DYNAMICS OF CROPPING PATTERN IN KERALA AFTER WTO AGREEMENT

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This is to certify that this thesis titled 'DYNAMICS OF CROPPING PATTERN IN KERALA AFTER WTO AGREEMENT' submitted by Mr. K. C. Francis for the award of the degree of Doctor of Philosophy, to the Department of Economics, University of Calicut, Dr. John Matthai Centre, Aranattukara, is a record of bonafide research work carried out by him under our guidance and supervision. We further certify that no part of this work has been presented before for the award of any degree, diploma, fellowship or any other similar titles in any University.

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DECLARATION

I, Mr. K.C. Francis, do hereby affirm that this written account titled 'DYNAMICS OF CROPPING PATTERN IN KERALA AFTER WTO AGREEMENT' is a bonafide record of research done by me under the guidance of Prof. K. P. Mani, (Rtd.) Professor, Department of Economics, Dr. John Matthai Centre, University of Calicut. I also declare that this thesis has not been submitted by me earlier for the award of any degree, diploma, fellowship or any other similar title.

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K. C. Francis

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DESIGN OF STUDY

1.1 INTRODUCTION

International economic order underwent significant structural changes as a consequence of liberalisation, privatisation and globalisation. Although liberalisation process has started in 1980s, in 1991, India launched its LPG reforms on a more intensive and rigorous basis. As a consequence, India too underwent several structural changes.

Prior to WTO, India was a member of the General Agreement on Tariffs and Trade (GATT) 1947. On 1st January, 1995, the GATT was officially replaced by the World Trade Organisation (WTO) to which India along with 122 other nations became signatories. WTO came to include GATT, General Agreement on Trade in Services (GATS), Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) and Agreement on Trade Related Investment Measures (TRIMS). The WTO was set up to work on the principles of- trade without discrimination, predictable and growing market access, promoting fair competition and encouraging development and economic reforms.

The Doha Declaration of 2001 was signed at the fourth WTO Ministerial Conference in order to clarify the terms and improve the discipline so that member countries would abide by their WTO

obligations. Stress was put on transparency in negotiations and special differential treatment was provided to under developed countries.

The provisions of the WTO that have an implication for Indian Agriculture are contained in the Agreement on Agriculture (AOA). The important provisions are market access, reduction in domestic support and export competition. Market access required the nations to replace all non-tariff barriers with tariffs and further reduce the extent of tariff in a gradual and phased manner. The domestic support measures were categorised into Aggregate Measurement Support (AMS), Blue Box, Green Box, Di-minimum and Special and Differential Treatment supports. For each type of support, certain upper limits and specific time frame were specified within which the countries had to meet their WTO obligations.

While the process of tariffication of non-tariff barriers and reduction in the tariffs have been beneficial to developed nations to access the under-developed markets, the benefits to the less developed countries has only been marginal. Similarly, while supports under Blue box are allowed up to certain limits, and those under Green box can be extended limitlessly to protect the interests of the farmers, the less developed nations are simply not rich enough to afford them. Nations like India give more of consumption subsidies than production subsidies.

Thus, agricultural producers in these LDCs have been forced to experience great fluctuations in international prices with very minimal protection. Farmers from the developed countries, on the other hand, provide stiff competition as they are able to reduce costs of production with government support.

It has been over 20 years since India broadly accepted the terms of this Agreement. The Agreement on Agriculture initiated after

liberalisation advocates export led growth. This export led growth brought substantial changes in the cropping pattern throughout the country.

Shift in cropping patterns occurs primarily in response to economic factors such as changing demand patterns, changes in relative prices, productivity, and availability of essential inputs and so on, besides climatic conditions. Therefore, it is primarily an economic phenomenon which takes place over time in almost every region and economy.

In the context of India, cropping patterns has been affected in two ways. One is the shift from one crop to another, such as food grains to cash crops; the other is shift of land from agricultural to non-agricultural activities. These shifts have been taking place over several years. This shift in cropping pattern has also been significant in Kerala state.

The agricultural history of Kerala indicates that it was almost passive until early 1980's without any notable changes in its structure but since 1980's the cropping pattern started to shift in favour of cash/plantation crops because of better returns. This trend continued and further accelerated since 2000 because of the strategy of competitive and export led agriculture under the regime of the reforms. The present study focuses on the dynamics of cropping pattern since WTO. A larger number of studies are available on this and related topics in research methodology. It is primarily believed that the research frame can be finalised only after a critical review in to the literature.

1.2 REVIEW OF LITERATURE

H. R. Sharma's (2005) study shows agricultural diversification towards fruit and vegetable crops in Himachal Pradesh, especially in some areas in the districts of Shimla, Kullu, Solan and Lahaul and Spiti. The process of crop diversification to high value crops has gained further

momentum in the late nineties and is spreading to many new areas in the low and mid hill districts. It has made a significant impact on the quality of life of the local people. The study has the following objectives: 1) to understand the pace and pattern of regional agricultural development; 2) to study the temporal changes in the process of agricultural diversification in terms of changing share of crop production, horticulture crops and livestock in the gross value of output originating in agriculture, and changes in the cropping pattern including area under high value crops; 3) to estimate and compare the costs and returns of high value cash crops in different regions surrogating different levels of agricultural transformation; and 4) to identify the etiological factors, both at the micro and macro level, which facilitated the whole process of change, and draw important lessons.

The foregoing analysis of Sharma shows that agriculture in Himachal Pradesh recorded a fairly high growth during the past three decades, more so in the eighties. The yield levels of different crops had also increased over the periods by varying degrees. The horticulture sector also registered significant increase in terms of area and production of fruits. Further, the state's agriculture over the years, especially since the late eighties, had diversified towards fruits and off season vegetables like peas, potato, cabbage, cauliflower, *etc*. The process of crop diversification was, however, more pronounced in the districts/areas enjoying favourable agro–climatic conditions. The household data show that the net returns from different crops like garlic, ginger, cabbage, cauliflower, peas and tomato were very high compared to traditional field crops. In brief, agricultural development and diversification in the state contributed to the prosperity of rural economy. Nearness of crop land from road head, adequate availability of family labour and availability of

irrigation facilities were important factors that prompted the farmers to switch over to the cultivation of high value cash crops.

Mruthyunjaya and Praduman Kumar's (1989) paper discusses how the crop production strategy followed in the Post Green Revolution period has led to the narrowing of the base of agricultural production. The authors examine the changes in input use, productivity, cost of production, profitability and employment in crops; identify and explain cropping pattern changes; and suggest ways of controlling the imbalances in the cropping pattern. The specific objectives of the study are: (i) to examine the changes in input use, productivity, cost of production, profitability and employment in crops, (ii) to identify and explain cropping pattern changes, and (iii) to suggest ways and means for controlling the imbalances in the cropping pattern and thereby widen the base of crop production in India.

The analysis of the study is based on time series cross section house hold data on crop inputs and output taken from the comprehensive Scheme on cost of cultivation of principal crops in India for the period 1972–1983. Area under paddy and wheat has continuously increased in many states at the cost of coarse cereals, millets, pulses, and in some areas, cotton. The reason for this growth, *viz,* technological support, price support, infrastructure support including markets and irrigation, subsistence requirements, lesser price and yield risks are well known. All these factors together made paddy and wheat production much superior in profitability to other crops. The important costs of this development are serious imbalances in the cropping pattern, widened regional disparities, increased instability in production and unplanned imports of commodities. To rectify the situation, the elements of the Green Revolution strategy have to be re-examined and set right.

P. K. Varghese's (2004) study shows trend analysis in area, production, productivity and price behaviour of cardamom in Kerala. The percentage share of cardamom to the spices export during 1980-1981 was 31.30. But since 1980-1981, the share shows a declining trend, and during 2001-2002 it was only 3.74 per cent. From the above data, it is clear that this major spice is facing serious threat in the world market from other competing countries. The important objectives of the study are to study the trends in the area, production and productivity of cardamom in Kerala and to analyse the behaviour of prices and the mechanism of price transmission. The hypothesis of the study is that auction and whole sale prices of cardamom are determined by the export price.

In order to have a clear picture of the long term trends in area, production and productivity of cardamom in Kerala, semi-logarithmic growth equations are used and the summary results are presented. The study clearly portrays that the area under cardamom registered a negative percentage annual trend growth rate, *i.e.,* 1.216 that is statistically significant. The output grows at an average annual trend growth rate of 4.14 per cent and yield registered an average annual trend growth rate of 5.51 per cent. The rate of change in the reduction of area is declining over the study period. In the case of cardamom, the area has been decreasing at a diminishing rate. Though the area under cardamom is decreasing over the period, the rate of decrease has declined gradually throughout the period of analysis. The production of cardamom has been increasing at an increasing rate. It means that the production of cardamom has an accelerating trend. Same as production, the productivity of cardamom has also shown an upward trend. It is clear from the analysis that the trend growth rate for area is negative. The other two variables, production and productivity show an accelerating trend. The result of the analysis shows

that auction, whole sale and export prices related to cardamom are positive and exhibit an upward trend.

Birthal *et. al*., (2006) argues that the north eastern region lags behind the rest of India in economic development. Between 1993-1994 and 2002-2003, Gross Domestic Product (GDP) in the region grew at an annual rate of 4.3 per cent and per capita G D P at 2.4 per cent, which are much lower than the corresponding growth rates of 6.0 per cent and 4.1 per cent at the national level. Agricultural diversification is one of the several path ways of agricultural development. The demand for high value food products such as fruits, vegetables, milk, meat and fish has been increasing rapidly in the domestic as well as global markets. The region has the potential from the existing subsistence agriculture to a commercial one through agricultural diversification. But, the congenial environment could not be utilized to harness the huge untapped potential due to a number of operational constraints.

The main objectives of this paper are to examine: (i) the status of agricultural diversification and its role in speeding up agricultural growth, (ii) the participation of small holders in agricultural diversification towards high value crops on different farm categories, and (iii) the driving forces that enable the producers to harness the potential of high value agriculture. The paper builds on the hypothesis that diversification towards high value commodities has considerable potential to accelerate agricultural growth and augment income and employment opportunities for the farmers, especially small holders. Diversification towards high value crops is considered as an important strategy to improve their viability, provided arrangements are made for market access. The results clearly reveal that small holders do participate in high value agriculture and allocate a larger proportion of area to high value crops, especially vegetables. This is expected, as most vegetables have a short production

cycle and generate quick returns. The cultivation of fruits is also labour intensive, but its initial capital requirement is higher, and the gestation period is longer that discourage farmers to undertake cultivation of such crops. Rapid growth in high value agriculture will accelerate the overall growth of agriculture sector and benefits a large number of poor small holders. Lack of infrastructure and markets is an important impediment in realizing the potential of high value agriculture in the region.

Ramesh Chand (1996) examines the scope for raising income and employment in various categories of land holdings by diversification through off-season vegetables cultivation and also examines the scope for fruit cultivation in mid hill zone. The study also analyses the impact of infrastructural, institutional and socio-economic factors on crop diversification through the vegetable crops. The analysis is based on grass-root level information covering 298 farm households in mid hill zone of the state of Himachal Pradesh. Wherever necessary, secondary data have also been used. Multi stage purposive sampling procedure was followed to select sample units at grass-root level. The sample was drawn from four Panchayaths in Solan block of Solan District since this district and the block represent success story of vegetable diversification. The four samples from the Panchayath represent levels of agricultural diversification as determined by their access to various infrastructural facilities. A sample of about 75 farm households is drawn from each of the four Panchayaths following cluster sample approach. Survey work was carried out during December 1993 to February 1994 and the reference period was from November 1992 to October 1993.

The findings based on micro level investigations reveal that in the case of commercial and high profitability enterprises, farm size is not a constraint for production and marketing. The study shows that it is not correct to assume that the marginal and small farmers do not have

sufficient land to put under commercial crops after allocating land to food grains to meet the family needs. It is found that where economic incentive is available, the farmers allocated the respective area based on relative profitability irrespective of the food grains requirement of the family which can be easily met through purchases. There is strong evidence that it is not the farm size but infrastructure like access to motorable road, market and irrigation which determine the extent, success and profitability of diversification through high paying crops like off season vegetables. Promotion of enterprises like off-season vegetables would go a long way in generating productive employment and income in the hill areas in the Western Himalayan Region where the size of holdings and per capita arable land are very small and traditional crops with low productivity are not capable of providing sufficient income and employment to the population dependent on the agriculture sector. The strategy of agricultural diversification needs to be location specific. While diversification through fruits has been quite a success in temperate areas, it has not been rewarding in non temperate zone. Climatic factors, and technological changes in fruits like mango and grapes, which compete with fruits grown in mid hills like stone fruits, have rendered fruit cultivation unattractive in mid hill areas of Western Himalayas. Relatively higher return from vegetable cultivation which is becoming more remunerative with the development of transport infrastructure is resulting in shift of land and other resources from fruits to vegetables. Increasing incidence of felling of fruit trees by the sample households points out that the strategy to develop the whole state of Himachal Pradesh through expansion of fruit area should be given second thought as many areas in the state do not have or have lost the comparative advantage in fruit production.

Chowdry *et. al*., (1996) makes an attempt in the paper to study the contribution of different farm enterprises to the income of the selected farm families and to suggest measures for diversification of agriculture for maximization of income of small farmers. A sample of 30 small farm families from four villages, two from irrigated area and two from dry land areas in Bodhan Mandal of Nizamabad district of Andhra Pradesh, was selected for the study through survey method. The data and information pertained to the agricultural year 1993-94. It was observed that agriculture on the small farms was in the process of transition from subsistence level to semi commercial level. Mostly, paddy and maize on dry land farms, and sorghum, maize and rain-fed paddy on irrigated farms were cultivated under subsistence farming. The cropping pattern was more diversified in the semi commercial farming with the addition of crops like sugarcane, groundnut, and sunflower in the irrigated areas, and cotton, chillies, and ground nut on dry land farms. It was observed that diversification of agriculture on the small farms helped to increase the income and employment of the small farmers. However, there were certain constraints to agricultural diversification such as inaccessibility to technological information, water shortages, capital scarcity, poor management, lack of inputs and institutional arrangements. Policy implications are suggested concerning agricultural research, skill orientation, conservation of nature, institutional arrangements, agro-processing and expansion of non–farm sectors.

G. R. Patil (1996) analyses diversification of cropping patterns in Karnataka during the post-Green Revolution period. The study focuses attention mainly on the following questions: (i) Is there diversification of cropping patterns in Karnataka, and if so, in favour of which crops and regions? (ii) Does it involve accelerated increases in the productivity of more favoured crops or is diversification based mainly on inter-crop area

shifts?, and (iii) What are the causal factors behind these changes in cropping patterns? The study uses the data collected from the publications of Centre for Monitoring Indian Economy (1995) on diversification of cropping and yields per hectare of principal crops. The study is confined to the years from 1970-1971 to 1993-1994. Its main focus is on the comparison between two sub-periods, namely, 1970-1971 to 1983-1984 (period I) and 1983-1984 to 1993-1994 (Period II). Changes in the cropping pattern have been very significant in Karnataka as compared to the country as a whole in the post Green Revolution period. The proportion of area under food grains declined considerably (by 14.8 per cent) during 1970-1971 to 1990-1991. There was a corresponding increase in the proportion of area under non food crops. The area under coarse cereals declined sharply. The area under superior cereals like rice has declined by a small percentage. The proportion of area under sugarcane, sunflower, soya bean and sesamum has increased significantly. The proportion of area under groundnut has declined, while the area under cotton remained constant. The growth rate of area under food grains in the first period has been zero and negative in the second period. The growth rate of productivity of food grains in the second period has increased marginally. The growth rate of area under non food grains has been quite significant. The major food grains, *viz.,* ragi, jowar, bajra and gram have shown negative growth rates of area and negligible growth rates of productivity. Cotton has shown positive growth rate of yield per hectare and negative growth rate of area. The growth rates of area and output of groundnut, sugarcane, sunflower and sesamum have increased. This implies that agriculture in Karnataka is diversifying. The cultivation of cash crops like sugar cane, sunflower, and groundnut has increased but the productivity increases are dismal. Southern Karnataka districts have been diversifying their cropping pattern more than the northern districts which are drought-prone and lack in irrigation facilities. Improvements in

the overall economic growth and rise in the middle class population have played an important role in increasing the demand for non food grains and superior cereals. Owing to buffer stock operations in food grains by the Government, development of marketing facilities, provision of storage and warehousing and expansion of irrigation facilities have helped even the small farmers in commercializing their production.

Salik Ram and M. P. Tripathy (1996) examine the pattern of diversification in the cropping pattern of Orissa from 1980-1981 to 1993-1994 and throw light on its future trend. The data relating to the distribution of area under different crops grown during *Kharif* and *Rabi* seasons in the years 1980-1981 and 1993-1994 were obtained from the publications of the Directorate of Agriculture and Food Production, Orissa. An in-depth analysis of the cropping pattern in Orissa revealed an overall departure from cereals. The trend of diversification swept favourably towards oilseeds and pulses during the period 1980-1981 to 1993-1994. During *Kharif*, the cropping pattern has favoured oilseeds and pulses in general; and till, ground nut, moong and biri in particular. During *Rabi*, crop diversification has favoured groundnut, mostly. However, the trend of cropping pattern moved favourably towards vegetables during *Kharif* and *Rabi*.

