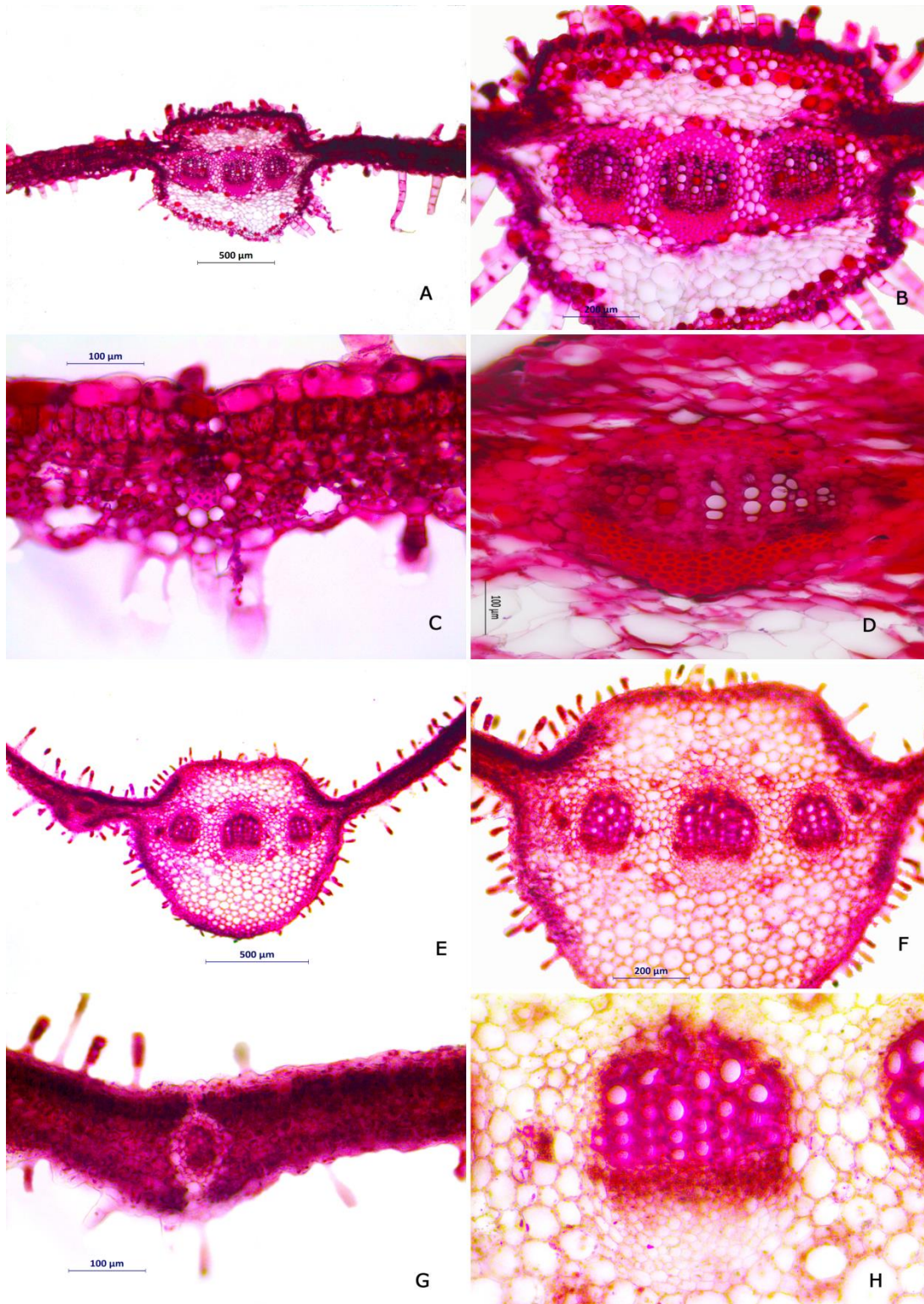


Fig. 86. Anatomical study of Leaf of *Laggera alata* (D. Don) Sch.-Bip. ex Oliver (A,B,C,D) and *Laggera crispata* (Vahl) Hepper & J.R.I. Wood (E,F,G,H). A & E: cross section of leaf showing midvein and lamina; B & F: midvein; C & G: lamina; D & H: Ground tissue.

Blumea Stem Anatomy

Stem with prominent ridges in *Blumea fistulosa*, *B. sessiliflora*, *B. barbata*, *B. paniculata* var. *paniculata*, *B. paniculata* var. *jacquemontii*, and *B. virens*. Slightly ridged in *B. hieraciifolia* var. *flexuosa*, *B. belangeriana*, *B. lanceolaria*, and *B. axillaris*. The stem is more or less round in other taxa. A single-layered epidermis with oval, oblong, or spherical cells is present on the surface of all investigated taxa. Linear oblong cells were observed in *B. lacera* var. *lacera*. Most of the studied taxa show small epidermal cells. But comparatively large cells were observed in *B. hirsuta*, *B. obliqua* var. *obliqua*, *B. obliqua* var. *arenaria*, *B. hieraciifolia* var. *flexuosa*, and *B. malcolmii*. Epidermal cells showed depositions in the majority of taxa studied. Epidermal cells are not uniformly sized in most of the taxa. Both large and small cells were present in the same epidermis. But it is almost uniform in *B. obliqua* var. *arenaria*, *B. obliqua* var. *obliqua*, *B. lacera* var. *lacera*, *B. hirsuta*, and *B. axillaris* epidermal cells. A thick cuticle is present.

Multicellular trichomes were identified in all the stems. We observed non-glandular and glandular trichomes in the studied *Blumea* taxon. Non-glandular trichomes are multicellular, uniseriate, and have variously sized trichomes. Only non-glandular trichomes were observed on *B. lanceolaria*, *B. hirsuta*, *B. belangeriana*, *B. bifoliata*, and *B. obliqua* var. *arenaria*. Glandular trichomes are of two types: capitate and peltate. Two types of capitate glandular hairs were observed. Type 1 has a cup-like head cell and a stalk of uniseriate or biseriate basal cells, whereas Type 2 has an oval or pear-like head cell and a short or long stalk. Peltate glandular trichomes with round head cells and a short stalk. Type 1 and 2 glandular and non-glandular hairs of different lengths were observed in *B. fistulosa*. Type 1 glandular hairs and long non-glandular hairs are found in *B. sessiliflora*, *B. sinuata*, *B. axillaris*, *B. barbata*, *B. paniculata*, *B. eriantha*, *B. malcolmii*, and *B. paniculata* var. *jacquemontii*. Non-glandular hairs of varying length and peltate glandular hairs in *B. lacera* var. *lacera*, *B. hieraciifolia* var. *flexuosa*, and *B. oxyodonta*. In *B. obliqua* var. *obliqua*, non-glandular hairs of varying length and type 2 glandular hairs were observed. No trichomes were observed in *B. virens*.

The cortex is differentiated into the hypodermis, middle cortex, and inner cortex. The hypodermis is made up of collenchyma cells with depositions. The middle cortex is made up of chlorenchyma cells, and the inner cortex is made up of parenchymatous cells. Depositions are present in the hypodermis of the stems. Cortex is 4-7 layered in *B. barbata*, *B. paniculata* var. *paniculata*, *B. virens*, *B. sessiliflora*, *B. axillaris*, *B. eriantha*, *B. lacera* var. *glandulosa*, *B. paniculata* var. *gardneri*, *B. paniculata* var. *jacquemontii*, *B. obliqua* var. *obliqua* and *B. obliqua* var. *arenaria*; 3-5 layered in *B. belangeriana* and *B. lacera* var. *lacera*; 4 or 5 in *B. malcolmii*, *B. virens* and *B. hirsuta*; 7-9 in *B. sinuata*, *B. oxyodonta* and *B. fistulosa*; 6-8 in *B. hieraciifolia* var. *flexuosa*; highest is observed in *B. lanceolaria* and *B. bifoliata* which is 12-14 and 10-12 respectively. The cortex is aerenchymatous in *B. obliqua* var. *arenaria*. In the cortex of *B. obliqua* var. *obliqua* and *B. bifoliata*, numerous air spaces were observed.

Numerous secretory canals were present in the parenchymatous inner cortex of most of the taxa studied. But it is absent in *B. axillaris*, *B. lacera* var. *lacera*, *B. bifoliata*, *B. eriantha*, *B. malcolmii*, and *B. lacera* var. *glandulosa*. Beneath the cortex, numerous vascular bundles are present. Xylem and phloem members are clearly visible. Phloem is made up of sieve cells, companion cells, fibres, and phloem parenchyma. Xylem is differentiated into metaxylem and protoxylem. Metaxylem is oriented towards the periphery, and protoxylem vessels are oriented towards the pith, making the xylem endarch. Medullary rays are composed of 3-4 vertically arranged cells. Sclerenchymatous cells are seen just above the phloem.

Pith is made up of large, spherical, thin-walled parenchymatous cells with intercellular spaces. The cells just below the vascular bundles are small, thick-walled parenchymatous cells. Calcium oxalate crystals were observed in the parenchymatous pith cells of *B. hieraciifolia* var. *flexuosa*, *B. lanceolaria*, *B. malcolmii*, *B. paniculata* var. *jacquemontii*, *B. axillaris*, and *B. oxyodonta*. In most of the studied taxa, the pith cells are spheroidal with intercellular spaces, but in *B. hirsuta*, *B. hieraciifolia* var. *flexuosa*, *B. paniculata* var. *gardneri*, *B. paniculata* var. *jacquemontii*, and *B. virens*, the cells are isodiametric.

Lipid droplets were observed in some cortical chlorophyllous parenchyma or parenchyma in ground tissue in *B. bifoliata*, *B. obliqua* var. *arenaria*, *B. axillaris*, *B. oxyodonta*, *B. lanceolaria*, and *B. lacera* var. *glandulosa*. **Figs. 87-97 (A,B,C,D)**

***Laggera* Stem Anatomy**

The stems of *Laggera* are more or less round in transverse section. The epidermis consists of single-layered, flattened cells surrounded by a more or less thick cuticle. The epidermal cells are somewhat wavy in outline in *L. alata*, but they are rounded in *L. crispata*. Rounded or ovate epidermal cells are found in *L. alata* and small, linear ovate cells in *L. crispata*. Epidermal cells are uniformly sized in *L. crispata*, but they are irregular with small and large cells in *L. alata*. All epidermal cells have depositions in *L. crispata*, but only some cells show depositions in *L. alata*.

Epidermis with numerous trichomes. In *L. alata*, both glandular and non-glandular trichomes are present, but in *L. crispata*, there are only glandular trichomes. Curly multicellular non-glandular trichomes and short-stalked multicellular multiseriate peltate glandular trichomes in *L. alata*. Type 2 capitate glandular trichome with short uniseriate stalk and multicellular oval or pear-shaped head cell in *L. alata*. Non-glandular trichomes were absent in *L. alata*.

Cortex is 9-11 layered with collenchyma, chlorenchyma, and parenchyma. The cortex is bound internally by the endodermis. Parenchymatous cells in the inner cortex of *L. crispata* are comparatively larger than those in *L. alata*. Vascular bundles are collateral and numerous, arranged in a circle, and separated from one another by parenchymatous tissue. Large sclerenchymatous bundle caps are present in both. Schizogenous secretory canals are present near the phloem of *L. crispata* but absent in *L. alata*. Parenchymatous pith cells are different sizes and circular with numerous intercellular spaces in *L. alata*, but in *L. crispata* they are isodiametric with intercellular spaces.

Fig. 98

***Pseudoconyza viscosa* Stem Anatomy**

The stem is almost circular in cross-section. The epidermis is single-layered with ovate or oblong cells with a thick cuticle. Both glandular and non-glandular hairs are present. Type 2 capitate glandular hair with a short stalk and oval-shaped

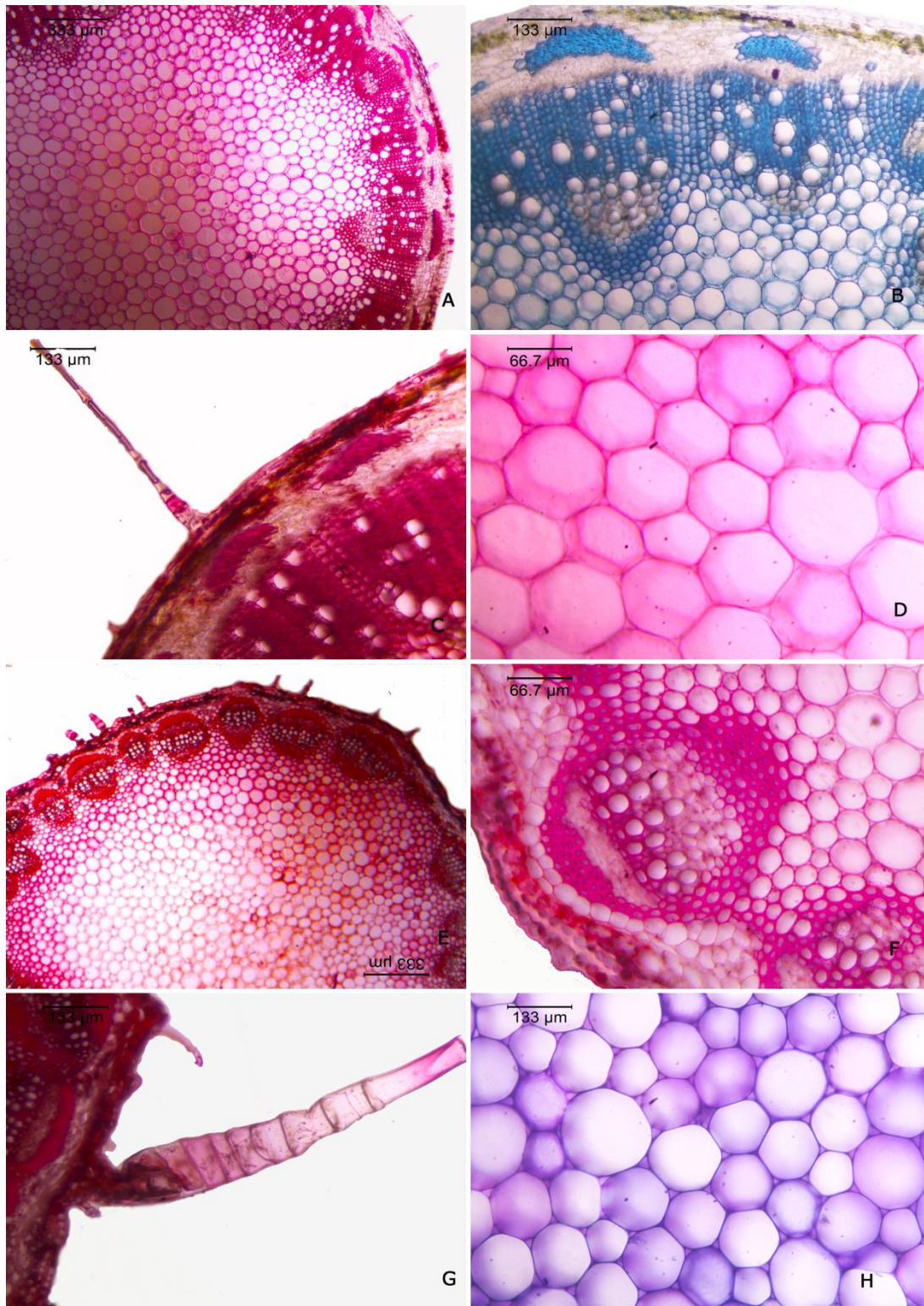


Fig. 87. Anatomical study of Stem of *Blumea axillaris* (Lam.) DC. (A,B,C,D) and *Blumea barbata* DC. (E, F,G, H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