A. K. Sharma *et. al.*, (1996) attempted to examine the extent of variability in area, productivity, price and income of selected farm enterprises. The study was conducted in Nagrota Bagwan and Kangra development blocks of Kangra district of Himachal Pradesh. The sample of 150 vegetable farms was purposively chosen from farms having assured Kuhi irrigation throughout the year. The average size of operational holding was 0.69 hectare. A two stage simple random sampling technique was adopted for selecting the sample farmers. The data were obtained by survey method. The study area is situated at an

elevation of 730 to 750 metres above mean sea level. There are four distinct vegetable seasons in a year. The vegetable farmers grow cereals on their farms for home consumption. The farmers who devote considerable proportion of their area under vegetable crops face fluctuations in their income every year by diversifying their cropping pattern and adopting mixed farming. The study revealed that cereals and vegetable crops accounted for 43 and 40 per cent of the area respectively. However, the gross returns from cereals and vegetables constituted 26 and 62 per cent respectively, indicating thereby that vegetable crops are highly profitable when compared to cereals. An investigation in the magnitude of risk revealed that the cereals were less risky than the vegetable crops in respect of area, productivity, prices and gross returns. The magnitude of risk decreased with an increase in the farm size. The study revealed that ladies finger came out to be the most risky crop from the point of view of prices and gross returns, followed by pumpkin and potato. The production of cereals turned out to be less risky and remunerative when compared to vegetable crops.

D. D. Gupta and Dalvir Singh (1996) attempt to examine the diversification in cropping pattern in Haryana State since its inception and to study the changes in the production pattern of principal crops. During the period from 1966-1967 to 1993-1994, the study is based on secondary data collected from official sources. The study revealed that with an increase in the area under irrigation from 37.8 per cent of the net area sown during 1966-1967 to 75.8 per cent in 1993-1994, the cropping and production pattern of the crops had registered a substantial change. Over time, diversification in the cropping pattern took place wherein high value crops and those responsive to irrigation-oriented new technology like rice, wheat and rapeseed and mustard gradually replaced relatively with less remunerated crops like bajra, gram and barley.

K. J. Joseph and M. V. Srinivasagowda (1996) attempt to examine the extent of commercialization in the agricultural economy of Kerala by working out the annual compound growth rates of area, yield and production of the major crops of the state during the post Green Revolution phase (1970-1971 to 1994-1995) and two sub periods therein: sub period I (1970-1971 to 1982 – 1983) and sub period II (1983-1984 to 1994-1995). They also study the evolving structure of the State's agriculture with respect to cropping pattern changes and discuss how far the equity and poverty alleviation components of our development policy have been undermined by rapid commercialization of agriculture. A temporal trend in area and yield of crops was observed by fitting index numbers to quinquennial data from 1975-1976 with base 1970-1971. Annual compound growth rates over different time periods were estimated using a modified exponential trend equation. The area under food crops declined sharply over the period, the index number for rice coming down to 58 and that of tapioca to 44 in 1994-1995. Consistent increase in average was noticed for plantation crops notably rubber and coffee, their index numbers shooting up to 248 and 257 respectively in 1994-1995. The transition probability matrix for cropping pattern changes in the state showed rubber to be the most stable crop which retains over 75 per cent of the previous period's acreage in the current period. Other relatively stable crops were rice and coconut while tapioca was found to be highly unstable. Rapid commercialization and the delusive trend of shift in the cropping pattern away from food crops will have numerous deleterious implications which have been highlighted in the paper.

S. P. Saraswat (1996) analyses the diversification of cropping pattern and farming system in a typical village in Hamirpur district of Himachal Pradesh spanning a period of three decades from 1959-1960 to 1989-1990. Census method of enquiry was adopted both during

benchmark survey and later. Land holding size decreased from 1.58 hectare to 0.72 hectare and about 52 per cent of the total land was under cultivation. Maize and wheat are major crops accounting for more than 80 per cent of the gross cropped area. The change in the cropping pattern in the village was marginal because of lack of irrigation facilities and due to the reason that some crops were eliminated and some other crops were introduced but all are dry land crops. The diversification in agriculture took place due to increasing trend of agricultural productivity because of the technical changes. *i.e.*, use of high yielding variety (HYV) seeds, fertilizers, pesticides and improved methods of cultivation in agriculture. Due to all round development of the economy, non agricultural sectors also increased at a faster rate. The remittance based mixed farming system prevailed in the village. Farmyard manure, HYV seeds and pesticides which were not used in 1959-1960 are widely used now in crop cultivation.

T. Raman and N. K. Sharda (1996) made an attempt to study the extent of diversification of agriculture and attempt has been made in the paper to study the extent of diversification of agriculture and the factors responsible for it in Himachal Pradesh and its constituent districts. The study is based on secondary data obtained from various research reports and other published sources. The agricultural year 1973-1974 was taken as the base year while 1992-1993 was considered as terminal year to work out the pace and direction of diversification of agriculture in Himachal Pradesh. In order to study the trend in diversification of agriculture, the crops are grouped into two categories. The first category belongs to traditional crops which include cereals, pulses and oilseeds, and the second category is of remunerative crops consisting of fruits, vegetables, ginger, tea, etc. The study reveals that the agriculture has diversified in favour of fruits and vegetables in the state. But the extent of

diversification has not been similar in all the districts. Out of 12 districts, *viz*., Bilaspur, Hamirpur and Una, lying in the low hill zone, have not witnessed such a diversification. Five districts, *viz*., Shimla, Kullu, Lahaul Spiti, Kinnaur and Solan lying in the mid and high hill zones have registered much greater agrarian diversification on account of agro-climatic conditions favourable for fruit and off-seasonal vegetable crops. No definite trend of agrarian diversification has been observed in the remaining four districts.

Mandal and Bezbaruab (2013) seek to examine the determinants of cropping pattern diversification in flood affected agriculture in the plains of Assam using farm level survey data. Crop diversification has been adopted quite extensively by the farmers in chronically flood-prone areas, where floods are rather certain but the annual cropping time available to the farmers is limited to flood free months. The findings of the study do not allow us to conclude that farmers in Assam plains have been diversifying their cropping patterns to cope with flood related production risks. Instead, it can be said that farmers who are restrained by floods in a regular manner have gone for an intensive and diversified cropping pattern to counter the flood-induced restrictions on them. Moreover, a diversified cropping pattern is found to contribute to farm income generations in the study area. Thus, although cropping pattern diversification cannot be said as a risk minimization strategy in the study area, it clearly helps farmers raise their farm income. This has significant implications for making farming a remunerative profession in the state.

N. Narayana's (2000) study shows the shifting to mulberry cultivation from food crops and non food crops. Sericulture is an agro-based industry and it occupies a place of pride in the rural economy of the country. The study attempts to analyze the development of sericulture and its impact on cropping pattern in the drought prone districts of

Rayalaseema region of Andhra Pradesh. The entire area where sericulture activity exists in all the four districts was divided in to eight sericulture divisions from each sericulture division. One village was selected at random. From each selected village, nine marginal farmers and seven small, medium, and big farmers were selected at random.

Scarcity of labour was found to be the main reason for a low rate of increase in mulberry cultivation. The positive impact of sericulture on cropping patterns is noticed only in irrigated areas. This is because irrigation facilities and suitability of land are chiefly responsible for the growth and development of sericulture in the region. From the foregoing analysis, it is seen that the cropping pattern of mulberry cultivation was favourable from 1987-1988 to 1992-1993 due to good prices and a positive market for cocoons. Ultimately, farmers have replaced the food crops and non food crops grown in the wet land/irrigated area with mulberry cultivation. After 1992-1993, the average area under mulberry cultivation decreased due to high fluctuations in cocoon prices and unfavourable climatic conditions.

Dhindsa and Sharma (1995) attempt to analyze the growth rates of area, production and yield of various crops in relation to the cropping pattern changes in the Punjab State during the period 1965-1966 to 1990-1991. Aggregate changes in cropping patterns in terms of 'Expansion' and 'Substitution' effects have been measured by calculating area and gross cropped area elasticity of various crops. Contribution of various crops in total returns due to cropping pattern changes during 1965-1968 and 1988-1991 has also been worked out. The specific objectives of the study are to: (i) present a brief review of changes in cropping pattern which took place in Punjab during 1965-77 to 1990-1991, (ii) analyse the growth rate of area, production and yield of various crops/crop groups in relation to the cropping pattern changes in the state, (iii) examine the

relative contribution of area yield, cropping pattern and their perspective interactions to the growth of crop output in the state, (iv) examine the aggregate changes in cropping pattern in terms of substitution and expansion effects, and (v) measure the changes in agricultural output (in value terms) due to changes in cropping pattern.

The analysis of cropping pattern of Punjab indicates a definite pattern of change which has occurred during the post Green Revolution period. The entire increase in total cropped area is mainly claimed by the cereals, and among them, the major share goes to wheat and rice. Pulses and oil seeds as a group have been losing area to other corps, despite the fact that rapeseed and mustard among the oil seeds and moong and other pulses have gained some area. Other crops like chillies, sugarcane and cotton *desi* etc. have registered a decline in their percentages shares in the gross cropped area. The cropping pattern which was highly diversified during 1965-66 is found to reveal a change towards a specialized farming of cereal-crops, mainly of wheat and rice.

Kapur and Kahlon's (1967) study shows continuous adjustments in cropping patterns are required to maximize the farm incomes consistent with the changed resource restrictions and techno economic conditions of the farm organizations. They try to analytically examine the cropping patterns of the IADP district Ludhiana. More specifically, the objectives of this study are: (i) to appraise the existing cropping patterns of the districts; and (ii) to determine optimum cropping patterns based on (a) existing production techniques, and (b) improved production techniques. By changing production techniques and cropping patterns, income and output increased. The farm business analysis of all the farm situations indicated that through shifts in crop combinations and adoption of yield-increasing technology, the returns to the fixed farm resources increased by 99.46, 98.69 and 76.73 percent on small, medium and large size farms

over the existing cropping patterns respectively. Thus, it may be concluded that the net returns to fixed farm resources and net farm earnings could be increased by rationalizing the farm resource use and by adopting improved production techniques in all the different sized synthetic farm situations.

Ghosh *et al*. (2005) examine the agricultural growth and cropping pattern of West Bengal over the period of 1970-71 to 2000-01. The paper also seeks to explore the nature of changes in the cropping pattern in the state over the period under study. The study seeks to decompose the output changes in terms of substitution effect and expansion effect. From the overall analysis, it is clear that the cropping pattern in West Bengal, in terms of allocation of acreage, has been skewed towards food grain. In the cropping scenario of West Bengal, though the non food grain crops like oil seeds, potato, chillies *etc.* have been gradually replacing the food grain crops, the cropping pattern of the State is still food grain dominated (2005).

Padma's (1999) study examines the employment conditions of women workers in the light of shift from food grain production to fish/prawn cultivation. The shift in cropping pattern from food grain production has raised the following issues: (i) Does aqua culture generate more man-days than agriculture for women? (ii) Does it leads to the growth of ancillary and subsidiary industries? (iii) If so, do women get employment in these industries? (iv) Will it improve the nutritional standards and food supply to people? (v) Are the small and marginal farmers' household members fully employed after the conversion of the land in to aqua culture? (vi) Could the seasonal variation in the employment and income of the agriculture workers be evened out after conversion of agriculture land into aqua culture farms?; and (vii) What is

the life pattern of agriculture workers, particularly women workers, after the conversion of the field in to aqua culture farms?

The survey was conducted in Andhra Pradesh. Three villages were selected from West Godavari district and one village was selected from East Godavari district. Though conversion of agriculture land in to aqua culture farms also took place in Nellore, the corporate sector there entered into this field on a large scale. The shift from food grain production to fish/prawn cultivation resulted in loss of man-days for women workers. The living conditions of the women workers and their families have not improved with the emergence of fish/prawn cultivation. The shift in cropping pattern from paddy to fish/prawn cultivation failed to generate employment opportunities for women workers. The living conditions and status of women workers have deteriorated. Thus, on the whole, the liberalization has had an adverse impact on employment, wage and living conditions of women workers (1999).

George's (1965) study examined the changes in price structure and acreage response to price in Kerala State during the decade of the first and second Five Year Plans. The finding is that cropping pattern of Kerala had already undergone a slight shift from food crops to cash crops during the last one decade prior to the date of survey and that the acreage response to price had been positive in the case of most crops. The increase in acreage under rubber and cashew-nut were the result of relative increase in their price. Similarly, the decline in the acreage under tapioca, both in absolute and relative terms, was due to fall in relative price. Again, what little evidence shows that it was the relative increase in prices, and not the absolute increase, which brought about a favourable response in acreage under a particular crop? As per the methodology, any price is taken to find the change in acreage. Other factors like wage,

transportation, supply of High Yielding Varieties etc. also must be considered for better and broader result.

Batnagar *et. al.,* (2009) argue that Indian farmers have to move from subsistence farming to value added contract farming to improve the rural population. The study mainly speaks about Gherkin cultivation under contract farming in India, especially in Karnataka State. Karnataka is emerging as one of leading States in contract farming in vegetables with over 26 companies, both domestic and multinational, are offering contract farming in a varieties of vegetables. The farmers realized the problems they face in production of agricultural commodities which resulted in poor output and low income. After realizing the situation of the past experiences in agribusiness activities, there is a tendency among the farmers to go in for an alternative cropping system and farm activity for larger output and monetary benefits. Contract farming is one such mechanism which provides effective and efficient management of productivity operations, extension activities, assured market at per agreed price. The multinational corporations are coming forward to play a crucial role in agricultural development through contract farming system. It is the order of the day that we have to move from subsistence farming to value added contract farming to improve the rural population emphasizing the need for a new orientation for farm sector and the States should create new laws for enabling contract farming on commercial basis and enabling corporate to contact their requirements from farms.

Rajalakshmy G. (2009) argues that there is no doubt that productivity enhancement plays a key role in bringing about a turn-around in the dismal agricultural scenario. This calls for steps like technology up gradation, education and implementation, better organization in the form of public private partnership and contract farming. Encouraging diversified activities like livestock keeping,

poultry, and aquaculture will enable the farmers to earn supplementary income. Considering the booming market for organic products which are sold at a premium rate, there is an urgent need to go in for organic farming. There is a huge potential in India to develop the food processing facilities since at present only 2% of fruits and vegetables are processed as against 70-80% in developed countries which calls for better infrastructure and proper logistics facilities. While it is essential to provide the basic infrastructure for agricultural development, it is also necessary to adopt the latest technology and ideas for ensuring higher yields, remunerative prices for farmers, better quality produce and better livelihood opportunities. Empowering and enabling the small farmers alone can ensure sustained growth of this sector.

Ray and Ghosh (2007) show Boro paddy had been the triumph of modern agriculture in rural West Bengal. In the recent past, concern has been expressed about the economic and ecological sustainability of this so-called profitable crop. The study attempts *inter alia* to understand the rationale of farmers' choice of Boro paddy harvest in a situation of declining profitability and growth in output, the impact on ground water reserves in West Bengal, and damage to the soil substrate caused by such mono cropping. Despite a dearth of scientific data on the polluting effects of agro-chemical dumping, indicators show that a large number of farmers of West Bengal, who are growing Boro paddy, are becoming ecologically handicapped. The study attempts to understand this 'paradox of prosperity.'

In spite of an unfavourable economic return, the cultivators' effort to continue with the same crop, year after year, worsened the ecological balance of the entire agricultural scenario. Boro paddy being a summer crop is absolutely dependent on irrigation. From the stand point of water utilization, Boro paddy is far less attractive. The situation worsens when

incidence of arsenic contamination is considered. Often, summer rice has been held responsible for widespread arsenic contamination in ground water sources. Excessive withdrawals have resulted in declining ground water levels and this is doubted to be one of the causes for occurrence of arsenic beyond the permissible limit in underground sources of water. The efforts of farmers to increase the yield of Boro paddy have resulted in the uncontrolled use of ground water and agro-chemicals. Modern agriculture has encouraged a cropping practice that is exploitative of soil and people. What is more surprising is that the consequences do not influence farmers' decision to cultivate crop.

Duhan and Yadav (2010) try to explain the need of technological progress in agriculture. Though there is an increase in the annual growth rate in the agriculture sector, the share in the GDP is declining. The study tries to find the methods by which development can be achieved in agriculture. The emphasis is on the improvement in the technology. The importance of technology in agriculture development was first demonstrated in the 1970s with impressive growth in yields following the introduction of new wheat and rice varieties. The only way to increase productivity and prevent food shortage in the light of the growing population was to take the latest technology to the farmers. For technological progress, genetic engineering and the biotechnology revolution provide a prospect of developing new varieties that can flourish with less dependence on water and chemical inputs. The crop should be adaptable to the dramatic climatic change. For that, the use of latest technology in agriculture is the only solution. The overall goal is to increase the crop production with the reduction in land and facing environmental changes. The technology may vary from one challenge to another. The different technologies—genetic engineering, nano bio-technology, electronics etc.—are used in agriculture.

Deshmukh M. S. (2010) observes that the post liberalization period is marked by an increase in the exports of agricultural commodities in general and horticultural products in particular. The main objectives were to assess the growth rates in area, production, productivity and export of horticultural crops in India and to assess the variation in area, production, productivity and export of horticultural crops in India. The study reveals that horticultural exports have increased from Rs.4495.56 crores in 1991-92 to Rs.7811.48 crores in 2008-09. The unit value of horticultural crops has increased from Rs. 8.24 per kg. in 1991-92 to Rs. 22.12 per kg. in 2008-09. Export of horticultural products from India has shown wide variations in terms of quantity as well as value for the years 1998-99, 2001-02 and 2001-08 showed negative percentage change. The export of Indian horticultural products in value terms has increased considerably in the post-reform period, but still the share of India's horticultural trade is negligible. The compound growth rate of almost all the horticultural products have shown highest growth rate.