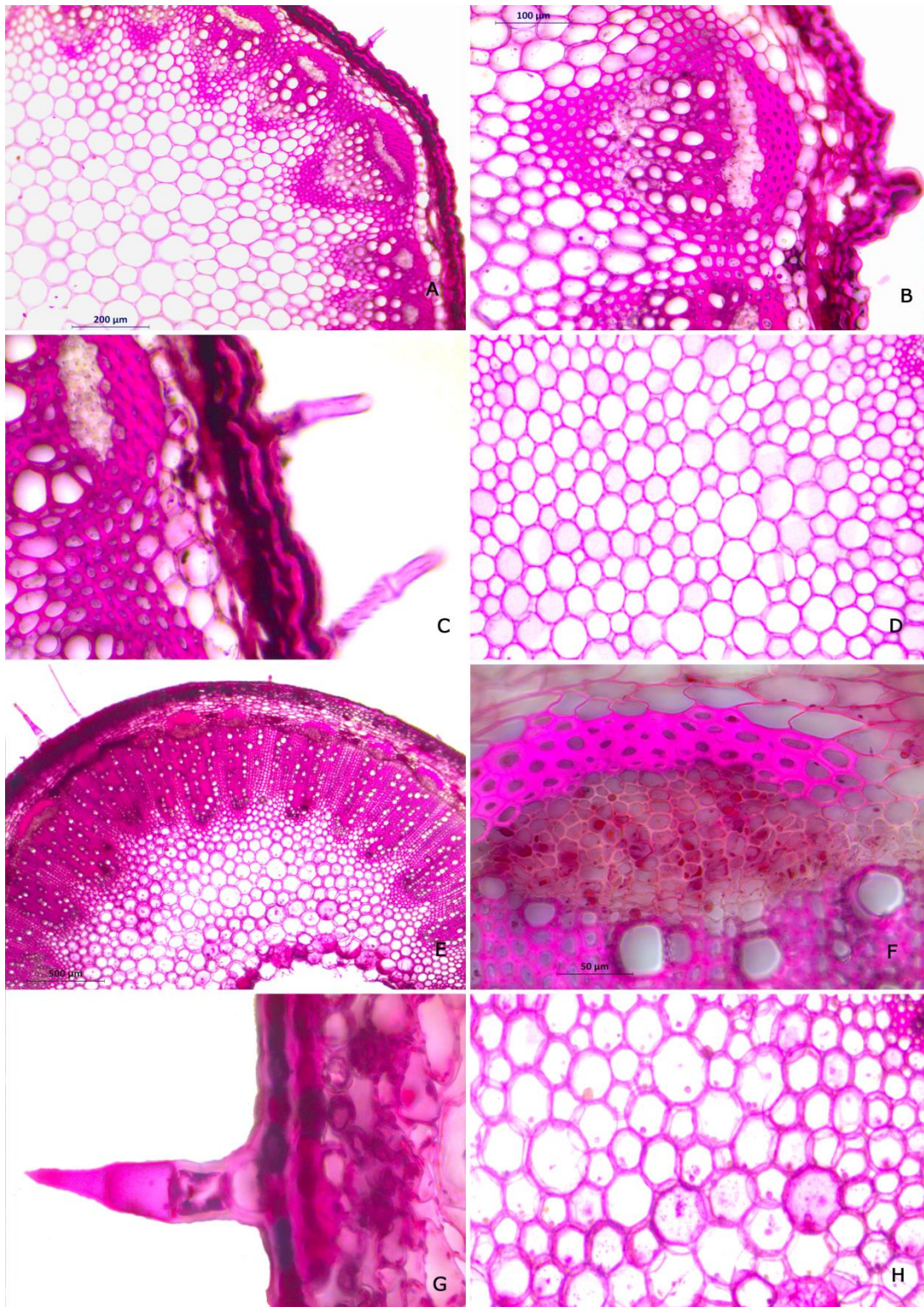


Fig. 88. Anatomical study of Stem of *Blumea belangeriana* DC. (A,B,C,D) and *Blumea bifoliata* (L) DC.(E, F,G, H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

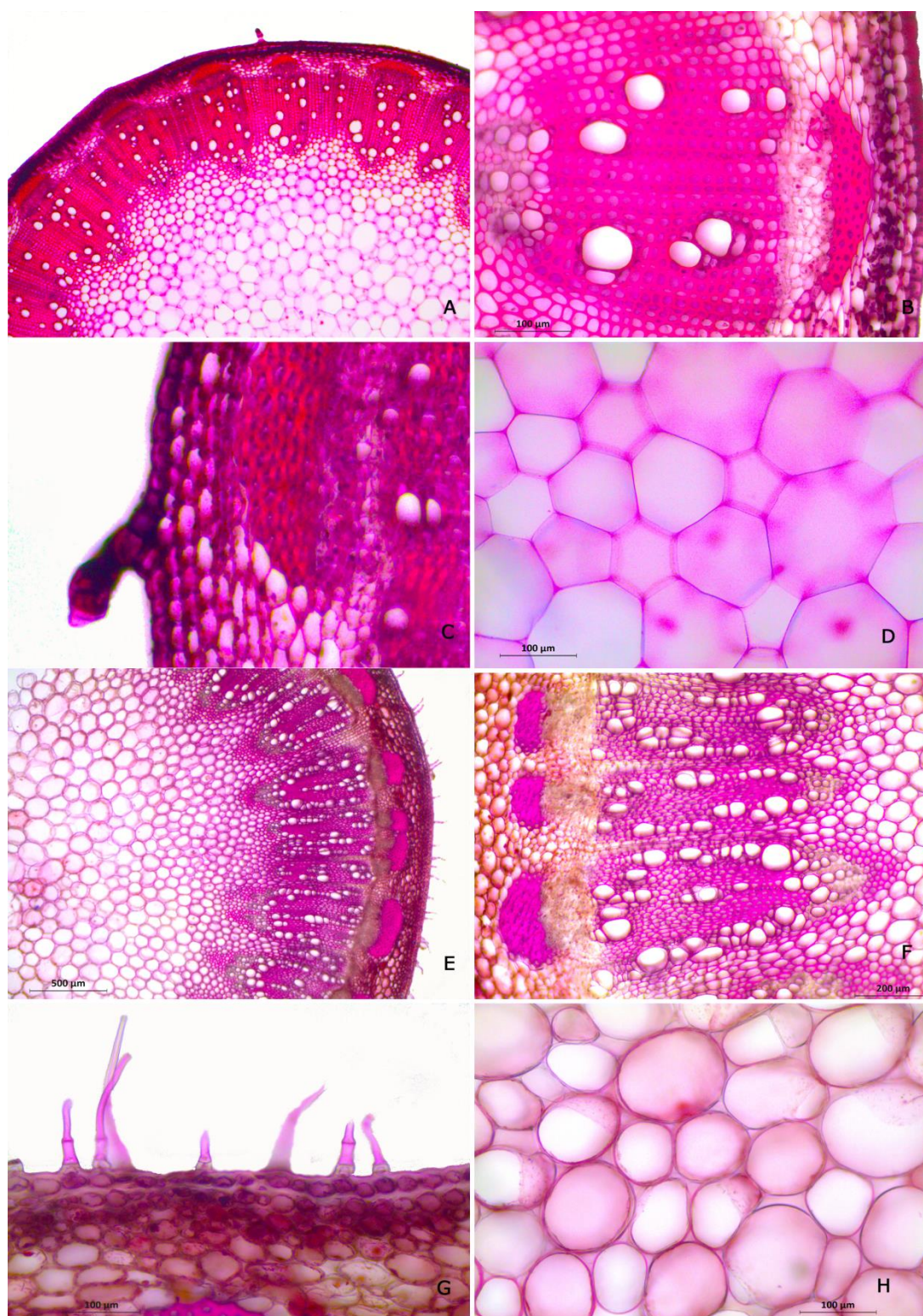


Fig. 89. Anatomical study of Stem of *Blumea hirsuta* (Less.) M. R. Almeida (A,B,C,D) and *Blumea eriantha* DC. (E, F,G, H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

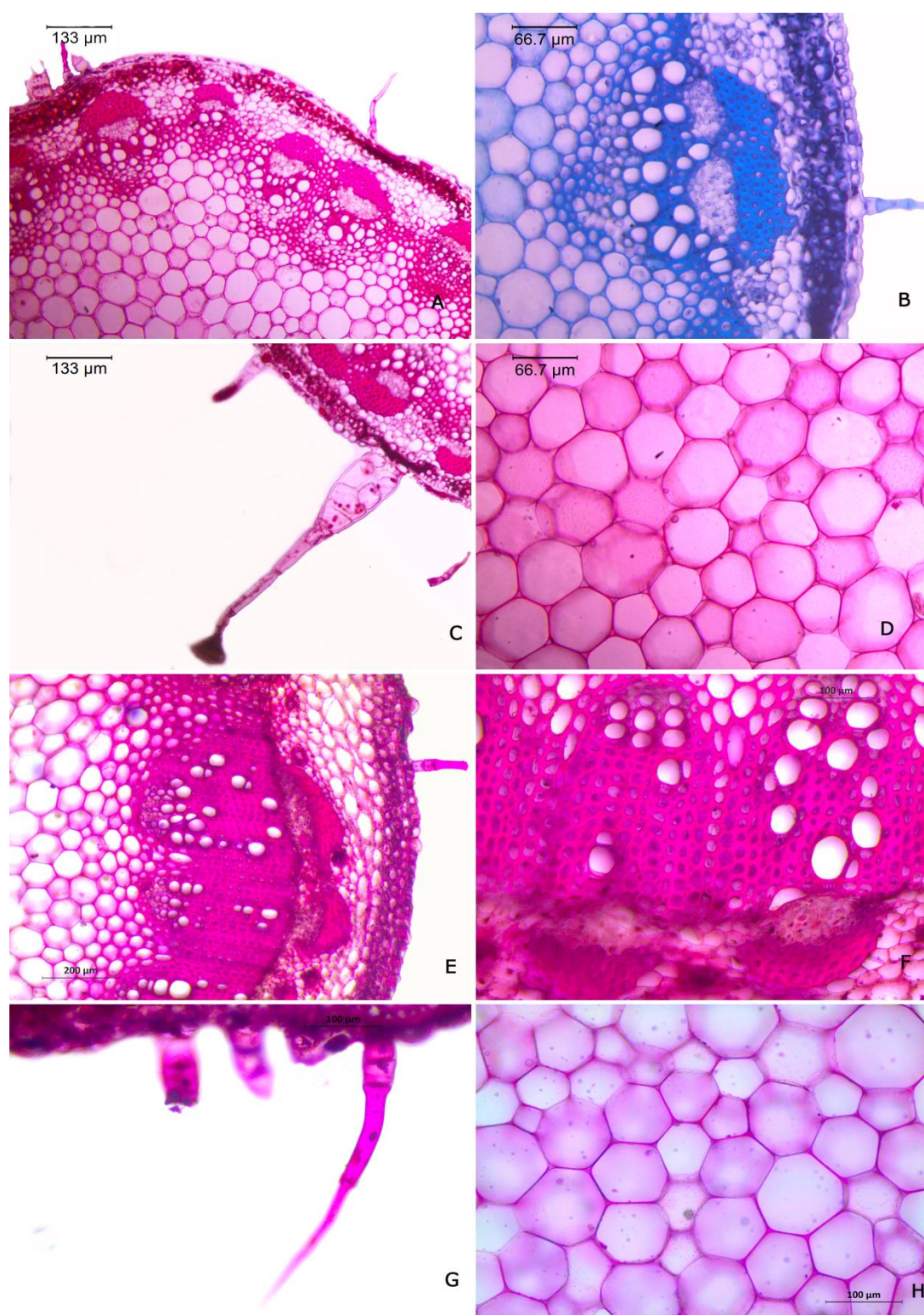


Fig. 90. Anatomical study of Stem of *Blumea fistulosa* Kurz. (A,B,C,D) and *Blumea hieraciifolia* var. *flexuosa* (C.B.Clarke) Randeria (E, F,G, H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

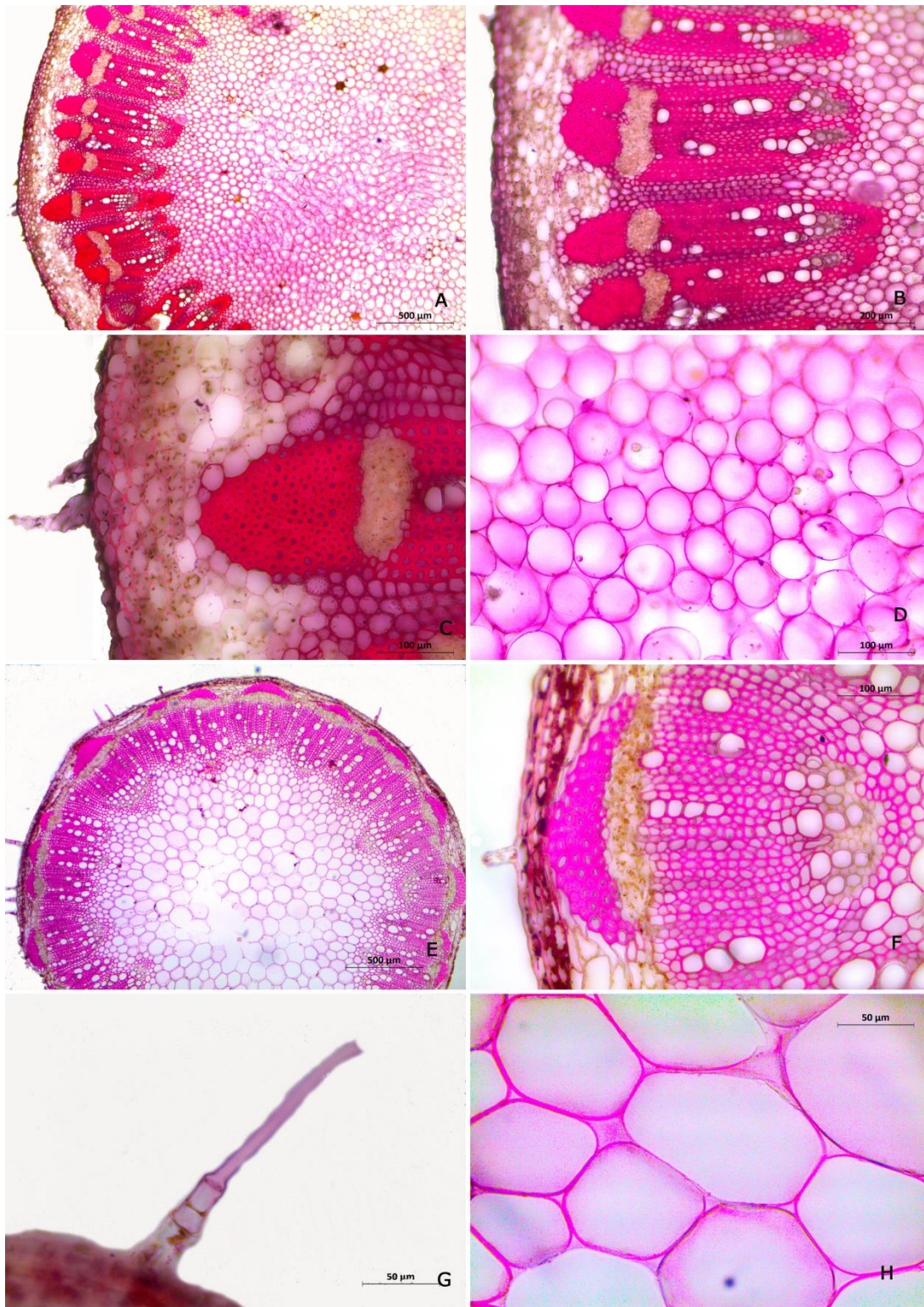


Fig. 91. Anatomical study of Stem of *Blumea lanceolaria* (Roxb.) Druce (A,B,C,D) and *Blumea lacera* (Burm. f.) DC. (E,F,G,H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

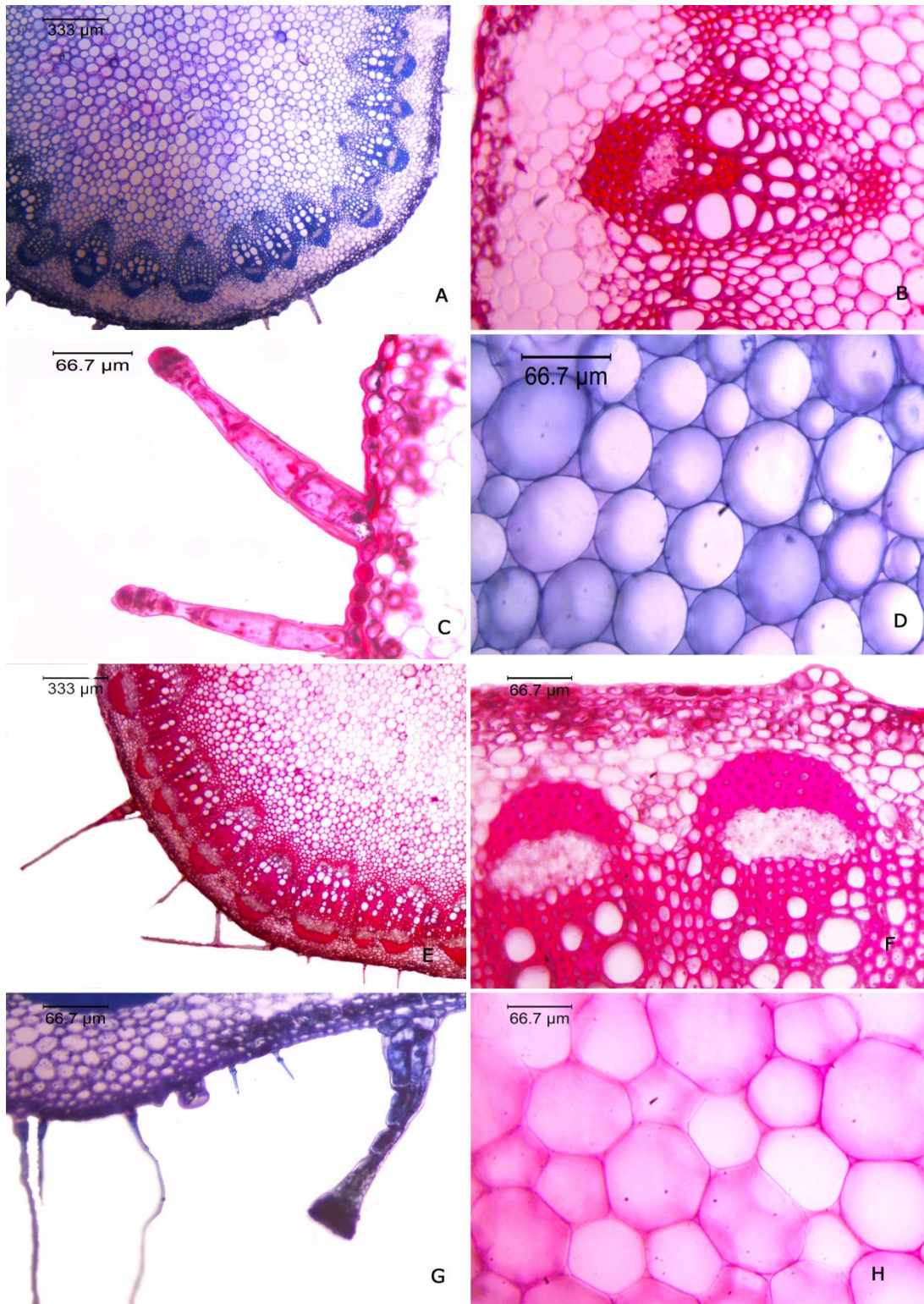


Fig. 92. Anatomical study of Stem of *Blumea lacera* var. *glandulosa* Hook.f. (A,B,C,D) and *Blumea sinuata* (Lour.) Merr.(E,F,G,H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