Dantwala M. L. (1986) argues that a rational price structure has to be evolved for both input as well as output in order to bring about a desired change in the cropping pattern. He is of the opinion that what determine the decision of the farmers on choosing a cropping pattern is his net return and not simply the price of the crop. The Economic Survey, 1985-86, citing state level study by the National Council of Applied Economic Research, has stated that "at least in regard to yield per acre, in several states, the cropping pattern does not match the states' comparative advantage in yields. Crops for which conditions are most suitable are under-produced and there is over production of crops which are not suitable." Why such an irrational cropping pattern does emerge in several states? The farmers' behaviour is guided by the comparative revenue obtained from growing different crops, rather than by the technical

potential of comparative yields. Changes in relative prices can, to some extent, reduce the gap, but the increase in price (of the under-produced crop) needed to neutralize the difference in net revenue may be exorbitant.

Mani P. S. Mundin (1983) says that very little change has taken place in the cropping pattern in the country. Food crops dominate the cropping pattern in most of the developing countries. In order to change the cropping pattern, measures like appropriate incentives, provision of a favourable optimum use of land, diversifying the cropping pattern and mixed farming should be given due attention. The main reasons for unchanging cropping pattern in the country are social factors, such as density of population, customs, traditions, attitude towards material things, physical factors like soil, climate, rainfall, economic factors such as prices of inputs and outputs, farm size, tenure, insurance against risk, *etc*.

Shinde (2009) noted that some positive and some negative changes have taken place in agriculture after Economic Reforms which form the objective of the study. The important findings are: The share of agriculture in GDP of India declined after the reforms. Growth rate of agriculture and allied sector was 4.8 before the reforms and it declined on an average to 3.74 after the post-reform period. Growth rate of food grains production before the reform period remained on an average of 3.72. It shows a declining trend after the reform period and remained on an average of 2.48. Gross area under the crops, cereals, pulses, jowar and bajra have shown negative growth rate. While the crops like rice, wheat, maize, gram, *tur*, oil-seeds, cotton and sugarcane revealed positive growth rate in gross area, this was increased after the reforms period. Oil seeds have shown highest growth rate in gross area and the rate of jowar, after reforms period, shows highest decline *i.e.* negative growth rate in gross

area under cultivation. The trends in the production of major crops after the reforms show that except jowar, all crops revealed positive rising trend. There is a rising growth rate of exports of agriculture commodities and allied products, such as oil cakes, spices, sugar and molasses. Trends of imports of principal commodities of agricultural sector after the post-reforms show that except food articles all other commodities show rising growth.

S. Venkiteswaran (1984) explains the changing pattern and food economy of Kerala. The objectives of the study are: (i) to examine the *á priori* reasons for conversion of paddy fields into other crops, especially coconut gardens; (ii) to forecast the posterior probabilities of conversion process of paddy fields; and (iii) to evaluate the resultant impact in the food and agricultural economy of Kerala in the long run. Main findings are the following: The economic profile of sample convertors and non-convertors presented in table revealed that the convertor group had an edge over non-convertors group in respect of average land possessed, average value of assets and average income. The Main reasons mentioned by the convertors for shifting to cash groups were lack of irrigation facilities, shading of trees, soil erosion, low yield from paddy, risk in cultivation of paddy, comparative long run benefit from cash crops, paucity of labour, and high wage rate. The process of conversion will continue as long as the cost-benefit ratio is favourable for coconut and will come to a halt with the fall in the price.

Selavarathnam (1985) explains about non-economic factors which influence cropping pattern. He takes Kanyakumari district of Tamil Nadu state for the case study. He highlights one ‘extra economics’ factor for crop shifting, which is possibly the major reason behind the transformation in cropping pattern in the area under study. The shades of perennial crops, like coconut, mango, jackfruit affect the growth of annual

crops. So they are forced to shift their plots from annual crops to perennial tree crops. Within a short duration of time, the whole area gets converted towards perennial crops. A chain effect sets in which can be stopped only after the extensions meet a neutral boundary like a road, residential hamlets or grazing grounds. It is also mentioned that some shifting from tapioca to rubber took place because of menace from monkeys. Shifting from paddy also took place due to personal enmity. Easier supervision and easy labour management also necessitated shift from rubber and coconut to cultivation of low grade timber trees.

Devyanee Nemade and Rachana Wankhade (2010) analyzed the changing cropping pattern in disadvantaged districts of Maharashtra and studied the shifts in crops in acreage for Yavatmal district as one of the disadvantaged districts. The two objectives are to examine the crop diversification and to study the structural changes in the cropping pattern. The methodologies used are the Herfindhal Index and the Entropy Index for measuring the shift in cropping pattern. The study found that the Herfindhal Index is nearer to zero, which indicates that the district has experienced crop diversification during 1990-91 to 2005-06. The higher value of Entropy Index lies between 0.61 and 0.73. This higher value confirms the diversification of the crops in the study area. The structural changes at the district level indicate that farmers retained 84 percent of the area under *jowar* while other area is diverted to *tur* and other pulses. The shift is mainly due to the losses they incurred in raising their regular crops. The study is limited to the disadvantaged districts of Maharashtra.

T. Haque (1985) examined the nature and extent of variations in the pattern of rural diversification and compared the recent trends and variability in the net output of crops. The study tried to find out the relationship between occupational structure and patterns of rural poverty in various regions. The major findings of the study pointed out that the

crop production accounted for the lion's share in the net aggregate output of the rural sector. The percentage share of animal husbandry and poultry in the aggregate output of the rural sector varied widely between regions. During 1981-82, it ranged between 3.5 percent in Tripura and 25.9 percent in Rajasthan. The relative share of animal husbandry and poultry in the aggregate output enormously increased in Kerala, Tamil Nadu, Karnataka and Andhra Pradesh.

The major findings from the analysis of occupational structure and pattern of poverty distribution show that the proportion of agricultural households to the total households varied from 55.4 percent in Kerala to 86.7 percent in Madhya Pradesh. In the states of Punjab, Haryana, Rajasthan, Jammu & Kashmir and Kerala, a diversification helped in reducing the incidence of poverty but in states like Andhra Pradesh, Karnataka and Tamil Nadu, the proportion of rural households below the poverty line remained very high despite some occupational diversification involving shifts from crop production to animal husbandry and poultry in all these States. The study concluded that there is no generalized relationship between rural diversification and poverty.

A. J. Singh *et.al.,* (1985) conducted a study with the specific objective to examine the major factors affecting the diversification of agriculture in Punjab at the macro and micro levels. The study is divided into three parts. In the first part, the diversification trend of Punjab economy was studied. Based on the analysis of inter-spectral diversification, it may be inferred that the declining trend in the differences of Entropy indices based on the three and the five sectors' classification of the economy reflected the increasing diversification within the primary sector.

This clearly indicates that paddy-wheat rotation has increased the decline in the index of diversification. At the macro level analysis,

fertilizer consumption was the most significant factor impinging on diversification, while micro level results pointed out that diversification is inversely related to the size of farm, distance from the market and assets per hectare. The Herfindahl index depended positively on family size.

R. P. Gupta and S. K. Tewari (1985) made an attempt to find out the factors affecting crop diversification in Uttar Pradesh. The results on the empirical relationship between different crops diversification measures are defined on acreage proportion and net crop income proportion. From the analysis, it is interested to note that tenancy (cash renting) is required to be discouraged for promoting crop diversification whereas the smaller farms are more diversified. Share cropping and family size do not affect the level of diversification. Larger farms are relatively less diversified while the farms with higher irrigation intensity, and located nearer to market, and farms which perceive greater business risk relatively have more crop diversification.

Amrik S. Saini and Raj Vir Singh (1985) examine the impact of diversification on income, employment and credit needs of small farmers in Punjab. The analysis revealed that the diversification of farming with livestock activities resulted in an increase in income ranging from 12.21 percent to 54.12 percent. This clearly revealed the significant role of dairy enterprises to diversify the crop farming for higher income on the small farmers. The findings highlight the positive impact of diversification on employment. Plans involving livestock activity led to a marked increase in human employment in all the sample zones. Crop farming with milch animals under improved level of technology resulted in considerable increase in farm income of small farmers. The study suggested the need of medium term credit on easy terms to the small farms.

P. V. Throve and V. D. Galgalikar (1995) studied the economics of diversification of farming with dairy enterprise. The specific objective

of the study was to find out the impact of dairy enterprises on the cost and return on different size–groups of farm. The results show that the incorporation of dairy enterprise increases the efficiency of capital by 36 percent. Mixed farming with dairy enterprises combined with crop production can be suggested to small farmers to raise their income. Though the study is based entirely on data from a part of the Akola district of Maharashtra, the study has arrived at generalisation as if applicable to a pan-Indian context which is misleading.

Dayakar Rao and Shahid Parwez (2005) studied the dynamics of cropping pattern in Sorghum growing states of India. The major objective of the study was to analyze the transactions of area among different crops in relation to sorghum in six major sorghum-growing states in the country like Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra and Rajasthan. The study found that there is considerable reduction in the area under rainy sorghum crop which indicates that the crop has lost its area to cotton, groundnut, maize, peal millet, mung bean and red gram etc. Among all these crops, cotton and groundnut are the most competing crops of rainy sorghum in most of the sorghum growing states of India. The area under sorghum was highly unstable, losing to other competing crops during the 1970s and 1980s. The loss has reached a certain plateau during 1990s and that is being continued with a steady decline every year. The possible reason is that the farmers are profit motivated and crop land is accounted for consumption consideration.

J. P. Singh and V. P. Sharma (2000) analyse the growth and diversification in agriculture in Haryana. It is reported that there has been a spectacular growth in the production of oil seeds (10.12 percent), cotton (5.44 percent) and food grains (4.4 percent) in Haryana in the last three decades. The objectives of the study are to analyse the growth in area,

production and productivity of principal crops in Haryana and to measure the extent of diversification in Haryana. The analysis in growth and diversification in the state indicated that with the advent of new technology and development of infrastructure like irrigation facilities and price support, few crops, which have registered a major breakthrough in their productivity, have replaced other crops grown in the state. This has been leading to the situation that could be termed as increasing specialisation in the relatively developed regions of agriculture.

L. S. Venkata Raman and M. Prahaladachar (1978) reported that the effect of changes in prices and growth rates in yield and irrigation has influenced the change in cropping pattern. The objectives were to review the changes in cropping pattern, to analyse the growth rate in area, yield, and the output of major crops and to analyse the behavioural response of farmers in allocating area under major crops. The relative price is a major factor for allocating area under different crops. During the period under study, the farmers did not make any large change in their cropping pattern. The relative change is visible mainly under individual crops. The major changes in cropping pattern that occurred in this period were under rice (5 percent), ground nut (1 percent), sugarcane (0.4 percent), and maize (0.7 percent). The increases in area under rice and groundnut were mainly due to the relative increase in price of rice and groundnut. The relative decline in area under *jowar*, *bajra*, *ragi*, total pulses and cotton were also due to the decrease in their relative price.

Ashok Gulati and Pradeep K. Sharma (1990) try to examine the manner in which the agriculture sector could contribute towards three national priorities, namely employment generation, saving/ earning of foreign exchange and prudent resource use which is ecologically sustainable. By estimating international competitiveness of different crops, the study observed that the crops like wheat, rice, cotton and gram

have been efficient import substitutes while sugarcane and oilseeds have received substantial protection. It implies that a shift of resources in favour of non-protected crops would stabilize the foreign exchange. The domestic incentive structure is more favourable to wheat, rice, oilseeds, groundnut and sugarcane. The analysis reveals that though the change in cropping pattern confirms the domestic crop-specific profits the profitability structure is not in line with the desirable cropping pattern given the national priority of employment, foreign exchange and environment.

Desai (1977) made an exploratory study in the specialisation and estimation of an econometric model to explain the crop pattern of a group of farm families of Surat district of Gujarat. Desai reported that family finance is one of the important factors influencing the choice of crops which differ in the working of capital intensity. Increase in the availability of irrigable land would shift the crop pattern in favour of more remunerative and also labour intensive crops such as banana, sugarcane, and HYV paddy. This shift would in turn lead to an increase in the income of farmers. The negative co-efficient for farm size in the case of high return crops such as sugarcane, banana, high yielding paddy, and *desi* wheat indicate that as farm size increases, the proportion of acreage under these crops declines. The study suggests that as the farmers' ability and willingness to take risk increases, the crop pattern would shift from low risk to high risk crops.

K. Sivasubramaniyan (2000) in a state level analysis on the impact of different sources of irrigation on crop intensity, cropping pattern and productivity, has analyzed the differences in crop intensity and the difference in land productivity between irrigated and non irrigated farm in Tamil Nadu. There are differences in cropping pattern between well-farmers and non-well farmers. Well-farmers raise paddy and annual

crops such as banana and sugarcane while among the non-well farmers, paddy is the predominant crop and hardly any sugarcane or banana is grown. The study observed that productivity of land differs considerably even within irrigated areas mainly due to differential access to water by the farmers. The villages with the high level of water supply get relatively more output compared to the elevated sluice villages.

P. C. Bansil (1972) analyzed the regional distribution of production as a result of green revolution. The effect of green revolution varies from state to state. During 1964-65 to 1970-71, the area and the production of rice are higher in Punjab and Haryana. During the green revolution, the relative crop-shift has occurred in favour of cereals. It is observed that the states which occupy high area consume large quantities of fertilizers and irrigation resources, while at the same time not making proportionate contributions to the production. The study highlights the fact that the growth rates during the green revolution period were higher than those in the pre-revolution period.

P. L. Guglani and A. S. Sirohi (1972) emphasize the role of optimal allocation of resources. The objectives were to determine the possibility and extent of increasing farm returns through optimal allocation of resources of the farmer and to determine the scope of high yielding varieties of wheat for various types of farm resource situation in the Union Territory of Delhi. The improvement in crop intensity and farm return was mainly due to the optimal organization of crop and dairy enterprises along with credit facilities. The increase in return is different among water-logged zone and non-water logged zone. During the wet year, the optimization of resources increased the cropping intensity by 29 to 81 percent as compared to 14 to 50 percent during the normal year. The analysis of the changes in the cropping pattern and dairy enterprises in various optimal plans show that dairy becomes a competitive enterprise in

the wet year only. The cropping intensity increased more on the small farms than on medium farms. The increase in returns was more on the tractor operated farms than on the bullock operated farms in the non-water logged zone, but the picture was just the reverse in the water-logged zone.

S. Senthilnathan and J. S. Amarnath (1996) made an attempt to identify the extent of diversification on small farms, to quantity the benefits of diversified production programme on small farms, to identify the problems faced by the small farmers in diversifying farm activities and to suggest solutions for them. Sub-Zone II of Tamil Nadu was purposively selected for the study and 175 small farmers (operating less than 2 hectares of cultivated area) spread over 18 Taluks of the zone formed the sample for the study. The study revealed that the average size of operational holding was the maximum in situation III and in system V. Among the three situations studied, cropping intensity was the maximum in situation II because of the use of ground water in the farms. The need for fodder crops to feed the animal on the small farms and draught animal has increased the cropping intensity. But it had failed to generate equally proportionate income, though inclusion of milch animal in the farming system has generated nonfarm employment and increased income to the small farms, even with lower level of cropping intensity. Crop + milch animal + sheep system had generated non-farm employment, besides augmenting farm income.

Rajesh Sharma *et. al.,(*1996) made a study to examine the growth of production of different crops in Rajasthan, the changes that have taken place in the cropping pattern and whether these changes over the last thirty years have assured food in terms of per capita production. The results of simple linear growth production in Rajasthan (1960-1961 to 1993-1994) show that there was a major breakthrough in the growth rate

of area and yield of oil seeds at 8.45 per cent and 13.2 per cent respectively, resulting in high growth of production at 32.42 per cent per annum. In the case of cereals, the growth in area was not high (0.32 per cent) but the increase in productivity was quite promising (3.51 per cent). Pulses showed insignificant results as there has been wide variability. The irrigated area increased at the rate of 7.19 per cent, which might be the reason for increase in the yield. There is a continuous decline in food grain production per capita except in 1991 (193.6 Kg per annum) and this fall is specially due to decline in pulse production per capita from 64.18 Kg in 1961 to 31.24 Kg in 1991. Per capita oil seed production has been almost static in the sixties and seventies and jumped to a high level of 50.7 Kg per capita in 1991. Rajasthan State is almost meeting its requirements. It can be concluded that cropping pattern is changing in favour of remunerative crops presently; this is not affecting food security adversely as there is enough scope to increase the cropped area. The state is yet to achieve a breakthrough in pulses production.