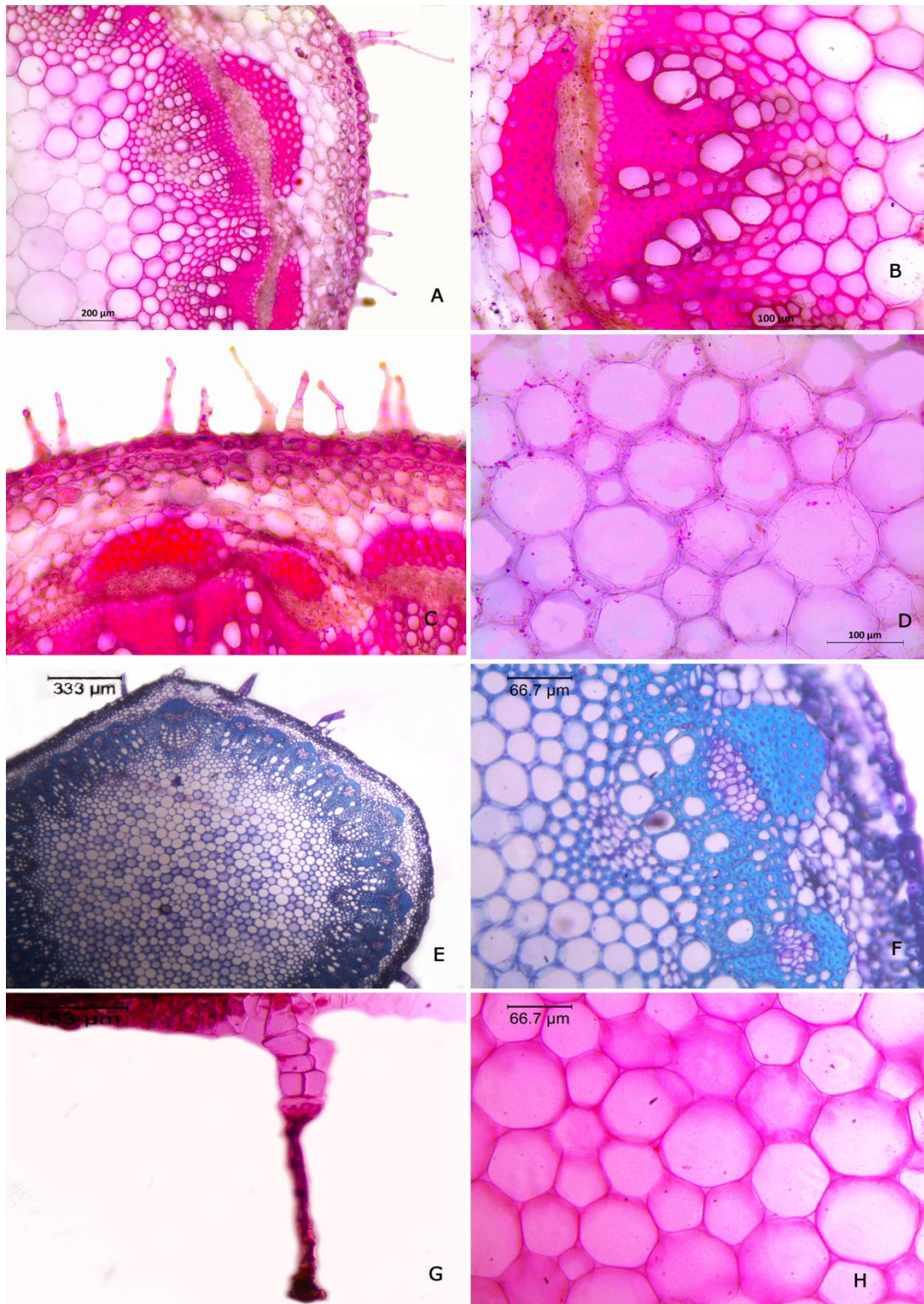


Fig. 93. Anatomical study of Stem of *Blumea malcolmii* (Clarke) Hook. f. (A,B,C,D) and *Blumea paniculata* (Willd.) M. R. Almeida (E,F,G,H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

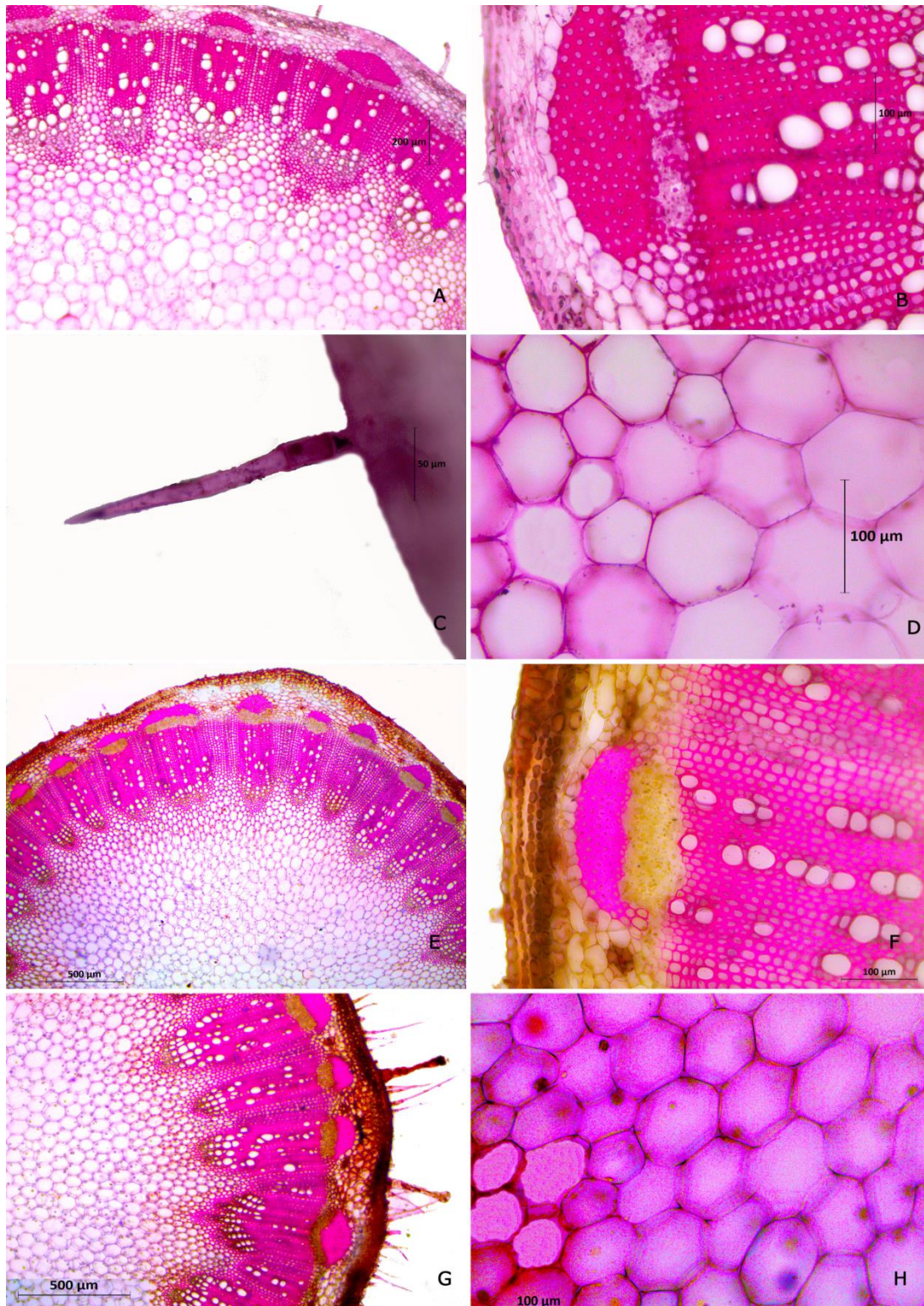


Fig. 94. Anatomical study of Stem of *Blumea paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George (A,B,C,D) and *Blumea paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida (E,F,G,H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

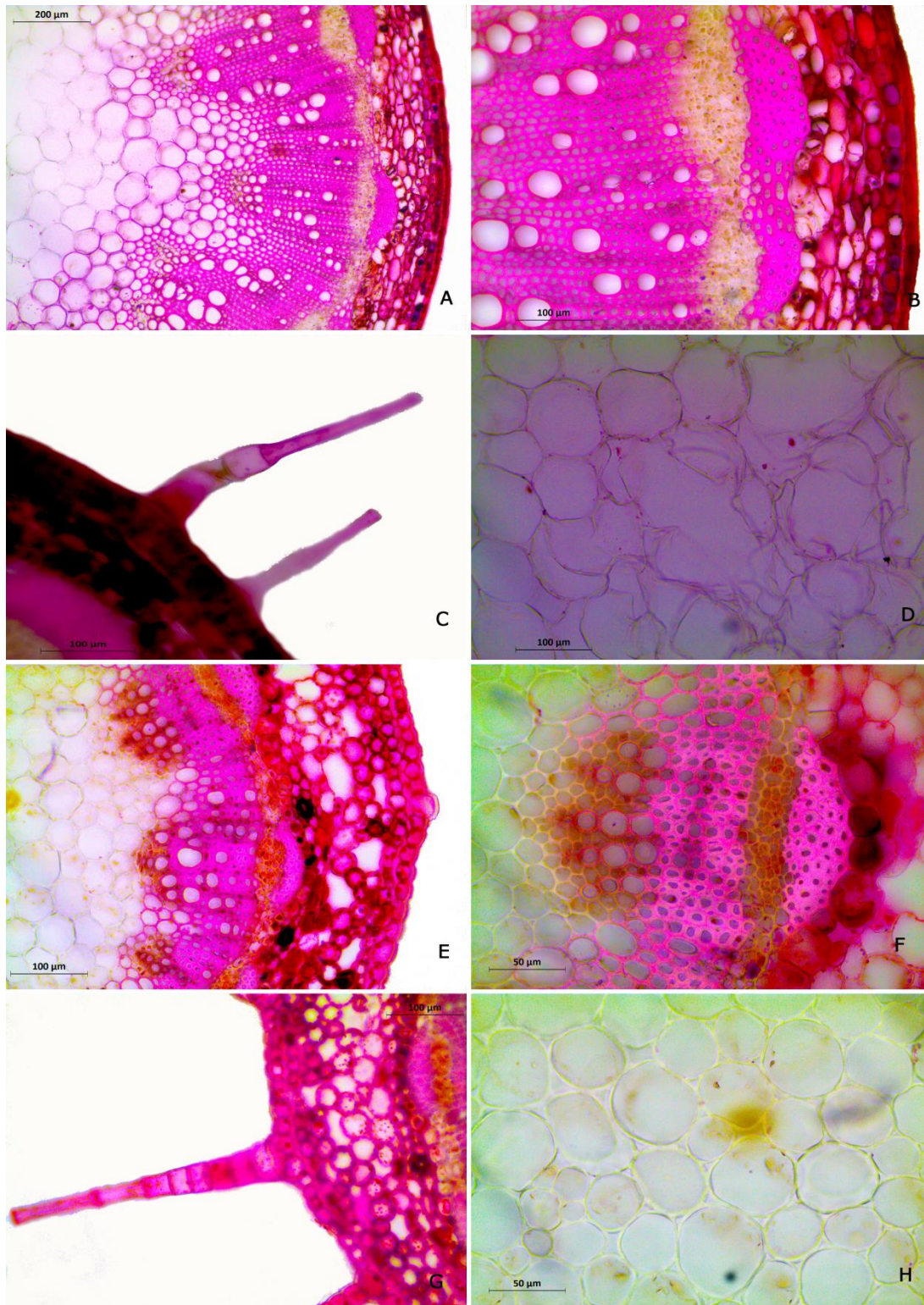


Fig. 95. Anatomical study of Stem of *Blumea obliqua* (L.) Druce (A,B,C,D) and *Blumea obliqua* var. *arenaria* (DC.) G.S. Giri & B. Mitra (E,F,G,H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

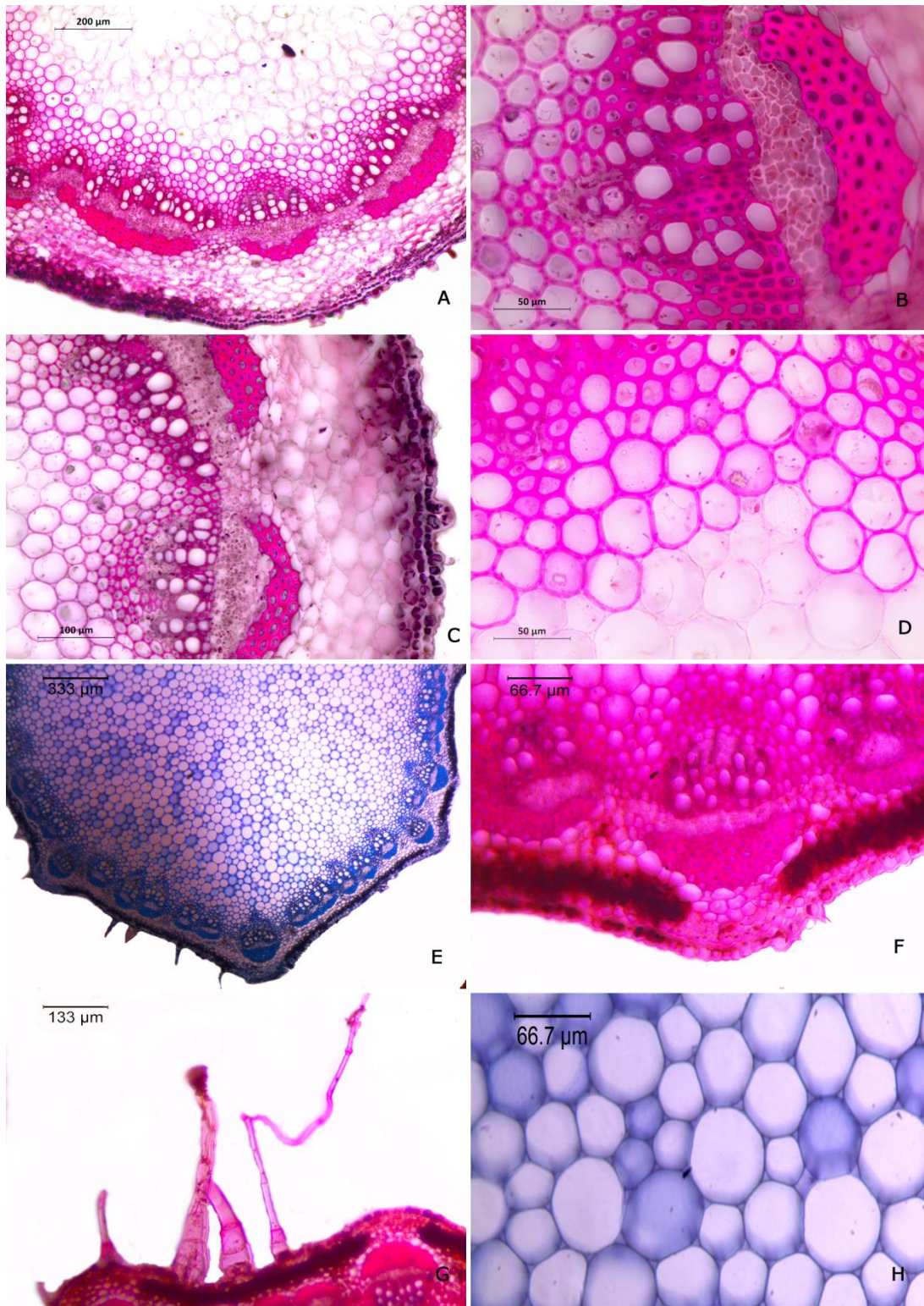


Fig. 96. Anatomical study of Stem of *Blumea oxyodonta* DC. (A,B,C,D) and *Blumea sessiliflora* Decne. (E,F,G,H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

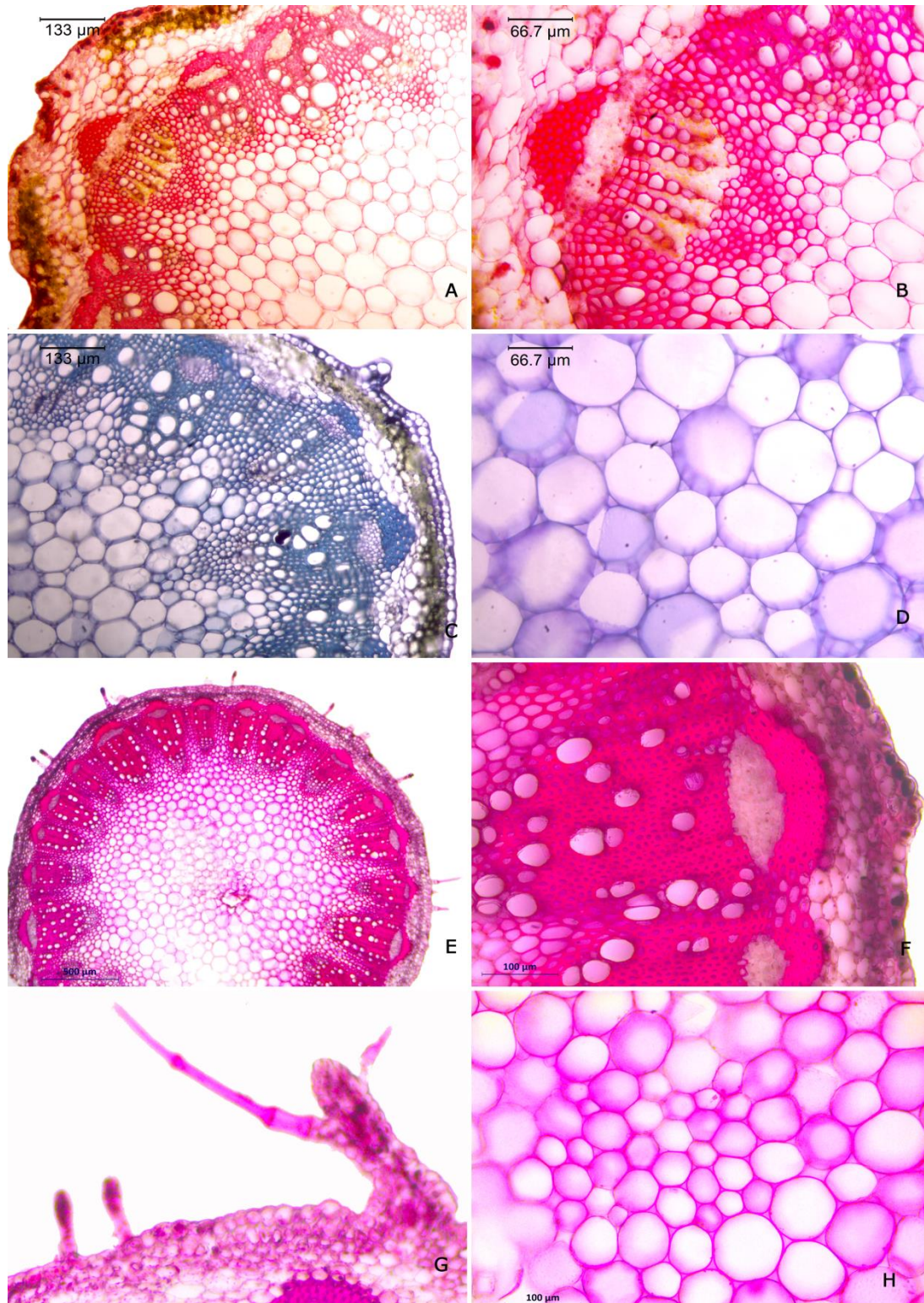


Fig. 97. Anatomical study of Stem of *Blumea virens* DC. (A,B,C,D) and *Pseudoconyza viscosa* (Mill.) D'Arcy (E,F,G,H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