According to T. S. Chahal and H. S. Prehar (1996), a number of agro industries have been established in Punjab which is expected to contribute towards diversification of agriculture in the state. The specific objectives of the study are (i) to compare the cropping pattern of three different sized farms in three different zones (ii) to study the income and employment level of farmers in three zones of the study area: (iii) to study the linkage co efficient of income and employment on investment in different zones of the study area; and (iv) to suggest policy implications. The linkage effect on the cropping pattern, income, employment and investment levels of farmers were studied. A multi stage random sampling technique was adopted. The study showed that large sized farms had higher intensity of cropping than small and medium sized farms in every zone, probably due to higher level of resource availability with

them. The income in all the categories of farms in the zone I was higher than in zones II and III. The farm employment was also higher is zone I than in zone II and zone II farms which were situated away from the processing unit and had relatively less area under tomato and other vegetables. The pattern of total investment on farm machinery, livestock and farm building was similar and was higher in all the categories of farms in zone I than in zones II and III. It was observed that per hectare capital investment on medium sized farms was much higher than in other size groups of farms in all the three zones. The linkage co efficient of income on investment again showed highest levels of income in zone I.

According to Raj Krishna (1963), relative profitably per acre is the main determinant of crop pattern changes in Punjab (Raj Krishna). He estimated the relative price elasticity's of the acreages of eight out of eleven major crops are to be positive, ranging from 0.1 to 1.6. An index of the optimality of land allocation, based on a modified linear program solution is found to be as high as 0.84 for the year, 1957-58. The excess return test revealed that the acreages shift have been made in an optimal direction in all but depression and war years. It seems that wherever data have been analysed in depth, with well-specified models, relative price movements are found to have systematic and significant marginal effects on crop pattern.

G. C. Mandal and Sukesh K. Ghosh (1963) have made an attempt to analyse the cropping pattern of Bihar which is typically a multi crop region in terms of the family labour and farm size capacity. They found that there is no significant correlation between the farm size and the number of crops grown. Small farmers earn more with four crops or less, and therefore, should not grow more than four crops. It seems that the increase in proportion of paddy is more associated with the increase in size of the farm than increase in the number of crops. The analysis is

related to labour capacity and cropping pattern revealed the positive association between the farm size and number of labours. Farm size below 7.5 acres growing a large number of crops showed a tendency of a slight increase in the number of workers. The analysis about the net return revealed that bigger farms operate at a lower level of efficiency.

R. P. Singh (1972) finds out that the introduction of new technology had a positive impact on the intensity of cropping and production pattern and earned level of the major food grains in a dry farming region in Haryana. Among the crops, *bajra* and oilseeds show good yield potential and *Bajra* is the only crop in the dry farming area showing a considerable increase in its production after the introduction of new technology. The production of barley declined considerably due to a reduction in its area but the use of fertilizers and plant protection measures had shown a remarkable increase in the yield. The area shift was more in the case of HYV wheat, which was at the cost of barley and oil seeds. The reduction in the area under wheat was mainly due to the optimal doses of scare input control which cannot be increased proportionally in the dry region.

Gurudev Singh and Hari Prakash (1972) examined the changing production pattern in Gujarat. The specific objectives of the study were to analyze the trends in production of major crops and also examined the relative importance of area and productivity in the changed product mix. The trend analysis showed that the growth was positive for all the seven selected crops. The inter-crop comparison of growth rates showed that bajra had achieved highest growth followed by groundnut and jowar. The relative importance of area and productivity in the growth was studied through disaggregation of total growth. The analysis indicated that except for groundnut and bajra, the contribution of area to the total growth was positive for all crops. It was highest for jowar and lowest for rice.

Umananda Phukan (1972) made an attempt to analyze the extent and nature of crop rotation and the causes of low crop-intensity in Sibsagar district of Assam during 1968-69. It was found that several technical and socio-economic factors were responsible for rice-rice-rotation. Lack of irrigation is the main factor behind this. The high land was used for growing crops like jute, pulses, sugarcane and potato. The rotation in these areas was varied and limited to 16.39acres.In the case of low land areas, 13 percent of the land was used for rotations. The physical condition of soil and rainfall are responsible for the absence of other rotations such as rice-jute and rice-wheat. The important rotation in low land was *Sali* paddy (winter paddy) followed by *Ahu* paddy (summer paddy).

V. P. S. Arora and B. Prasad (1972) conducted a study about the impact of optimal production pattern on farm incomes and borrowings. They observed that the combination of maize and or paddy with wheat crop should be grown on the maximum possible area of Meerut district of Uttar Pradesh. The study utilizes the cross-sectional data from 88 randomly selected farmers for the year 1969-70.The model for small, medium and large farms was developed under two alternative situations of existing technology without borrowing, and existing technology with borrowing. Cash was found to be limiting factor for all the farm size groups. For implementing the optimal plan the farmers of all size-groups require additional fund. The introduction of optimal production pattern increased the farm income of all the size groups. The study suggested that there is a need for providing adequate production and credit from outside sources to the farmers before the introduction of optimal production pattern.

Katar Singh and K. M. B. Rahim (1978) emphasized the importance of watershed as the most appropriate unit for land use and

crop planning in the hill areas. Using an aggregative linear programming model, they have developed a set of five alternative optimal crop plans for the land suitable for cultivation in a sub-watershed of the Ramganga catchment of Uttar Pradesh. The optimal plans formulated for the land suitable for cultivation were characterized by the introduction of high yielding varieties in the place of local varieties and of new crops like soya beans, capsicum, french beans *etc*. Fruit orchards and pastures were the two major activities included in the improved land use pattern for the community land in the sub-watershed. The optimal crop plans showed substantial potential for increasing returns over variable cost. Given the higher profitability of the improved cropping pattern, the authors have also not examined the question of implementation of such micro level plans.

V. Rajagopalan and S. Varadarajan (1978) made an attempt to analyze the risk and uncertainty in the hill farming system. The specific objectives imply to investigate the impact of technology on farm risk and evaluate the economic benefits of formal and informal methods of risk management. They have evaluated risk under the traditional and modern methods of farming in the Nilgiris hill. Using a quadratic programming model, they have formulated minimum risk optimal plan for two typical farms, *via*, one traditional rain fed and another modern with sprinkler irrigation. They found that the risk minimizing optimum levels of activities were very close to the actual levels. The risk (coefficient of variation) was estimated to the 18 to 30 percent for the traditional farm and 21 to 33 percent for the modern farm. Farming with dairying is found to be less risky than farming without dairy.

V. S. Vyas (1980) examined the structural changes in land holdings pattern in the country. The period selected for this study was mid fifties to early seventies but the major emphasis on the decade of

1960s. Gini-Lorenz ratio and cross sectional analysis are used for analyzing the changes. The analysis of Gini ratios are negatively and significantly related to the yield level of wheat and rice (the value of R^2 is more than 0.5). It is not significantly related to the yield level of the most other crops. The access structure of land in Tamil Nadu and Karnataka has more skewed than ownership, whereas the states like, Assam, Bihar, Orissa U.P. and West Bengal, access structure is clearly less skewed than ownership. The study highlights the need for a proper alignment of technologies, institutional and organizational factors in the context of the changed agrarian scene in the country.

C. S. Raghubanshi (1968) has studied the trend in cropping pattern in Himachal Pradesh. The study is aimed at examining the changes in the cropping pattern and the impact of development programmes in the Solan region of Himachal Pradesh. The share of food crops in the total cropped area expanded fairly during the decade 1955-56 to 1965-66. The increase in area under food crops was 25.7 percent. This may probably due to the high prices of food grains and encouraged the farmers to take up food crops cultivation. There was an abrupt increase in the area under maize (170.7 percent), paddy (69.4 percent) and wheat (27.3 percent) while the share of area under other non-food crops remained more or less unchanged except ginger. It is observed that the yield per cultivation is very low in the Solan region and hence the study suggested to make the region self sufficient with regard to food grain requirements through multiple cropping.

Jeemol Unni's (1983) study makes an attempt to analyse the reasons for shift in cropping pattern away from rice and in favour of coconut. Actual (net) area under rice has fallen, particularly in recent years, whereas area under coconut has increased phenomenally. There is a suggestive evidence to show that coconut has been substituting rice on the

wet lands. The rationale for this shift is found in the fact that relative profitability of coconut cultivation is much higher than that of rice cultivation. It is also seen that single cropped paddy lands are more likely to be converted to coconut gardens than double cropped lands. The reason for the marked differences in the profitability of two crops is located in the greater labour and fertiliser cost involved in rice cultivation. Profitability of crop is determined by input cost and output prices. Over the past two decades whereas price of rice has been fluctuating, falling sharply in recent years, the price of coconut increase consistently. Wage rate of agricultural labours and fertiliser prices have also been rising over this period. Since labour cost and fertiliser cost are much higher in rice cultivation, the rising prices of this input would affect rice cultivation more adversely than coconut cultivation. The fluctuating paddy prices and rising input cost worked together to make rice cultivation a less profitable venture. On the other hand, the consistent rise in coconut prices and smaller quantum of labour and fertiliser use in coconut cultivation increased profitability of the latter. Thus the substitution of coconut for rice can be attributed to diminishing profitability of rice cultivation, the latter being due to the large amount of labour and fertiliser use in rice cultivation, and the long term unfavourable movement of input and output prices over the past two decades.

K. P. Mani (2006) has studied the performance of agricultural sector in Kerala with special emphasis on post economic reform period. The rate of expansion of agricultural production in Kerala was high during 1980's. Expansion of non food grains was faster during the second part of decade. During 1990's the growth rate of agricultural production slowed down considerably. The per capita availability of food grains has declined. Decline in the food grain production is directly or indirectly linked to a series of related issues like input supply, markets, price policy,

trade policy etc... Study also mentions that share of gross cropped area under rice has consistently declined. There is a dominance of cash crops like coconut and rubber. Kerala produces only 50 % of required rice.

According to P. M. Thomas (1996) Kerala is a food deficit state and paddy is its major food crop. Over the past several years paddy sector of the state has shown declining trends both in area and production. Major objectives of this study were to assess the performance of paddy crop in Kerala since its formation and to examine the economic causes for the decline of the crop. The study also aimed to identify the current problems in paddy farming. With these objectives we have examined the growth trends in area, production and productivity of paddy crop, role of major sources of productivity in improving the per hectare yield of paddy in the state, absolute and relative profitability of the crop and other factors affecting its performance. The study is based on three hypotheses, *viz.,* (i) sources of productivity in paddy crop such as HYV coverage, annual rainfall and proportion of irrigated paddy area, extent of fertilizer use and plant protection measures have not significantly helped to improve paddy productivity in the state, (ii) low level of per hectare profit in paddy cultivation and low profitability of paddy compared to its alternative crops had resulted in the decline of area under paddy and (iii) other factors like the role of public distribution system in stabilizing paddy prices, growing pressure on land, land price differentials, shortage of labour and capital, absentee land ownership, extensive use of paddy lands for non agricultural purposes and changing attitude of younger generation towards paddy farming have also contributed to the decline of paddy cultivation in the state.

The researcher observes that sustained declining of area under paddy is a process in which marginal paddy lands with comparatively lesser productivity had been going out of cultivation. Low level of

absolute per hectare profits and profitability of paddy crop have played a key role in bringing down the area under the crop in the state. The rate of decline in area under paddy crop in Kerala is related to the absolute profit and profitability of crop. Comparative analysis of profit and profitability of paddy with some of its alternative crops show that paddy cultivation is less remunerative in Kerala during the period 1980-81 to 1989-90, and the per hectare average annual profit of coconut is found to be higher than that of paddy.

Rajalakshmi's (2006) analysis of the shifting of paddy cultivation is essentially an empirical study. The study was based on two hypotheses, *viz;* (1) Low profitability of paddy when compared to its alternate crops induced paddy farmers either to keep their paddy fields fallow or shift to the cultivation of alternate crops which are less labour intensive, and (2) Small size of per capita holding, part time nature of cultivation and other non-economic factors like the changing outlook of the agricultural labourers and their resultant non availability for work in paddy fields also forced them to shift from paddy cultivation. The economics of paddy cultivation has been examined in this study with net returns approach. On the basis of estimated cost of cultivation and the gross income generated, the net returns and the cost benefit ratio were estimated. The relationship between farm size and productivity was examined by estimating log-linear regression of farm size on productivity. The researcher examines the economics of paddy cultivation in Kerala, identifies the determinants of shifting, and the current problems faced by the paddy cultivators. One of the findings is that paddy cultivation, being labour-intensive and comparatively less remunerative crop, is giving way to plantain, coconut, tapioca, and rubber. Current problems faced are non-availability of labourers, improved machines, equipments, trained service mechanics and thrasher operator.

Bathla (2008) studied the regional dimensions of inter-crop diversification in India. To what extent area shifts have taken place within the cropping sector and what implications do such inter-crop diversifications have for the growth of the sector? This paper intends to explore these two questions by analyzing the temporal and spatial changes in the cropping pattern of principle crops, measuring the magnitude of crop diversification across the crop groups and evaluating the sources of output growth of major crops. The analysis is carried out over a longer period of time from 1971/72 to 2002/03 at all India and from 1980/81 to 2002/03 across the states.

Review Summary

Review No.	Name of the author	Problem discussed
1	H. R. Sharma (2005)	Crop shifting/ diversification
2	Mruthyunjaya and Praduman Kumar (1989)	Shift from coarse cereals to superior cereals
3	P. K. Varghese (2004)	Export price determine whole sale price and auction price
4	Birthal *et. al*., (2006)	Shift to high value crop, market , infra
5	Ramesh Chand (1996)	Profitability based on profitability
6	Chowdry *et. al*., (1996)	Diversification- production- income
7	G. R. Patil (1996)	Diversification- productivity
8	Salik Ram and M.P. Tripathy (1996)	Diversification and shifting
9	A.K. Sharma *et. al.*, (1996)	Large Size- Less Risk
10	D.D. Gupta and Dalvir Singh (1996)	Less remunerative- high remunerative
11	K. J. Joseph and M. V.	Shifting to rubber from tapioca and

Review No.	Name of the author	Problem discussed
	Srinivasagowda (1996)	rice
12	S.P. Saraswat (1996)	Irrigation
13	T. Raman and N. K. Sharda (1996)	Diversification tradition
14	Mandal and Bezbaruab (2013)	Alluvial deposition by flood leads to diversification
15	N. Narayana (2000)	Shifting – tapioca to rubber
16	Dhindsa and Sharma (1995)	Cropping pattern - Shift to wheat
17	Kapur and Kahlon(1967)	Production technology changes – increase pdn
18	Ghosh *et al.* (2005)	Food to non food
19	Padma (1999)	Shift from rice
20	George (1965)	Price - rubber
21	Bhatnagar (2009)	Commercial cultivation- to wheat
22	Rajalakshmy G. (2009)	Productivity
23	Ray and Ghosh (2007)	Over utilization of fertilizers – less yield
24	Duhan and Yadav (2010)	Productivity - rice
25	Deshmukh M. S. (2010)	Liberalisation – increase in exports
26	Dantwala M. L. (1986)	Price influence – lalam rubber
27	Mani P.S. Mundin (1983)	Area not change – rice – eco-non eco reasons
28	Shinde (2009)	Profitability and quality
29	S. Venkiteswaran (1984)	Declining area of rice
30	Selavarathnam (1985)	Shades of perennial crops & Menace of monkeys (area of tapioca)
31	Devyanee Nemade and Rachana Wankhade	Crop diversification

Review No.	Name of the author	Problem discussed
	(2010)	
32	T. Haque (1985)	Shifting based on income
33	A. J. Singh *et.al*.,(1985)	Fertilizer
34	R. P. Gupta and S. K. Tewari (1985)	Irrigation
35	Amrik S. Saini and Raj Vir Singh (1985)	Credit - puzhakkal
36	P. V. Throve and V. D. Galgalikar (1995)	Cost
37	Dayakar Rao and Shahid Parwez (2005)	Income
38	J. P. Singh and V. P. Sharma (2000)	Subsidy
39	L. S. Venkata Raman and M. Prahaladachar (1978)	Price
40	Ashok Gulati and Pradeep K. Sharma (1990)	Profitability
41	Desai (1977)	Influence of Income on rice
		Influence of income on rubber
42	K. Sivasubramaniyan (2000)	Irrigation
43	P.C. Bansil (1972)	Productivity
44	P. L. Gulani and A. S. Sirohi (1972)	Productivity
45	S. Senthilnathan and J.S. Amarnath (1996)	Other crops
46	Rajesh Sharma *et. al.,* (1996)	Profitability
47	T.S. Chahal and H.S. Prehar (1996)	Efficient utilisation of resources
48	Raj Krishna (1963)	Relative profitability

Review No.	Name of the author	Problem discussed
49	G. C. Mandal and Sukesh K. Ghosh (1963)	Profitability
50	R.P Singh (1972)	Fertilizer
51	Gurudev Singh and Hari Prakash (1972)	Area increased
52	Umananda Phukan (1972)	Lack of Irrigation
53	V.P.S.Arora and B.Prasad (1972)	Credit
54	Katar Singh and K.M.B. Rahim (1978)	Fertility
55	V. Rajagopalan and S. Varadarajan (1978)	Risk avoiding
56	V.S. Vyas (1980)	Infrastructure
57	C.S Raghubanshi (1968)	Multiple cropping pattern
58	Jeemol Unni (1983)	Cost
59	K.P. Mani (2006)	Decrease in production of rice
60	P.M.Thomas (1996)	Decline in area of paddy
61	Rajalakshmi (2006)	Decline in area of paddy
62	Bathla (2008)	Shift to HYV seeds

1.3 RESEARCH GAP

Primary investigations on the shifting of agricultural crops during the last two decades suggest that the period after India became a signatory to the WTO Agreement in 1995 witnessed shifting of crops—from food crops to cash crops, and from cereals to pulses and vegetables—at increasing rates compared to the pre-WTO Agreement years. Though there is general awareness on the impact of WTO Agreements on the agrarian sector, the question of the impact of the WTO Agreement on

shifting of the cropping patterns in Kerala has not yet received sufficient scholarly attention. The impact of trade on the agricultural production of Kerala's five major crops - rice, tapioca, coconut, pepper and rubber has also been dealt with in detail.