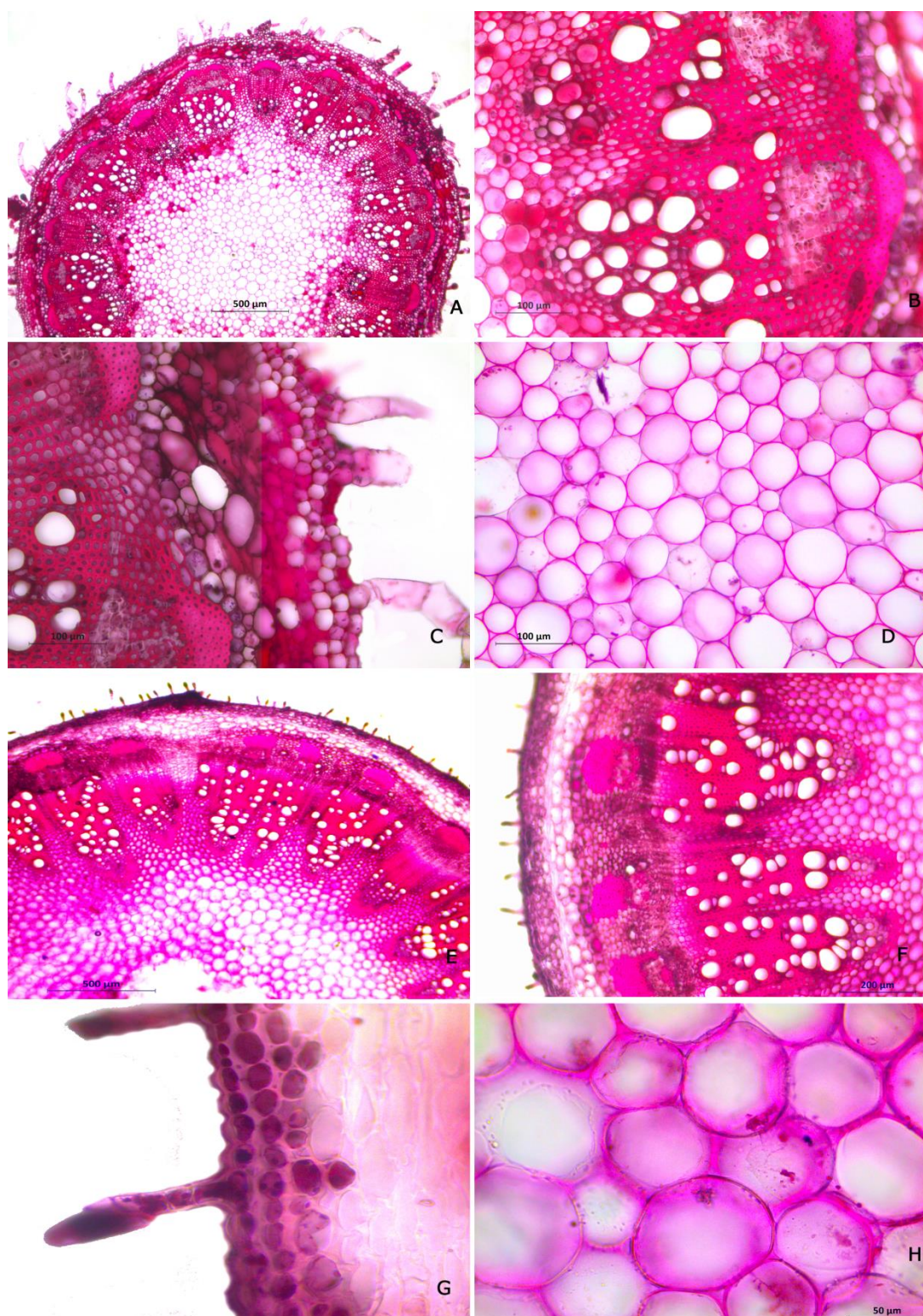


Fig. 98. Anatomical study of Stem of *Laggera alata* (D. Don) Sch.-Bip. ex Oliver (A,B,C,D) and *Laggera crispata* (Vahl) Hepper & J.R.I. Wood (E,F,G,H). A & E: cross section of stem showing epidermis, cortex, vascular bundle & pith; B & F: Vascular bundle enlarged; C & G: trichomes; D & H: Pith.

head cell. One wing-like extension with non-glandular hairs was also observed. Cortex is 5-8 layered and consists of 1-3 layered collenchyma, followed by chlorenchyma. No secretory canals were observed. Endodermis is distinct. Numerous vascular bundles are present. A distinct sclerenchymatous cap is present above each vascular bundle. Xylem and phloem members are clearly visible. Phloem is narrow. Xylem is differentiated into metaxylem and protoxylem. Metaxylem is oriented towards the periphery, and protoxylem vessels are oriented towards the pith, making the xylem endarch. Medullary rays are composed of 3–4 vertically arranged cells. Pith is parenchymatous, with spherical, variously sized cells with large intercellular spaces.

Fig. 97 (E,F,G,H)

Discussion

The basic anatomical traits of the Asteraceae family were described by Metcalfe and Chalk (1979). The distribution and morphology of secretory structures have always been used as an identifying character for delimiting different taxa in the family Asteraceae (Solereeder, 1908; Metcalfe & Chalk, 1979; Castro *et al.*, 1997). Zamora and Madrid (1987) reported secretory structures in young and mature stems of *B. balsamifera*. Secretory structures were observed in the cortex of the majority of *Blumea* taxa studied. It's also found in the *L. alata* stem. Secretory canals are also being reported in the leaf mesophyll of Asteraceae (Hoffmann *et al.*, 1984; Ponce, 1986). The presence or absence of secretory canals in stem and leaf can be used to distinguish taxa in the three genera studied.

Characteristics of indumentum (occurrence, shape, density, and distribution of glandular and non-glandular trichomes) are regarded as important traits in taxonomy (Hayat *et al.*, 2009). Previous workers have found trichome studies to be very valuable at the specific level (Faust & Jones, 1973; Adedeji, 2004; Adedeji *et al.*, 2007). In many cases, species, genera, or even entire families can be distinguished by the existence of a specific type of trichome (Metcalfe & Chalk, 1979). On the same plant, different kinds of trichomes can be found in the family Asteraceae (Funk *et al.*, 2009).

Amazingly complicated trichome distributions can be found in *Blumea*, *Laggera*, and *Pseudoconyza*. The variety of trichome types and variations in trichome density account for the complexity. Both long and short multicellular uniseriate non-glandular trichomes were found in the different taxa studied. In addition to secretory ducts inside the organs, Asteraceae plants also have glandular trichomes at the organ surfaces as another secreting system (Bartoli *et al.*, 2011). We observed different kinds of glandular trichomes, such as capitate and peltate glandular trichomes. Capitate glandular trichomes are again of two types. They are capitate glandular hair with a long stalk and cup-shaped head cell and oval or pear-shaped head cell with a short stalk. Only non-glandular trichomes can be found in some taxa, or some have all these trichome types.

Calcium oxalate crystals in Asteraceae have been described in several works (Dormer, 1961; Horner, 1977; Meric & Dane, 2004; Meric, 2008). In this study, we observed calcium oxalate crystals in the form of druses in the parenchymatous pith cells of *B. hieraciifolia* var. *flexuosa*, *B. lanceolaria*, *B. malcolmii*, *B. paniculata* var. *jacquemontii*, *B. axillaris*, and *B. oxyodonta*.

Adedeji and Jewoola (2008) well documented the leaf epidermal characters of Asteraceae. The shape of leaf epidermal surfaces, both laminar surfaces and trichome diversity, were utilised by Randeria (1960) for the taxonomic revision of *Blumea*. In our observations, we found that the upper epidermal cells of the leaf blade are larger than the lower epidermis in the majority of the taxa studied. Whereas in *B. bifoliata*, *B. obliqua* var. *obliqua*, *B. obliqua* var. *arenaria*, *B. eriantha*, *B. virens*, *B. barbata*, and *B. sinuata*, both epidermis are of the same size.

In the opinion of Carlquist (1961), leaf anatomy offers a number of characteristics that could be used for taxonomic reasons. The number of palisade parenchyma layers, size of epidermal cells, shape of the midrib, vascular bundles, secretory canals, and trichomes are the most important characters noted in the leaf anatomical studies in this study. Trichome diversity is not in accordance with stem anatomical studies. Peltate glandular trichomes are observed in some of the taxa studied. But its occurrence in stems is relatively low compared to leaves.