1.4 RESEARCH PROBLEM UNDER INVESTIGATION

There have been significant changes in the cropping pattern of India in general. Kerala too has seen significant changes in the cropping pattern since the 1980s. Therefore, we need to look into the shift in the pattern in Kerala. Several factors such as productivity, costs of production, prices *etc.*, can cause the shift in cropping pattern. In the case of Kerala's agricultural sector, what are the important determinants of the shift? How have these determinants been affected by the WTO Agreement? With the advent of the WTO reforms and policies, farmers have been forced to face international price fluctuations. International competition has important implications for Kerala's farmers. There has been a general trend of shift from food crops to cash crops in India. How far is the increase in the production of cash crops and decrease in the production of food crops in Kerala, a result of the impact of WTO Agreement? Are there any other implications of the WTO Agreement on the major crops of Kerala? What has been the experience of the farmers and the constraints faced by them?

1.5 OBJECTIVES

The main objectives of the study are:

1. To examine the trends in area, production and yield of major crops in Kerala since 1980.
2. To identify the determinants of shifts in cropping pattern.
3. To analyse the implication of WTO policies on major crops in Kerala.

4. To identify constrains experienced by farmers as a consequence of liberalisation and trade reforms.

1.6 HYPOTHESIS

1. WTO significantly influenced cropping pattern in Kerala

1.7 METHODOLOGY OF THE STUDY

This section discusses the methodological aspects of the study. It deals with the sources of data, sample design, selection of the sample farmers, methods of data collection and statistical tools.

1.8 SOURCES OF DATA AND SAMPLE DESIGN

The study made use of both primary and secondary sources of data. The secondary data were mainly collected from Ministry of Statistics and Programme Implementation (MoSPI), Planning Commission, International Monetary Fund, World Trade Organisation, Directorate of Economics and Statistics (DoES), Ministry of Agriculture, Ministry of Agriculture and Farmers' Welfare, Government of India, and *Economic Survey*. Kerala specific data were also collected from Kerala State Planning Board's *Economic Review* (various years), Kerala Agricultural Statistics Division, Spices Board, Coconut Development Board, Indian Rubber Statistics and Rubber Board. Data were also collected from *EPW* Research Foundation and from www.indiastat.com.

For the primary survey, the sample was collected so as to cover three geographic areas or eco zones- namely, lowland, midland, and highland according to the principle of multistage sample. From each of these zones, one district was chosen, and finally, from each district, one block was selected. So we selected Vypin Block from Ernakulam, Puzhakkal Block from Thrissur and Lalam Block from Kottayam.

From each block, we considered only those farmers who owned at least 40 cents of land. This was done as the objective of the study is to check the implications of WTO policies on the cropping pattern. To check the impact of trade, we require data from farmers who cultivate for purposes other than self-consumption.

From this set of farmers, 100 farmers were selected randomly from each block- Vypin, Puzhakkal and Lalam. The information was collected directly through the use of a pre-tested schedule and interview method. The schedule included questions related to area, production, yield of five major crops- rice, tapioca, rubber, pepper and coconut. It looked into the cropping pattern before and after 1990 and 1995. The schedule also asked the opinions of the farmers regarding implications of WTO and constraints faced by them.

To get an idea about the overall figures related to international trade in the case of rubber, pepper and coconut, data were also collected from the Rubber Board, Spices Board and Coconut Development Board. Officials of these institutes were also interviewed to get an idea about the impact of Sanitary and Phytosanitary (SPS) measures and different trade agreements on the trade in related crops. Further, the officer in charge of Directorate of Plant Protection, Quarantine and Storage, Plant Quarantines station- an institute that certifies fulfilment of the SPS measures was also contacted.

The most commonly used tools for analysing the general characteristics of primary data were averages, percentages, diagrammatic methods. Multiple regression method was used to identify the influence of the determinants of cropping pattern.

1.9 SCHEME OF THE STUDY

The present study is divided into six chapters. The first chapter deals with the introduction which covers literature review, research gap, statement of the problem, objectives, methodology and sources of data.

The second chapter gives an overview of Indian agriculture.

The third chapter analyses area, production and yield and implications of WTO policies.

The fourth chapter analyses the various determinants of the cropping pattern, the influence of rise in prices on area, production and yield of 4 crops and examines the constraints experienced and reported by the farmers.

Chapter five looks at the export and import trends of three crops-rubber, coconut, and pepper. It also looks into the impact of SPS measures on Indian exports. We further look into the impact of ten important Free Trade Agreements that India has entered into besides WTO.

The sixth chapter presents findings, summary and policy implications of the study.

Chapter II

INDIAN AGRICULTURE: AN OVERVIEW

CHAPTER II

INDIAN AGRICULTURE- AN OVERVIEW

2.1 INDIAN AGRICULTURE IN A GLOBAL CONTEXT

India is one of the fastest growing economies of the world and is currently the focus of international attention. It is the seventh largest country in the world in terms its geographical size. Today it has a population of nearly 1.34 billion which makes it the second most populous nation in the world. Even though industrial sector and services sector made rapid expansion in recent years, primarily India is an agrarian economy. India's status in the world agriculture is very significant.

2.2 INTRODUCTION TO CROPPING PATTERN IN INDIA

There is a conventional argument that agriculture is the back bone of the Indian economy. To a great extent this argument is valid because even after significant structural changes in the Indian Economy as a consequence of reforms, this sector contributes 17% of GDP in 2013-14 year. It provides employment for 48.9% of population in 2011 and liberally contributes towards foreign exchange earnings. These reform process and the resultant changes brought some rapid tilt in the behaviour and performance of the agricultural sector. One important consequence is the notable shift in cropping pattern skewed in favour of cash crops. These trends are the result of two factors; firstly the shift in the cropping pattern, a trend started by late 1980's at the national level for which

various reasons can be attributed. Secondly the reform process compelled this shift because of the new strategy of export led growth. The cropping pattern in favour of cash crops necessitated substantial changes in the composition of inputs and also its distribution. In this chapter a detailed discussion is made on the shift in cropping pattern at the national level and at the state level. Before entering into a discussion on cropping pattern, a brief profile of the Indian agriculture is also presented.

2.2.1 Share of Agriculture in GDP of India

As mentioned above the share of agriculture in the GDP of India is consistently declining which is evident from table 2.2.

Table 2.1 **India's Position in world agriculture in 2015**					
Item	India	World	Percentage share of India	Rank	Next to
Area (million ha) (a) Land (b) Arable land	 297 159	 13009 1411	 2.3 11.3	 7 2	Russian Federation, China, USA, Canada, Brazil, Australia USA
Crop Production (million ton)					
Cereals (total)	267	2521	10.6	3	China, USA
Wheat	79	683	11.5	2	China
Rice	148	686	21.6	2	China
Pulses(total)	15	681	24.6	1	
Groundnut	6	58	10.3	3	China, Canada
Potatoes	35	326	10.6	2	China
Onion(Dry)	14	73	18.5	2	China
Sugarcane	348	1736	20.1	2	Brazil
Tea	0.81	3.90	20.7	3	China, Turkey
Coffee(green)	0.26	8.25	3.2	7	Brazil, Vietnam, Colombia, Indonesia, Ethiopia, Mexico
Cotton(lint)	3.77	22.85	16.5	2	China
Tobacco leaves	0.52	6.88	7.6	3	China, Brazil

Source: Agricultural Research Data Book (2015), Indian Agricultural Statistics Research Institute, New Delhi.

Table 2.2 GDP in India (1960-2015)			
YEARS	GDP (crore INR)		
	2002004 – 2005 (Base Year)5	GDP at Current Year	Share of agriculture**
1960-61	410,279	17,049	7434
1970-71	589,787	44,382	19086
1980-81	798,506	136,838	50760
1990-91	1,347,889	531,814	168166
1995-96	1,737,741	1,118,586	319243
2000-01	2,348,481	2,000,743	506476
2005-06	3,253,073	3,390,503	732234
2010-11	4,918,533	7,248,860	1524552
2013-14	5,741,791	10,472,807	2248888*

SOURCE: Ministry of Statistics and Programme Implementation, Planning Commission, Government of India, International Monetary Fund (October- 2016).

**advanced estimate*

*** Agriculture includes: agriculture, forestry and fishing, mining and quarrying.*

From table 2.2 it is seen that GDP of India at current prices remains at Rs.17049 crores in 1960-61 which reached Rs.531834crores by the end of 1991, the starting year of reforms. Further data revealed the consistent increase of GDP of India which touched Rs.10471807 crores by the end of 2013-14. Correspondingly, the value of agriculture remained at Rs.7434 in 1960-61, Rs.168166 by the end of 1990-91 and Rs. 2248888 by the end of 2013-14. In terms of percentage share of agriculture in GDP remained at 43.60 % in 1960-61, 31.62 % in 1991 and 17 % in 2013-14. Thus it is evident that there is a consistent fall in the share of agriculture since reforms. This does not mean that the

significance of agriculture is declining in the economy and succeeding discussion will substantiate this argument.

2.2.2 Land Utilisation Pattern in India

The land utilisation pattern is discussed in table 2.3.

Table 2.3
Pattern of land utilisation – All India('000 hectares)

	1960-61	1970-71	1980-81	1990-91	1995-96	2000-01	2005-06	2010-11
Classification of reported area :								
Forest	54052	63830	67460	67805	68817	69529	69775	70028
2. Not available for cultivation	50751	44606	39554	40476	41371	41478	42582	43574
3.Permanent pastures & other grazing lands	13966	13261	11989	11404	11064	10666	10428	10305
4. Land under misc. tree crops & groves (not included in net area sown)	4459	4367	3578	3818	3481	3441	3422	3204
5. Cultivable waste land	19212	17500	16744	14995	14098	13630	13154	12647
6. Fallow land other than current fallow	11180	8728	9720	9662	10016	9884	10020	10323
7. Current fallows	11639	10598	14826	13703	13831	14778	13789	14275
8. Net area sown	133199	140863	140288	142999	142197	141365	141810	141563
Area sown more than once	19573	24928	32342	42743	45274	43980	50800	56000
Total cropped area	152772	165791	172630	185742	187471	185344	192611	197563

Source: (1960-61 to 2005-06) Directorate of Economics and Statistics, Ministry of Agriculture (2010 – 11) MOSPI

From table 2.3 it is seen that there is an increase of 3.27% in the area under forests between 1980-81 and 2010-11. The most important indicators are net area sown and total cropped area. In the case of net area sowed, it was 133199000 hectares in 1960-61 which increased to 141365000 hectares in 2000-01. But since then further increase in net area sown is also noticed. In the case of total cropped area, area remained at 152772000 hectares in 1960-61 which increased to 1585742000 hectares in 1990-91; the rate of increase being 21.58% between 1990-91 and 2010-11. This further increased to 11821000 hectares, the rate of increase being 6.36%. These trends indicate that in terms of total cropped area reforms has not adversely affected. In other words these are indications that agriculture is again getting prominence at least in total cropped area even after reforms. The utilisation pattern of total cropped area will disclose more. Hence in the succeeding section area under major food crops are discussed, firstly at macro level, followed by crop wise.

2.2.3 Area of Major Food Crops in India

Table 2.4
Area of major food crops in India 1950-2015
(' 000 Hectare)

Years	Rice	Jowar	Bajra	Maize	Ragi	Wheat	Pulses	Oilseed	Total food crops
1950-51	31056	15554	9744	3250	2254	10010	20554	10968	103390
1960-61	34056	18426	11470	4401	2478	12931	23665	12777	120204
1970-71	37381	16871	13391	5856	2474	18293	23126	14719	132111
1980-81	40237	16412	11658	6032	2504	22225	22708	15698	137474
1990-91	42744	14158	10735	5893	2145	24046	24883	25152	149756
2014-15 (AE)	43855	5299	7118	9258	1201	30969	23098	25726	146524

AE: Advanced estimates

Note: Figures in parenthesis give area in thousand hectares for which crop-wise details are not available but has been included in total Area under crops.

Source: Ministry of Agriculture, Govt. of India & MOSPI, Govt. of India

From table 2.4 it is seen that total food area under crops remained at 103390 thousand hectares in 1950-51, share of major food crops rice and wheat respectively being 30.04% and 9.68%. In the initial year of reforms area under food crops increased by 44.85% the share of rice being 28.54% and wheat being 16.06%. Thus compared to 1950-51, the percentage area under rice declined and percentage area of wheat increased in 1990-91. In the next decade the area under food crops almost remained stagnant with marginal variations. This has happened mainly due to two reasons, one being conversion of agricultural land for nonfarm activities and also shift in favour of non food crops which are considered to be rich in income and profit. Generally this is the rule of the day.

2.2.4 Production of Major Food Crops in India

Table 2.5
Production of major food crops in India 1950-2015
('000 Tonnes)

Years	Rice	Jowar	Bajra	Maize	Ragi	Wheat	Pulses	Oilseed	Total food crops
1950-51	20600	5495	2600	1729	1429	6460	8411	6200	52924
1960-61	34600	9814	3300	4080	1838	11000	12704	6980	84316
1970-71	42200	8105	8000	7486	2155	23830	11818	9540	113134
1980-81	53600	10431	5300	6957	2420	36310	10627	9373	135018
1990-91	74300	11681	6900	8962	2340	55140	14265	18609	192197
1995-96	77000	9327.1	5400	9534	2501	62100	12310	22107	200279.1
2000-01	85000	7529.4	6800	12043	2732	69680	11076	18440	213300.4
2005-06	91800	7629.6	7700	14709	2354	69350	13384	27978	234904.6
2010-11	96000	7003.1	10400	21726	2193	86870	18241	32477	274910.1
2014-15	105500	5445.3	9200	24172	2061	86530	17152	27511	277571.3

Source: Ministry of Agriculture and Farmers Welfare, Govt. of India & Past Issues

From table 2.5 it is seen that total production under food crops remained at 52924 thousand tonnes in 1950-51, share of major food crops rice and wheat respectively being 38.92% and 12.21%. In the initial year of reforms, production under food crops increased by 263.16%, the share of rice being 38.66% and wheat being 28.68%. Thus, compared to 1950-51, the percentage production under rice slightly declined and percentage production of wheat increased in 1990-91. In the next decade the production under food crops increased sharply. This has happened mainly due to two reasons, one being increase in the productivity and other being a shift in favour of food crops which are considered to be yielding greater income and profit. Generally this is the rule of the day.

2.2.5 Productivity of Major Crops in India

Table 2.6

Productivity of major food crops in India 1950-2015

(in kg/ hectare)

Years	Rice	Jowar	Bajra	Maize	Ragi	Wheat	Pulses	Oilseed	Total food crops
1950-51	668	353	288	547	649	663	441	520	4129
1960-61	1013	533	286	926	731	851	539	507	5386
1970-71	1123	466	622	1279	872	1307	524	578	6771
1980-81	1336	660	458	1159	958	1630	473	532	7206
1990-91	1740	814	658	1518	1078	2281	578	771	9438
1995-96	1797	823	577	1595	1410	2483	552	851	10088
2000-01	1900	764	688	1822	1553	2708	544	810	10789
2005-06	2102	880	802	1938	1534	2619	597	1004	11476
2010-11	2239	949	1079	2540	1705	2989	691	1193	13385
2014-15	2391	884	1272	2632	1706	2750	728	1075	13438

Source: Ministry of Agriculture and Farmers Welfare, Govt. of India (ON1299) & Past Issues

From table 2.6 it is seen that total productivity under food crops remained at 4129 kg/hectare in 1950-51, share of major food crops rice and wheat respectively being 16.18% and 16.06%. In the initial year of reforms, productivity under food crops increased by 128.58%, the share of rice being 18.44% and wheat being 24.17%. Compared to 1950-51, the percentage productivity under rice increased and percentage productivity of wheat increased in 1990-91. In the next decade the productivity under food crops increased sharply. One of the reasons for this is use of HYV seeds through increase in the research and development activities and another one is a shift in favour of food crops which are considered to be yielding greater income and profit.

2.3 INTRODUCTION TO CROPPING PATTERN IN KERALA

Agriculture sector continues to be an important sector of the Kerala economy. This argument is valid because even after significant structural changes in the Kerala Economy as a consequence of reforms, this sector has contributed to 11.36 % of GSDP in 2014-15. It provides employment to 17.16 % of population in 2011 (Economic Review, 2011) and liberally contributes towards foreign exchange earnings. The behaviour and performance of the agricultural sector have witnessed significant changes due to these reform processes and the resultant changes. A notable shift in cropping pattern skewed in favour of cash crops is one of the important consequences. This is in keeping with the shift in the cropping pattern, seen at the national level- a trend that started by late 1980's for which various reasons can be attributed. The reform process compelled this shift because of the new strategy of export led growth. The changes in the cropping pattern in favour of cash crops have led to substantial changes in both composition as well as distribution of inputs. A detailed discussion is made here on the shift in cropping pattern

at the state level. Before entering into a cropping pattern a brief profile of Kerala agriculture is also presented.

2.3.1 Share of Agriculture in GSDP of Kerala

As mentioned above the share of agriculture in the GSDP of Kerala is consistently declining which is evident from table 2.7.

Table 2.7
GSDP of Kerala

	GSDP (crore)	Share of agriculture& allied activities in GSDP (crore)	GSDP (crore) AT CURRENT PRICE	Share of agriculture & allied activities in GSDP (crore) at current price
Years	1999-2000 (base year)			
1960-61	462	241	461.98	254.089
1970-71	1255	652.6	2207.21	620.47
1980-81	3823	1682.12	6189.18	1399.33
1990-91	12195	4756.05	18591.44	3872.54
1995-96			42510.88	9959.80
2000-01	63715	14017.3	72658.83	11424.49
2005-06			125588.08	16990.22
2010-11			263773.30	
2014-15	432364(quick estimate)	47984.53	519895.85(q)	59076.77(q)
2015-16	46724313	49206.31	588336.59(q)	

Source: Department of Economics and Statistics, 2005, 2009

Economic Survey 2014,2015, 2016

Compiled from Economic Review 1970, 1992, 2010, 2011, 2012, 2013, 2014, 2015, 2016.

q: quick estimate.

In table 2.7, we can see that the GSDP of Kerala at current prices increased from Rs. 461.98 crores in 1960-61 to Rs. 18591.44 crores by the end of 1991. Consistent increase of GSDP of Kerala touched the figure Rs.519895.85 crores by the end of 2014-15. The value of agriculture remained at Rs.254.09 in 1960-61, Rs.3872.54 by the end of 1990-91, and Rs. 59076.77 by the end of 2014-15 respectively. The share of agriculture in the GSDP of Kerala which was 55 % in 1960-61, gradually reduced to 20.82 % in 1991 and 11.36 % in 2014-15. There has thus been a consistent fall in the share of agriculture since the 60s. This trend has continued after the reforms as well. However, this does not mean that the significance of agriculture is declining in the economy. The following discussion will substantiate this argument.

2.3.2 Land Utilisation Pattern in Kerala

The land utilisation pattern is discussed in table 2.8

Table 2.8. Land utilisation pattern

Classification of area/year	1960-61	1970-71	1980-81	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	2015-16
Total geographical area	3858523	3858523	3885497	3885497	3885497	3885497	3886287	3886287	3886287	3886287
Forest	1056048	1055733	1081509	1081509	1081509	1081509	1081509	1081509	1081509	1081509
Land put to non agricultural use	204645	275000	269824	297381	313131	381873	370322	384174	419828	434646
Barren and uncultivable land	151341	72000	85770	58308	43154	29318	26457	19573	12952	13100
Permanent pastures and other gazing land	45228	27800	5432	1912	1170	164	274	153	5	0
Land under misc. tree crops	204260	130000	63875	34375	26852	15409	9526	3690	2653	2663
Cultivable waste	143409	80000	129032	94608	74382	59257	66133	91665	100676	99499
Fallow other than current fallow	62739	23000	26886	26466	29143	33988	45171	51943	54741	55258
Current fallow	67122	24000	43579	44164	51314	77853	70166	76028	65329	70003
Net area sown	1923731	2170990	2179590	2246774	2264842	2206126	2132483	2071507	2042881	2023073
Area sown more than once	425158	762010	705250	773206	802383	815546	853244	575954	581743	604503
Total cropped area	2348889	2933000	2884840	3019980	3067225	3021672	2985727	2647461	2624624	2627576.59

Source: Kerala State Board in Association with Department of Economic and Statics Government of Kerala, Economic Review 2011

Table 2.8 shows that there is no change in the area under forest between 1980-81 and 2010-11. Net area sowed increased from 1923731 hectares in 1960-61 to 2023073 hectares in 2015-16. The total cropped area remained at 2348889 hectares in 1960-61 which increased to 3019980 hectares in 1990-91, the rate of increase being 28.57%. There is a decrease of 392403.41 hectares between 1990-91 and 2015-16, the rate of decrease being 12.99%. Thus in terms of total cropped area, these trends indicate that the Reforms have had an adverse effect. These are indications that agriculture is losing prominence in total cropped area after reforms. The area under major food crops are discussed in the succeeding section for assessing the utilisation pattern of total cropped area, both at macro level and crop wise.

2.3.3 Area of Major Food Crops in Kerala

Table 2.9
Area of major food crops in Kerala1960-2015

(in 000' Hectare)

Years	Rice	Tapioca	Banana and other plantain	Cashew	Sugarcane	Mango	Oilseed	Other food crops	Total food crop
1960-61	778.913	242.206	44.425	54.319	9.146	59.561		215.410	1565.154
1970-71	874.930	422.210	48.8	102.7	7.7				
1980-81	801.699	244.990	49.262	139.917	8.041	62.574		181.690	1778.001
1990-91	559.450	146.493	65.637	115.621	7.625	75.480		172.935	1466.182
1995-96	471.150	113.601	72.861	103.284	5.623	81.874		200.474	1441.390
2000-01	347.455	114.609	99.412	92.122	3.367	90.571	933.397	331.688	1349.076
2005-06	275.742	90.539	116.622	78.285	6.844	87.965	904.257	354.897	1318.646
2010-11	213.187	72.3	107.800	43.848	2.845	62.200	773.847		
2014-15	198.159	75.49	118.697	45.436	1.517	77.301	795.369		
2015-16	196.870	69.405	117.518	43.090	1.361	79.992			982.301

Source: Kerala State Planning Board in association with Department of Economics and Statistics, Govt. of Kerala (1960-2006).

Agricultural Statistics 2010-11, 2014-15, 2015-16

Directorate of Economics and Statistics (2010-2015 cashew, sugarcane, rice, sugarcane & oilseeds)

1970-71: Banana & other Plantain – Economic Review 1972

From table 2.9, it is seen that the total area under food crops remained at 1565154 hectares in 1960-61, share of major food crops for rice and tapioca respectively being 49.77% and 15.47%. In the initial year of reforms, the area under food crops decreased by 6.32%, the share of rice being 38.16% and tapioca being 9.99%. Thus compared to 1960-61, area under rice and tapioca declined in 1990-91. In the next decade also, the area under food crops slightly declined. Thus it is evident that in the case of food crops there is a general decline in recent years. Mainly two reasons can be pointed out. One is, conversion of agricultural land to non-farm activities. The second is a shift in favour of cash crops which are considered to be yielding more income and profit.

In the succeeding section an attempt is made to examine the shift in the cropping pattern in Kerala.

2.4 AREA, PRODUCTION AND YIELD OF FIVE MAJOR CROPS IN KERALA (1980-2015)

We now turn our attention to five major crops of the Kerala Economy. For the purpose of our study, we consider two staple food crops- rice and tapioca. Further, we consider three important cash crops- pepper, rubber and coconut. The following sections deal with the agricultural trends of each of these crops during the period 1980-2015, in detail.

2.4.1 Area, Production and Yield of Rice in Kerala (1980-2015)

Table 2.10

Area, production and yield of rice in Kerala (1980-2015)

Year	Area (in '000 hectare)	Production (in '000 tonnes)	Yield(kg/hectare)
1980-81	801.7	1272	1587
1983-84	740.1	1207.9	1632
1986-87	663.8	1133.8	1708
1989-90	583.4	1141.2	1956
1992-93	537.6	1084.9	2018
1995-96	471.2	953	2022
1998-99	352.6	726.7	2061
2001-02	322.4	703.5	2182
2004-05	290.0	667.1	2301
2007-08	228.9	528.9	2308
2010-11	213.1	522.7	2452
2013-14	199.6	509.2	2551
2014-15	198.2	562.1	2836

Source: Directorate of Economics and Statistics, Department of Economics and Statistics

Area under Rice in Kerala

The cultivated area of rice showed a decreasing trend during 1980-2015. This can be seen in table 2.10. During 1980-81 the cultivated area was 801.7 thousand hectares; it decreased to 198.2 thousand hectares in 2014-15. There was a reduction of 603.5 thousand hectares with a negative growth rate of 75.27 % and a negative average growth rate of 2.15 % per annum. We split up the study period, 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015)

period. During 1980-81 the cultivated area was 801.7 thousand hectares; it decreased to 503.2 thousand hectares in 1994-95. There was a negative growth rate of 37.22 % and a negative average growth rate of 2.5 % per annum. We can see that during pre-WTO period, the cultivated area showed a decreasing trend. This reduction in the cultivated area may be because of lack of profitability, shift from rice to plantain, rubber, coconut, house construction; and shortage of labourers, increase in the labour charges and unavailability of irrigation facilities. During the post-WTO period the cultivated area decreased from 471.2 thousand hectares in 1995-96 to 198.2 thousand hectares in 2014-15. There was a negative growth rate of 57.93 % and a negative average growth rate of 2.89 % per annum. The cultivated area of rice in post-WTO period also showed a decreasing trend. This reduction in the cultivated area may also be attributed to the same factors as in the earlier period.

Production of Rice in Kerala

During 1980-2015 the production of rice showed a decreasing trend. The production of rice decreased from 1272 thousand tonnes in 1980-‘81 to 562.1 thousand tonnes in 2014-‘15. There was a reduction of 709.9 thousand tonnes with a negative growth rate of 55.81 % and a negative average growth rate of 1.59 % per annum. We split up the study period, 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015) period. During 1980-‘81 the production was 1272 thousand tonnes; it decreased to 975.1 thousand tonnes in 1994-‘95. There was a negative growth rate of 23.34 % and a negative average growth rate of 1.55 % per annum. We can see that the production of rice in pre-WTO period showed a decreasing trend. This may be due to unfavourable climatic conditions, labour shortage, lack of profitability and decrease in cultivated area. During post- WTO period the production decreased further from 953 thousand tonnes in 1995-‘96 to 562.1

thousand tonnes in 2014-‘15. There was a negative growth rate of 41.02 % and a negative average growth rate of 2.05 % per annum. This decreasing trend is explained by the exacerbation of the same factors that were prevalent in the pre-WTO period.

Yield of Rice in Kerala

During 1980-2015 the yield of rice showed an increasing trend. During 1980-‘81 the productivity of rice was 1587 kg/hectare; it increased to 2836 kg/hectare in 2014-‘15. There was an increase of 1249 kg/hectare with a growth rate of 78.74% and an average growth rate of 2.24 % per annum. We split up the study period, 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015) period. During 1980-81 the productivity was 1587 kg/hectare; it increased to 1937 kg/hectare in 1994-95. There was a growth rate of 22.05 % and an average growth rate of 1.44 % per annum. We can see that the productivity of rice in pre-WTO period showed an increasing trend. This may be due to efficient use of agricultural inputs, high yielding varieties of seeds, formation of agriculturists’ cooperatives. In post- WTO period the productivity of rice increased from 2023 kg/hectare in 1995-96 to 2836 kg/hectare in 2014-15. There was a growth rate of 40.25 % and an average growth rate of 2.01 % per annum. In post-WTO period the productivity of rice showed an increasing trend. Here, annual average growth rate attained during this period was greater than the annual average growth rate of rice in pre-WTO period. This may be due to Research and Development, use of HYV seeds and formation of agriculturists’ cooperatives.

2.4.2 Area and Production of Rice-A District Wise Comparison

The following section takes a look at the trends in area under cultivation and production levels of rice at the district wise level.

Table 2.11
Area of rice in Kerala (hectares) – A district wise comparison

DISTRICT	YEARS								CHANGE		AVERAGE	
	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	1980-2015	1995-2015	1980-2015	1995-2015
TRIVANDRUM	32583	26352	21677	16986	6995	4705	2919	2093	-30490	-14893	-871.14	-744.65
KOLLAM	50055	34794	30513	23252	14939	7218	3342	1327	-48728	-21925	-1392.23	-1096.25
PATHANAMTHITTA	-	14498	14234	10860	6279	3291	2986	2592	-11906	-8268	-396.87	-413.4
ALAPPUZHA	82466	56045	60675	44132	37740	28768	37060	34415	-48051	-9717	-1372.89	-485.85
KOTTAYAM	31948	31884	26257	24878	16677	12557	14775	17295	-14653	-7583	-418.66	-379.15
IDUKKI	9261	8251	5078	4660	3473	2932	1819	697	-8564	-3963	-244.69	-198.15
ERANAKULAM	102500	84804	63078	56533	37433	24934	9016	4644	-97856	-51889	-2795.89	-2594.45
THRISSUR	110314	95215	74038	58703	39384	31074	20259	24151	-86163	-34552	-2461.80	-1727.6
PALAKKAD	183634	160855	145687	135630	118701	113919	87511	82912	-100722	-52718	-2877.77	-2635.9
MALAPURAM	80022	65462	51934	37919	23148	14885	8949	8402	-71620	-29517	-2046.29	-1475.85
KOZHIKODE	45451	18750	12062	8749	6737	4703	3003	2321	-43130	-6428	-1232.29	-321.4
WAYANAD	-	30767	20343	20388	15000	11503	11054	9690	-21077	-10698	-702.57	-534.9
KANNUR	73465	28268	19582	16801	11791	9223	6339	4955	-68510	-11846	-1957.43	-592.3
KASARGODE	-	22336	14292	11659	9158	6030	4155	2665	-19671	-8994	-655.70	-449.7
TOTAL	801699	678281	559450	471150	347455	275742	213187	198159	-603540	-272991	-17244.00	-13649.55

Source: 1980-81 to 2005-06, Kerala State Planning Board 2009.

2010-011 Economic Review 2013, 2014-2015 Economic Review 2015

Area of Rice in Kerala– A District Wise Comparison

While going through the district wise data of area of rice from 1980 to 2015 we can see from table 2.11 that area of rice showed an decreasing trend from 801699 hectares in 1980-‘81 to 198159 hectares in 2014-‘15 *i.e.,* a total reduction of 603540 hectares, with a negative growth rate of 75.28%. The highest reduction in the cultivated area of rice is noticed in Palakkad district *i.e.,* 100722 hectares. The lowest reduction in the cultivated area of rice is noticed in Idukki district *i.e.,* 8564 hectares.

When we analyse the post-WTO development in the area of rice cultivation, we can see that reduction of area of rice continued *i.e.,* a total reduction of 272991 hectares, with a negative growth rate of 57.94%. The highest reduction in the cultivated area of rice is noticed in Palakkad district *i.e.,* 52718 hectares. The lowest reduction in the cultivated area of rice is noticed in Idukki district *i.e.,* 3963 hectares.

Reduction in the area of rice may be because of inadequate irrigation, slower increase in price of rice relative to other food items, shortage of labour, high wage, shift in investment from cultivated area of rice to non agricultural purposes, neglect of rice cultivation due to lack of profitability, and climatic unpredictability.

Table 2.12
Production of rice in Kerala (tonnes) – A district wise comparison

DISTRICT	YEARS								CHANGE		AVERAGE	
	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	1980-2015	1995-2015	1980-2015	1995-2015
TRIVANDRUM	45986	47106	38363	31831	14469	11034	6923	5561	-40425	-26270	-1155	-1313.50
KOLLAM	82189	60835	58385	45370	30812	16063	7155	3150	-79039	-42220	-2258.26	-2111.00
PATHANAMTHITTA	-	27715	33226	27210	17159	7518	6628	7573	-20142	-19637	-671.40	-981.85
ALAPPUZHA	144858	111971	131663	121047	103544	71748	91325	103095	-41763	-17952	-1193.23	-897.60
KOTTAYAM	58478	58104	62719	55609	43055	31261	40970	49393	-9085	-6216	-259.57	-310.80
IDUKKI	15503	16845	10953	10817	7892	7500	4744	1803	-13700	-9014	-391.43	-450.70
ERANAKULAM	144601	142756	102689	101951	65307	48033	17823	9974	-134627	-91977	-3846.49	-4598.85
THRISSUR	147571	151936	129287	113698	82105	72951	53079	76016	-71555	-37682	-2044.43	-1884.10
PALAKKAD	373782	306980	324907	280405	262173	266634	218155	236398	-137384	-44007	-3925.26	-2200.35
MALAPURAM	107488	93056	80830	65208	43797	31377	21069	22279	-85209	-42929	-2434.54	-2146.45
KOZHIKODE	54144	22394	14834	10593	9045	6314	3814	3423	-50721	-7170	-1449.17	-358.50
WAYANAD	-	54800	41974	46654	33802	28385	27911	26168	-28632	-20486	-954.40	-1024.30
KANNUR	97362	43102	32308	26050	20684	17383	13308	11164	-86198	-14886	-2462.80	-744.30
KASARGODE	-	35451	24440	19583	17484	13786	9834	6095	-29356	-13488	-978.53	-674.40
TOTAL	1271962	1173051	1086578	956026	751328	629987	522738	562092	-709870	-393934	-20282	-19696.70

Source:1980-81 to 2005-06, Kerala State Planning Board 2009

2010-11 Economic Review 2013, 2014-15 Economic Review 2016

Production of Rice in Kerala– A District Wise Comparison

While going through the district wise data of production of rice from 1980 to 2015 we can see in table 2.12 that production of rice showed a decreasing trend from 1271962 tonnes in 1980-81 to 562092 tonnes in 2014-15 *i.e.,* a total reduction of 709870 tonnes, with a negative growth rate of 55.81%. The highest reduction in the production of rice is noticed in Palakkad district *i.e.,* 137384 tonnes. The lowest reduction in the production of rice is noticed in Kottayam district *i.e.,* 9085 tonnes.