Some members of Asteraceae could be categorized using variations in midrib morphology (Noorbakhsh *et al.*, 2008). We observed significant differences in the shape of the leaf midrib, especially on the adaxial side. This character can be used to delimit different taxa. According to Ekeke and Mensah (2015), there are differences between species or genera in terms of the number of abaxial and adaxial parenchymatous cells, the shape of the midrib, and the number and layout of the vascular bundle. They also pointed out that for delimiting the family, these characters are useful. The studied taxa can be grouped based on differences in the number of vascular bundles.

Our study found that *Blumea* and *Laggera* can be delimited by the trichome characters. The non-glandular trichomes of *Laggera* are comparatively broader than the ones present in *Blumea*, and all cells have some kind of deposition in *Laggera*. *L. alata* and *L. crispata* are also distinguished by trichome types and the presence or absence of secretory canals. *Pseudoconyza* is distinguished from others by the wing-like extensions present in the stem. In the present study, it was noticed that some anatomical characters can be used for species delimitation in the three genera studied. Trichome characters, the presence of secretory canals, the shape of the leaf midrib, the number of vascular bundles in the leaf midrib, leaf epidermal characters, etc. can serve as useful characters for separating different taxa in *Blumea*, *Laggera*, and *Pseudoconyza*.

SUMMARY AND CONCLUSION

The current study has achieved every objective mentioned in the synopsis. 24 taxa in the genus *Blumea*, 2 taxa in *Laggera*, and the monotypic genus *Pseudoconyza* of Peninsular India were studied. Detailed descriptions, phenology, details of habitat, photoplates, distribution and relevant citations of each taxon are provided. The updated nomenclature has been given for each taxon. For simple identification, a taxonomy key is included. Specific comments on each taxon are given as a note under description.

Field Exploration

Different areas of Peninsular India were explored during the period of work. The states of Andhra Pradesh, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Tamil Nadu and Telangana were explored during the flowering time of the studied genera. The field trips were conducted for collecting live specimens. The type locations of respective taxa were visited during the period of study. The distribution of each taxa was recorded. For studying variations, different populations of each taxa were collected from different localities. The relevant information including phenology were recorded in the field book from field itself. The cypselas were stored in zip lock bags in the field itself.

Dry & Wet Preservation

The specimens collected were stored in both dry and wet conditions. Herbarium sheets are used for dry preservation whereas FAA and formalin are used for wet preservation. Herbarium sheets were prepared using conventional methods. Herbarium prepared during the study were deposited in herbarium of St. Joseph's College, Devagiri (DEV).

Systematic treatment

All the collected taxa were analyzed and described by consulting with available types, protologues, and other genuine collections. Detailed descriptions

and photo plates are provided for each taxon. In consultation with types, protologue, and latest literature and discussions with experts, the nomenclature of each species is updated. Type specimens from K, P, G, BM, GH, NY, FI, E, U, B, LINN, L, M, TUB and C have been consulted. The herbariums MH, CALI, KFRI, TBGT, BSI, BSID, BLAT, AHMA, CAL, DEV, and RHT were consulted.

New Status

1. *Blumea solidaginoides* DC., *Syn. Nov.* (= *Blumea axillaris* (Lam.) DC.)
2. *Blumea mollis* (D. Don) Merr., *Syn. Nov.* (= *Blumea axillaris* (Lam.) DC.)
3. *Blumea obliqua* var. *maritima* (C.B. Clarke ex Hook.f.) G.S. Giri & B. Mitra, *Syn. Nov.* (= *Blumea obliqua* (L.) Druce)
4. *Blumea obliqua* var. *tenella* (Clarke) Mahesh., *Syn. Nov.* (= *Blumea obliqua* (L.) Druce)
5. *Pluchea paniculata* (Willd.) Karthik. & Moorthy, *Syn. Nov.* (= *Blumea paniculata* (Willd.) M. R. Almeida)
6. *Blumea paniculata* var. *gracilis* (Hook.f.) M. R. Almeida, *Syn. Nov.* (= *Blumea paniculata* (Willd.) M. R. Almeida)
7. *Blumea paniculata* var. *muralis* (DC.) M.R. Almeida, *Syn. nov.* (*Blumea paniculata* var. *jacquemontii* (Hook.f.) M.R. Almeida)
8. *Blumea paniculata* var. *gardneri* (Hook.f) Dilsha M.V. & Satheesh George, *comb.nov.* (*Blumea membranacea* var. *gardneri* Hook. f.)

Typification

Lectotypes were designated for the following names:

1. *Blumea glomerata* DC.
2. *B. pterodonta* DC.
3. *B. hamiltonii* DC.

4. *Blumea arenaria* DC.
5. *Blumea virens* DC.
6. *B. solidaginoides* (Poir.) DC.
7. *B. floresiana* (Sch.Bip. ex Miq.) Boerlage
8. *B. dregeanoides* Sch.Bip. ex A.Rich.

Anatomical Study

Anatomical study of the leaf and stem of the three genera is attempted. In the present study, it was noticed that some anatomical characters can be used for species delimitation in the three genera studied. Trichome characters, the presence of secretory canals, the shape of the leaf midrib, the number of vascular bundles in the leaf midrib, leaf epidermal characters, etc. can serve as useful characters for separating different taxa in *Blumea*, *Laggera*, and *Pseudoconyza*.

RECOMMENDATIONS

In this study, the taxonomic studies of three genera, viz., *Blumea*, *Laggera*, and *Pseudoconyza*, were attempted. The plants were correctly identified with detailed descriptions, updated nomenclature, habitat details, photo plates, and distributions. A taxonomic key is provided for simple identification. In addition, leaf and stem anatomical studies of these three genera were also attempted. The trichome characters, the presence of secretory canals, the shape of the leaf midrib, the number of vascular bundles in the leaf midrib, and leaf epidermal characters were found useful in delimiting the different taxa. Based on the results of this study, the following recommendations were proposed for future studies:

1. The revisionary study of the genera *Blumea*, *Laggera*, and *Pseudoconyza* will add to the plant diversity documentation of India, and the correctly identified plant materials will open up new avenues for research in the fields of ethnobotany, phytochemistry and pharmacology.
2. As this study is based on Peninsular Indian specimens, the study of the entire Indian *Blumea*, *Laggera*, and *Pseudoconyza* would be helpful for these three genera, especially in variability studies.
3. A molecular phylogenetic study of *Blumea*, *Laggera*, and *Pseudoconyza* would greatly support the result of this study, as such a study in India has not been undertaken till date.
4. In Asteraceae, the cypselae anatomical characteristics have been employed to resolve taxonomic issues. Studying the anatomical features of cypselae of *Blumea*, *Laggera*, and *Pseudoconyza* might provide additional evidence to solve the taxonomic problems.

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APPENDIX 1

HERBARIUM ACRONYMS USED

AHMA: Agharkar Research Institute, Pune, Maharashtra, India.

B: ZE Botanischer Garten und Botanisches Museum, Freie Universität Berlin, Germany. Berlin.

BARO: Maharaja Sayajirao University of Baroda, India, Gujarat, Baroda

BM: The Natural History Museum, U.K. England. London

BSI- Botanical Survey of India, Western Circle, Pune, Maharashtra

BSID- Botanical Survey of India, Deccan Regional Centre, Hyderabad, Andhra Pradesh

C: University of Copenhagen, Denmark. Copenhagen.

CAL: Central National Herbarium, Botanical Survey of India, Howrah, West Bengal, India

CALI: University of Calicut, India, Kerala, Malappuram

DEV: St. Joseph's College, India, Kerala, Devagiri

E: Royal Botanic Garden Edinburgh, U.K. Scotland, Edinburgh

FI: Natural History Museum, Italy. Firenze

G: Conservatoire et Jardin botaniques de la Ville de Geneve, Switzerland. Geneve

G-DC: Geneva Herbarium – De Candolle's Prodromus (G-DC)

GH: Harvard University, U.S.A. Massachusetts. Cambridge

KFRI: Kerala Forest Research Institute

K: Royal Botanic Gardens, U.K. England, Kew

K-W: Wallich Herbarium in Kew

L: Naturalis Biodiversity Center, The Netherlands. Leiden.

LINN: Linnean Society of London, U.K. England. London.

M: Staatliche Naturwissenschaftliche Sammlungen Bayerns (SNSB), Germany. München.

MH: Tamil Nadu Agricultural University Campus at Coimbatore, India. Tamil Nadu. Coimbatore (Madras Herbarium, Coimbatore, Tamil Nadu, India)

NY: The New York Botanical Garden, U.S.A. New York. Bronx.

P: Museum National d'Histoire Naturelle, France. Paris

PDA: Department of National Botanic Gardens, National Herbarium, Peradeniya, Sri Lanka.

PNH: National Museum, Philippines. Manila.

RHT: Rapinat Herbarium, St. Joseph's College, Tiruchirapalli, Tamil Nadu, India

SUK: Shivaji University, India, Maharashtra, Kohlapur

TBGT: Tropical Botanic Garden and Research Institute, Trivandrum, Kerala, India.

TUB: Universität Tübingen, Germany. Tübingen.

U: Naturalis Biodiversity Center, The Netherlands. Leiden.