When we analyse the post-WTO development in the production of rice, we can see that reduction in the production of rice continued *i.e.,* a total reduction of 393934 tonnes, with a negative growth rate of 41.21%. The highest reduction in the production of rice is noticed in Ernakulam district *i.e.,* 91977 tonnes. The lowest reduction in the production of rice is noticed in Kottayam district *i.e.,* 6216 tonnes.

Reduction in the production of rice may be because of decrease in area, shift of investment from cultivation of rice to non-agricultural activities, neglect of rice cultivation due to climatic unpredictability and labour problems. Another important factor could be the change in consumption patterns of the population. There has been a gradual shift in the consumption basket from cereals to non cereal items. People now-a-days prefer a more diversified diet including commodities such as pulses, milk and milk products, fruits, eggs, meat products *etc*. As a result, there has been a fall in demand for cereals, in general. In addition to this, the slower growth of price of rice relative to other food items reduces the incentive to produce more rice.

2.4.3 Area, Production and Yield of Pepper in Kerala (1980-2015)

Table 2.13
Area, production and yield of pepper in Kerala (1980-2015)

Year	Area (In '000 hectares)	Production (in '000 tonnes)	Yield (kg/ hectares)
1980-81	108.1	28.5	264
1983-84	106.1	24.5	231
1986-87	128.9	30.4	236
1989-90	167.1	54.1	324
1992-93	183.5	49.7	271
1995-96	191.6	68.6	358
1998-99	182.4	68.5	376
2001-02	204.0	58.2	286
2004-05	237.7	75.0	315
2007-08	175.7	42.0	239
2010-11	172.2	45.3	263
2013-14	84.9	38.7	456
2014-15	85.4	40.7	477

Source: (1980-81 to 2010-11) Directorate of Economics and Statistics; Department of Economics and Statistics. (2011-12 to 2014-15) Spices Board, India.

Area under pepper in Kerala

The cultivated area of pepper showed a decreasing trend during the study period. This can be seen in table 2.13. The cultivated area of pepper decreased from 108.1 thousand hectares in 1980-81 to 85.4 thousand hectares in 2014-15 with a negative growth rate of 20.99 % and a negative average growth rate of 0.59 % per annum. When we split up the study period, 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015) period, we can see that the cultivated area of pepper increased from 108.1 thousand hectares in 1980-81 to 186.7

thousand hectares in 1994-95 with a growth rate of 72.71 % and an average growth rate of 4.84 % per annum in pre-WTO period. The cultivated area of pepper showed a positive growth rate during pre-WTO period. It may be due to profitability, favourable climatic conditions and optimum use of agricultural inputs. The cultivated area of pepper decreased from 191.6 thousand hectares in 1995-96 to 85.4 thousand hectares in 2014-15 with a negative growth rate of 55.42 % and a negative average growth rate of 2.77 % per annum in post-WTO period. During post-WTO period the cultivated area of pepper showed a negative growth rate. This may be due to labour shortage, unfavourable climate conditions; shift from pepper to coffee & coconut; increase in labour charges and lack of profitability.

Production of Pepper in Kerala

The production of pepper showed an increasing trend during the study period. The production of pepper increased from 28.5 thousand tonnes in 1980-81 to 40.7 thousand tonnes in 2014-15 with a growth rate of 42.80 % and an average growth rate of 1.22 % per annum. When we split up the period 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015) period, we can see that the production of pepper increased from 28.5 thousand tonnes in 1980-‘81 to 59.3 thousand tonnes in 1994-‘95 with a growth rate of 108.07% and an average growth rate of 7.20% per annum in pre-WTO period. The production of pepper showed a positive growth rate during the pre-WTO period. This may be due to increase in the area and productivity. The production of pepper decreased from 68.6 thousand tonnes in 1995-96 to 40.7 thousand tonnes in 2014-15 with a negative growth rate of 40.67% and a negative average growth rate of 2.03% per annum in post-WTO period. During the post-WTO period the production of pepper showed a negative growth rate. It may be due to decrease in area, unfavourable climatic conditions, labour shortage and pepper related diseases.

Yield of Pepper in Kerala

The productivity of pepper showed an increasing trend during the study period. The productivity of pepper increased from 264 kg/hectare in 1980-‘81 to 477 kg/hectare in 2014-‘15 with a growth rate of 80.68% and an average growth rate of 2.30% per annum. When we split up the study period, 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015) period, we can see that the productivity of pepper increased from 264 kg/hectare in 1980-‘81 to 317 kg/hectare in 1994-‘95 with a growth rate of 20.07 % and an average growth rate of 1.33 % per annum in pre-WTO period. During pre-WTO period the productivity of pepper showed positive growth rate. It may be due to favourable climatic conditions and more intensive cultivation of pepper. Better Research & Development also enabled cultivation of more disease resistant varieties of the pepper vine which helped increase productivity of the crop. In post-WTO period the productivity of pepper increased from 358 kg/hectare in 1995-96 to 477 kg/hectare in 2014-15 with a growth rate of 33.24% and an average growth rate of 1.66% per annum. During post-WTO period the productivity of pepper showed positive growth rate. This continued improvement can be attributed to the same reasons as in the earlier period.

2.4.4 Area and Production of Pepper- A District Wise Comparison

The following section takes a look at the trends in area under cultivation and production level trends at the district-wise level of Kerala during the period 1980-2015.

Table 2.14
Area of pepper in Kerala (in hectares) – A district wise comparison

DISTRICT	YEARS								CHANGE		AVERAGE	
	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	1980-2015	1995-2015	1980-2015	1995-2015
TRIVANDRUM	5362	5065	4154	5959	5668	6980	4760.82	2401	-2961	-3558	-84.60	-177.9
KOLLAM	9832	7886	8101	9130	10418	13509	7932.31	1312	-8520	-7818	-243.43	-390.90
PATHANAMTHITTA	-	4681	5409	4718	5059	5529	3420.93	1661	-3020	-3057	-100.67	-152.85
ALAPPUZHA	4843	3642	2316	1982	2134	2000	1506.15	614	-4229	-1368	-120.83	-68.4
KOTTAYAM	12786	11705	10912	7687	8581	9482	6770.6	3135	-9651	-4552	-275.74	-227.6
IDUKKI	12264	21417	34759	45011	58209	84219	87273.78	43852	31588	-1159	902.51	-57.95
ERANAKULAM	6652	6307	6977	7010	7312	6700	5024.82	1913	-4739	-5097	-135.40	-254.85
THRISSUR	4010	3739	5657	5222	3938	6033	4093.65	1801	-2209	-3421	-63.11	-171.05
PALAKKAD	1532	1736	2754	3460	1643	7457	5465.22	2695	1163	-765	33.23	-38.25
MALAPURAM	4030	4091	7593	8319	8253	11371	5732.39	2913	-1117	-5406	-31.91	-270.3
KOZHIKODE	20184	12808	15319	11976	11939	13923	7613.27	3428	-16756	-8548	-478.74	-427.4
WAYANAD	-	12231	26528	43039	44908	41464	16188.55	10064	-2167	-32975	-72.23	-1648.75
KANNUR	26578	16981	31225	31458	24569	22659	9568.71	4626	-21952	-26832	-627.20	-1341.6
KASARGODE	-	9276	6803	6625	6229	6672	6830.35	3084	-6192	-3558	-206.40	-177.05
TOTAL	108073	121565	168507	191596	198860	237998	172181.55	83499	-24574	-108097	-702.11	-5404.85

Source: 1980-81 to 2005-06, Kerala state planning board 2009

2010-11 and 2014-15, Agriculture Statistics Division

Area of Pepper in Kerala– A District Wise Comparison

While going through the district wise data of area of pepper from 1980 to 2015 we can see in table 2.14 that area of pepper showed an decreasing trend from 108073 hectares in 1980-‘81 to 83499 hectares in 2014-‘15 *i.e.,* a total decrease of 24574 hectares, with a negative growth rate of 22.74%. Net area of cultivation under pepper decreased; out of 14 districts only two districts, namely, Idukki and Palakkad witnessed increase in the area. The highest increase in the cultivated area of pepper is noticed in Idukki district *i.e.,* 31588 hectares. The lowest increase in the cultivated area of pepper is noticed in Palakkad district *i.e.,* 1163 hectares. The highest decrease in the cultivated area of pepper is noticed in Kannur district *i.e.,* 21952 hectares. The lowest decrease in the cultivated area of pepper is noticed in Malapuram district *i.e.,* 1117 hectares.

When we analyse the post-WTO development in the area of pepper cultivation, we can see that reduction in the area of pepper cultivation continued *i.e.,* a total reduction of 108097 hectares, with a negative growth rate of 56.42%. The highest reduction in the cultivated area of pepper is noticed in Wayanad district *i.e.,* 32975 hectares. The lowest reduction in the cultivated area of pepper is noticed in Palakkad district *i.e.,* 765 hectares.

Increase in the area of pepper may be because of increased demand from foreign countries for organic pepper and rising price of pepper. With encouragement from the side of government, there has been an increase in investment in pepper cultivation due to its relative profitability and improved productivity.

Reduction in the area of pepper may be because of shift from pepper to coffee cultivation, conversion of land for non agricultural activities, shortage of labourers, high wages and unfavourable climatic conditions.

Table 2.15
Production of pepper in Kerala (tonnes) – A district wise comparison

DISTRICT	YEARS								CHANGE		AVERAGE	
	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	1980-2015	1995-2015	1980-2015	1995-2015
TRIVANDRUM	2027	1567	1101	1846	1705	1710	939	916	-1111	-930	-31.74	-46.5
KOLLAM	3441	2979	2912	2748	3713	4625	1312	1195	-2246	-1553	-64.17	-77.65
PATHANAMTHITTA	-	1524	1585	1701	1228	1419	782	705	-819	-996	-27.30	-49.8
ALAPPUZHA	1007	648	274	405	297	177	151	147	-860	-258	-24.57	-12.9
KOTTAYAM	1777	1074	2002	1378	1153	1695	867	1078	-699	-300	-19.97	-15
IDUKKI	1852	4837	14096	22551	23282	52063	30919	23916	22064	1365	630.40	68.25
ERANAKULAM	1264	1083	1276	1311	918	1274	718	539	-725	-772	-20.71	-38.6
THRISSUR	690	566	1070	721	526	1282	614	502	-188	-219	-5.37	-10.95
PALAKKAD	170	486	345	451	598	1129	954	969	799	518	22.83	25.9
MALAPURAM	1108	1401	1415	1164	1053	1456	478	650	-458	-514	-13.09	-25.7
KOZHIKODE	7529	2905	3391	2746	2277	1869	823	1056	-6473	-1690	-184.94	-84.5
WAYANAD	-	6523	7577	22385	17915	11483	2431	4794	-1729	-17591	-57.63	-879.55
KANNUR	7654	5234	7897	7765	5038	5473	1740	2146	-5508	-5619	-157.37	-280.95
KASARGODE	-	2291	1861	1396	1226	1950	2539	2077	-214	681	-7.13	34.05
TOTAL	28519	33118	46802	68568	60929	87605	45267	40690	12171	-27878	347.74	-1393.9

Source: 1980-81 to 2005-06, Kerala State Planning Board 2009

2010-11 and 2014-15, Agriculture Statistics Division

Production of Pepper in Kerala – A District Wise Comparison

While going through the district wise data of production of pepper from 1980 to 2015 we can see in table 2.15 that production of pepper showed an increasing trend from 28519 tonnes in 1980-‘81 to 40690 tonnes in 2014-‘15 *i.e.,* a total increase of 12171 tonnes, with a growth rate of 42.68%. Though net production of pepper increased in two districts, namely, Idukki, and Palakkad witnessed increase in the production and other twelve districts witnessed decrease in the production of pepper. The highest increase in the production of pepper is noticed in Idukki district *i.e.,* 22064 tonnes. The lowest increase in the production of pepper is noticed in Palakkad district *i.e.,* 799 tonnes. The highest decrease in the production of pepper is noticed in Kozhikode district *i.e.,* 6473 tonnes. The lowest decrease in the production of pepper is noticed in Thrissur district *i.e.,* 188 tonnes.

When we analyse the post-WTO development in the production of pepper, we can see that production of pepper deceased *i.e.,* a total reduction of 27878 tonnes, with a negative growth rate of 40.66%. Though net production of pepper decreased, three districts, namely, Idukki, Kasaragode and Palakkad witnessed increase in the production and other eleven districts witnessed decrease in the production of pepper. The highest increase in the production of pepper is noticed in Idukki district *i.e.,* 1365 tonnes. The lowest increase in the production of pepper is noticed in Palakkad district *i.e.,* 518 tonnes. The highest decrease in the production of pepper is noticed in Wayanad district *i.e.,* 17591 tonnes. The lowest decrease in the production of pepper is noticed in Thrissur district *i.e.,* 219 tonnes.

Increase in the production of pepper may be because of increase in area, increased demand and rising price of pepper, increase in the productivity of pepper due to increase in the investment in pepper

cultivation, encouragement from the side of Government, increase in the relative profitability and favourable climatic conditions.

2.4.5 Area, Production and Yield of Coconut in Kerala (1980-2015)

Table 2.16

Area, production and yield of coconut in Kerala (1980-2015)

Year	Area (in'000 hectare)	Production (Million nuts)	Yield (Nuts/hectare)
1980-81	651.37	3008	4617.96
1983-84	682.28	2602	3813.68
1986-87	706.11	3173	4493.63
1989-90	832.17	4358	5236.91
1992-93	877.01	5124	5842.58
1995-96	914.37	5155	5637.76
1998-99	882.29	5132	5816.68
2001-02	905.72	5479	6049.33
2004-05	899.27	6001	6673.19
2007-08	818.81	5641	6889.27
2010-11	770.47	5287	6862.05
2013-14	797.21	5968	7486.11
2014-15	649.85	3370	5185.81

Source:1980-1981 to 2012-13 Directorate of Economics and Statistics; Department of Economics and Statistics. 2013-14 to 2014-15 Coconut Development Board, India.

Reduction in the production of pepper may be because of shift from cultivation of pepper to rubber; neglect of pepper cultivation due to climatic unpredictability and labour problems.

Area under Coconut in Kerala

The cultivated area of coconut showed a decreasing trend during the study period. This can be seen in table 2.16. The cultivated area of coconut decreased from 651.37 thousand hectares in 1980-'81 to 649.85 thousand hectares in 2014-'15 with a negative growth rate of 0.23% and an average negative growth rate of 0.01% per annum. When we split up

the study period, 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015) period, we can see that the cultivated area of coconut increased from 651.37 thousand hectares in 1980-‘81 to 910.96 thousand hectares in 1994-‘95 with a growth rate of 39.85 % and an average growth rate of 2.66 % per annum in pre-WTO period. The increase in area may be due to availability of better irrigation facilities, high yielding varieties of seeds, increase in relative profitability, increase in the availability of cultivable land *etc*. In post-WTO period, the cultivated area of coconut decreased from 914.37 thousand hectares in 1995-‘96 to 649.85 thousand hectares in 2014-‘15 with a negative growth rate of 28.93 % and an average negative growth rate of 1.45% per annum. This may be due to use of land for house constructions; less availability of irrigation facilities, fertilizer, capital, technology. Besides these, decrease in area may be due to decrease in the domestic and international demand, presence of coconut related diseases; decrease in subsidies, shortage of labour, lack of profitability and unfavourable climate conditions.

Production of Coconut in Kerala

The production of coconut showed an increasing trend during the study period. The production of coconut increased from 3008 million nuts in 1980-‘81 to 3370 million nuts in 2014-‘15 with a growth rate of 12.03 % and an average negative growth rate of 0.34 % per annum. We split up the study period 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) and post-WTO (1995-2015) period. In pre-WTO period, we can see that the production of coconut increased from 3008 million nuts in 1980-‘81 to 5336 million nuts in 1994-‘95 with a growth rate of 77.39% and an average growth rate of 5.16% per annum. The increase in production is due to increase in area, availability of irrigation facilities and high yielding varieties of seeds. This may be also due to favourable climatic

conditions and profitability. In post-WTO period the production of coconut increased from 5155 million nuts in 1995-‘96 to 3370 million nuts in 2014-‘15 with an average negative growth rate of 34.63 % and an average negative growth rate of 1.73% per annum. The decrease in production is due to lack of care of coconut trees.

Yield of Coconut in Kerala

The productivity of coconut showed an increasing trend during the study period. The productivity of coconut increased from 4617.96 nuts/hectare in 1980-‘81 to 5185.81nuts/hectare in 2014-‘15 with a growth rate of 12.30 % and an average growth rate of 0.35% per annum. When we split up the study period 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) and post-WTO (1995-2015) period, we can see that the productivity of coconut increased from 4617.96 nuts/hectare in 1980-‘81 to 5857.56 nuts/hectare in 1994-‘95 with a growth rate of 26.84 % and an average growth rate of 1.79 % per annum in pre-WTO period. The increase in yield may be due to availability of irrigation facilities, high yielding varieties of crop and increase in the availability of cultivable land. The productivity of coconut decreased from 5637.76 nuts/hectare in 1995-‘96 to 5185.81 nuts/hectare in 2014-‘15 with a negative growth rate of 8.02 % and an average negative growth rate of 0.40% in post-WTO period. The decrease in yield or productivity may be due to less availability of irrigation facilities, decrease in the use of fertilizer and unfavourable climatic conditions.

2.4.6 Area and Production of Coconut- A District Wise Comparison

The following section examines the trends in area of production and production levels of coconut at the district wise level of Kerala

Table 2.17
Area of coconut in Kerala (in 000' hectares) – A district wise comparison

DISTRICTS	YEARS								CHANGE		AVERAGE	
	1980-81S	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	1980-2015	1995-2015	1980-2015	1995-2015
TRIVANDRUM	73.77	73.09	85.58	91.67	88.66	84.08	69.67	73.08	-0.69	-18.59	-0.020	-0.929
KOLLAM	81.77	68.77	77.87	81.04	79.71	66.13	56.06	52.36	-29.41	-28.68	-0.840	-1.434
PATHANAMTHITTA		27.52	27.51	23.71	22.79	21.38	15.63	15.80	-11.72	-7.91	-0.391	-0.395
ALAPPUZHA	63.11	48.70	66.66	67.03	59.77	56.15	39.34	35.16	-27.95	-31.87	-0.799	-1.593
KOTTAYAM	51.12	49.03	47.22	40.33	41.60	39.94	28.41	26.53	-24.59	-13.80	-0.702	-0.690
IDUKKI	16.62	17.59	14.86	17.51	23.81	24.34	17.01	16.66	0.04	-0.86	0.001	-0.043
ERANAKULAM	60.88	59.63	66.26	62.50	67.40	58.55	42.89	43.68	-17.20	-18.82	-0.491	-0.941
THRISSUR	54.03	60.37	80.86	85.14	89.47	85.37	75.36	83.22	29.19	-1.92	0.834	-0.096
PALAKKAD	22.95	26.35	38.15	48.34	46.39	55.44	57.09	60.69	37.73	12.35	1.078	0.618
MALAPURAM	59.68	63.23	102.25	106.70	110.38	113.41	104.18	103.69	44.01	-3.01	1.258	-0.150
KOZHIKODE	94.47	111.47	122.06	122.84	128.74	129.50	121.69	123.07	28.60	0.23	0.817	0.011
WAYANAD		3.57	4.51	8.40	11.00	11.52	10.04	10.33	6.76	1.93	0.225	0.096
KANNUR	72.98	60.39	91.89	98.98	96.98	93.93	76.92	85.81	12.83	-13.17	0.366	-0.659
KASARGODE		34.98	44.33	60.20	59.07	58.09	56.17	63.79	28.81	3.59	0.960	0.180
TOTAL	651.37	704.68	870.02	914.37	925.78	897.83	770.47	793.86	142.49	-120.52	4.071	-6.026

Source: (1980-1996) Kerala State Planning Board 2009, (2000-2015) Agriculture Statistics Division

Area of Coconut in Kerala (In 000' Hectares) – A District Wise Comparison

While going through the district wise data of area of coconut from 1980 to 2015 we can see in table 2.17 that area of coconut showed an increasing trend from 651.370 hectares in 1980-'81 to 793.856 hectares in 2014-'15 *i.e.,* a total increase of 142.486 hectares, with a growth rate of 2.19%. Net cultivated area devoted to coconut increased. Trivandrum, Kollam, Pathanamthitta, Alappuzha, Kottayam, and Ernakulam were the six districts which witnessed a decrease in the area whereas the rest experienced an increase in the cultivated area. The highest increase in the cultivated area of coconut is noticed in Malappuram district *i.e.,* 44.014 hectares. The lowest increase in the cultivated area of coconut is noticed in Idukki district *i.e.,* 0.04hectares. The highest decrease in the cultivated area of coconut is noticed in Kollam district *i.e.,* 29.405 hectares. The lowest decrease in the cultivated area of coconut is noticed in Trivandrum district *i.e.,* 0.69 hectares.

On analysing the post-WTO development in the area of coconut cultivation, we can see that there is a decrease in the area of coconut cultivation *i.e.,* a total decrease by 120.517 hectares. Thus the area recorded a negative growth rate of 13.18%. Palakkad, Kozhikode, Wayanad and Kasaragode were the four districts where there was an increase in the area whereas the other ten districts showed a decline in the cultivated area. Thus, net area of cultivation under coconut decreased in this period. The highest increase in the cultivated area of coconut is noticed in Palakkad district *i.e.,* 12.351 hectares. The lowest increase in the cultivated area of coconut is noticed in Kozhikode district *i.e.,* 0.23hectares. The highest decrease in the cultivated area of coconut is noticed in Alappuzha district *i.e.,* 31.869 hectares. The lowest decrease in

the cultivated area of coconut is noticed in Idukki district *i.e.,* 0.855 hectares.

Increase in the area of coconut may be because of increased demand and expectations of higher price for coconut in future, increase in the investment in coconut cultivation, encouragement from the side of Coconut Board and increase in the relative profitability

Reduction in the area of coconut may be because of conversion of land for non coconut cultivation and non agricultural activities, shortage of labourers, labour problems, high wage and unfavourable climatic conditions.

Table 2.18

Production of coconut in Kerala (in million nuts) – A district wise comparison

DISTRICTS	YEARS								CHANGE		AVERAGE	
	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	1980-2015	1995-2015	1980-2015	1995-2015
TRIVANDRUM	354	340	453	481	635	665	499	665	311	184	8.89	9.2
KOLLAM	344	272	364	401	387	504	377	387	43	-14	1.23	-0.7
PATHANAMTHITTA		160	145	142	126	119	112	92	-68	-50	-2.27	-2.5
ALAPPUZHA	294	277	295	336	288	357	263	218	-76	-118	-2.17	-5.9
KOTTAYAM	188	217	195	160	197	217	148	140	-48	-20	-1.37	-1
IDUKKI	43	71	63	75	91	90	79	75	32	0	0.91	0
ERANAKULAM	327	338	346	370	358	369	221	212	-115	-158	-3.29	-7.9
THRISSUR	347	369	465	539	540	726	493	485	138	-54	3.94	-2.7
PALAKKAD	80	108	130	183	252	415	407	442	362	259	10.34	12.95
MALAPURAM	264	255	456	558	626	863	916	933	669	375	19.11	18.75
KOZHIKODE	456	603	644	925	903	845	769	1001	545	76	15.57	3.8
WAYANAD		5	6	16	43	38	50	59	54	43	1.8	2.15
KANNUR	311	281	436	578	621	692	528	533	222	-45	6.34	-2.25
KASARGODE		81	234	391	469	426	418	705	624	314	20.8	15.7
TOTAL	3008	3377	4232	5155	5536	6326	5280	6775	3767	1620	107.63	81

Source: (1980-1996) Kerala State Planning Board 2009, (2000-2015) Agriculture Statistics Division

Production of Coconut in Kerala– A District Wise Comparison

While going through the district wise data of production of coconut from 1980 to 2015, we can see in table 2.18 that production of coconut showed an increasing trend from 3008 million nuts in 1980-‘81 to 6775 million nuts in 2014-‘15 *i.e.,* a total increase of 3767 million nuts, with a growth rate of 125.23%. Net production of coconut increased. Out of 14 districts, only four- Pathanamthitta, Alappuzha, Kottayam and Ernakulam witnessed a decrease in the production. The highest increase in the production of coconut is noticed in Malappuram district *i.e.,* 669 million nuts. The lowest increase in the production of coconut is noticed in Idukki district *i.e.,* 32 million nuts. The highest decrease in the production of coconut is noticed in Ernakulam district *i.e.,* 115 million nuts. The lowest decrease in the production of coconut is noticed in Kottayam district *i.e.,* 48 million nuts.

When we analyse the post-WTO development in the production of coconut, we can see that increase in the production of coconut continued *i.e.,* a total increase of 1620 million nuts, with a growth rate of 31.43%. Though net production of coconut increased, seven districts, namely, Kollam, Pathanamthitta, Alappuzha, Kottayam, Kannur, Ernakulam and Thrissur witnessed decrease in the production of coconut and other six districts witnessed increase in the production of coconut and one district *i.e*., Idukki district witnessed no change in the production of coconut. The highest increase in the production of coconut is noticed in Malappuram district *i.e.,* 375 million nuts. The lowest increase in the production of coconut is noticed in Wayanad district *i.e.,* 43 million nuts. The highest reduction in the production of coconut is noticed in Ernakulam district *i.e.,* 158 million nuts. The lowest reduction in the production of coconut is noticed in Kollam district *i.e.,* 14 million nuts.

Increase in the production of coconut may be because of increase in area, increase in the productivity of coconut due to HYV seeds, increase in the investment in coconut cultivation, encouragement from the side of Government, increase in the relative profitability, better availability of irrigation facilities and favourable climatic conditions.

Reduction in the production of coconut may be because of shift from cultivation of coconut to rubber and nutmeg; neglect of coconut cultivation due to climatic unpredictability, labour problems, decrease in area, low price of coconut, prevalence of coconut related diseases and increase in the price of land.

2.4.7 Area, Production and Yield of Rubber in Kerala (1980-2015)

Table 2.19

Area, production and yield of rubber in Kerala (1980-2015)

Year	Area (In '000 hectare)	Production(In '000 tonnes)	Yield(In kg/hectare)
1980-81	237.8	140.3	590
1983-84	294.3	162.2	551
1986-87	347.8	202.1	581
1989-90	376.8	275.4	731
1992-93	428.9	368.6	860
1995-96	449.0	474.6	1057
1998-99	469.9	559.1	1190
2001-02	475.0	580.4	1222
2004-05	480.7	690.8	1437
2007-08	512.0	753.1	1471
2010-11	534.2	770.6	1442
2013-14	548.2	648.2	1182
2014-15	550.0	507.7	923

Source: (1980-81 to 2012-13) Directorate of Economics and Statistics; Department of Economics and Statistics.(2013-14 to 2014-15) Rubber Board of India.

Area under Rubber in Kerala

The cultivated area of rubber showed an increasing trend during the study period. This can be seen in table 2.19. The cultivated area of rubber increased from 237.8 thousand hectares in 1980-‘81 to 549.1 thousand hectares in 2014-‘15 with a growth rate of 131.3% and an average growth rate of 3.75% per annum. When we split up the period 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015) period, we can see that the cultivated area of rubber increased from 237.8 thousand hectares in 1980-‘81 to 443.3 thousand hectares in 1994-95 with a growth rate of 86.41 % and an average growth rate of 5.76 % per annum in pre-WTO period. Some of the factors to which we can attribute this increase are- favourable climatic conditions, profitability, increase in production and productivity, favourable policies of the Rubber Board. Production of rubber being less labour intensive and expectations of increase in the price of rubber in the future are the other reasons. The cultivated area of rubber increased from 449 thousand hectares in 1995-‘96 to 549.1 thousand hectares in 2014-‘15 with a growth rate of 22.29% and an average growth rate of 1.1% per annum in post-WTO period. The increase observed can be attributed to the same factors as in the pre-WTO period.

Production of Rubber in Kerala

The production of rubber showed an increasing trend during the study period. The production of rubber increased from 140.3 million tonnes in 1980-‘81 to 507.7 million tonnes in 2014-‘15 with a growth rate of 261.9% and an average growth rate of 7.5%. When we split up the study period 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015) period, we can see that the production of rubber increased from 140.3 million tonnes in 1980-‘81 to 442.8 million tonnes in 1994-‘95 with a growth rate of 215.6 % and an average growth

rate of 14.4 % in pre-WTO period. It may be due to increase in area, favourable climatic conditions, profitability, increase in productivity, relative profitability of crop and encouragement from Rubber Board. The production of rubber increased from 474.6 million tonnes in 1995-‘96 to 507.7 million tonnes in 2014-‘15 with a growth rate of 6.97% and an average growth rate of 0.35% in post-WTO period. It may be due to increase in area, favourable climatic conditions, profitability, increase in productivity and encouragement from Rubber Board.

Yield of Rubber in Kerala

The productivity of rubber showed an increasing trend during the study period. The productivity of rubber increased from 590 kg/hectare in 1980-‘81 to 1925 kg/ hectare in 2014-‘15 with a growth rate of 56.4% and an average growth rate of 1.6% per annum. When we split up the study period, pre-WTO (1980-1995) period and post-WTO (1995-2015) period, we can see that the productivity of rubber increased from 590 kg/hectare in 1980-‘81 to 999 kg/hectare in 1994-‘95 with a growth rate of 69.32 % and an average growth rate of 4.62 % in pre-WTO period. It may be due to increase in area, favourable climatic conditions, policy support from Rubber Board and less labour intensive nature of production. The productivity of rubber decreased from 1057 kg/hectare in 1995-‘96 to 925 kg/hectare in 2014-‘15 with a negative growth rate of 12.68% and an average negative growth rate of 0.63% per annum in post-WTO period. It may be due to reduction in the number of tapping days, less care and poor maintenance and less encouragement from Rubber Board.

2.4.8 Area and Production of Rubber- A District Wise Comparison

The following section examines the trends in area under cultivation and production levels in Kerala at the district-wise level for the period 1980-2015.

Table 2.20
Area of rubber in Kerala (in '000 hectares) – A district wise comparison

DISTRICTS	YEARS								CHANGE		AVERAGE	
	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	1980-2015	1995-2015	1980-2015	1995-2015
TRIVANDRUM	8.74	14.72	22.66	26.00	28.20	28.92	30.97	32.00	23.27	6.01	0.665	0.300
KOLLAM	38.89	36.03	30.08	35.35	36.77	36.86	36.53	37.17	-1.72	1.82	-0.049	0.091
PATHANAMTHITTA		28.34	43.72	47.06	47.87	47.97	50.26	50.81	22.47	3.75	0.749	0.187
ALAPPUZHA	4.27	3.77	2.90	3.57	3.80	3.93	4.38	4.50	0.22	0.92	0.006	0.046
KOTTAYAM	63.23	83.64	107.94	109.58	111.20	112.24	113.73	114.34	51.11	4.76	1.460	0.238
IDUKKI	17.45	31.06	34.60	37.24	38.08	38.84	40.00	40.52	23.07	3.28	0.659	0.164
ERANAKULAM	23.33	37.77	60.91	55.25	56.64	57.29	59.03	60.02	36.69	4.77	1.048	0.239
THRISSUR	9.39	9.49	6.86	12.25	13.37	14.06	15.41	15.63	6.24	3.38	0.178	0.169
PALAKKAD	11.08	14.77	24.05	26.03	28.93	31.95	36.43	37.80	26.72	11.77	0.763	0.588
MALAPURAM	19.28	20.40	20.46	26.31	29.21	32.59	39.52	42.67	23.39	16.37	0.668	0.818
KOZHIKODE	18.17	15.45	11.34	17.35	17.69	18.24	21.38	21.88	3.71	4.53	0.106	0.227
WAYANAD		4.78	4.71	5.30	6.43	7.78	10.07	10.79	6.01	5.49	0.200	0.274
KANNUR	23.93	16.88	23.10	28.42	33.94	38.37	44.78	47.97	24.04	19.55	0.687	0.978
KASARGODE		13.20	18.31	19.28	22.23	25.37	31.74	33.86	20.66	14.58	0.689	0.729
TOTAL	237.77	330.32	411.62	448.99	474.36	494.40	534.23	549.96	312.19	100.97	8.920	5.048

Source: (1980-2006) Kerala State Planning Board 2009, (2010-11) Agriculture Statistics Division

(2014-15) http://www.ecostat.kerala.gov.in/docs/pdf/reports/agristat/1516/dist_data_1415.pd

Area of Rubber in Kerala– A District Wise Comparison

While going through the district wise data of area of rubber from 1980 to 2015 we can see in table 2.20 that area of rubber showed an increasing trend from 237.769 hectares in 1980-‘81 to 549.955 hectares in 2014-‘15 *i.e.,* a total increase of 312.186 hectares, with a growth rate of 131.30%. In all the districts the cultivated area of rubber increased considerably. The highest increase in the cultivated area of rubber is noticed in Kottayam district *i.e.,* 51.108 hectares. The lowest increase in the cultivated area of rubber is noticed in Alappuzha district *i.e.,* 0.22 hectares.

When we analyse the post-WTO development in the area of rubber cultivation, we can see that there is an increase in the area of rubber cultivation *i.e.,* a total increase of 100.967 hectares, with a growth rate of 42.46%. All districts witnessed increase in the area of cultivation of rubber. The highest increase in the cultivated area of rubber is noticed in Kannur district *i.e.,* 19.55 hectares. The lowest increase in the cultivated area of rubber is noticed in Alappuzha district *i.e.,* 0.92 hectares.

Increase in the area of rubber may be because of increased demand and price for rubber, increase in the productivity of rubber due to HYV seeds, due to lack of employment opportunity, increase in the investment in rubber cultivation, encouragement from the side of Rubber Board and increase in the relative profitability.

Table 2.21
Production of rubber in Kerala (000 tonnes) – A district wise comparison

DISTRICTS	YEARS								CHANGE		AVERAGE	
	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	1980-2015	1995-2015	1980-2015	1995-2015
TRIVANDRUM	5.93	8.48	15.51	27.30	33.32	43.66	44.93	29.20	23.27	1.90	0.665	0.095
KOLLAM	25.56	19.81	26.95	38.82	46.29	55.44	54.13	35.00	9.44	-3.82	0.270	-0.191
PATHANAMTHITTA		16.25	34.26	52.97	62.42	70.87	79.22	50.40	34.16	-2.57	1.139	-0.129
ALAPPUZHA	2.77	2.72	2.14	3.14	4.00	6.79	6.74	4.20	1.43	1.07	0.041	0.053
KOTTAYAM	36.13	50.13	82.85	120.95	141.27	166.94	172.20	104.90	68.77	-16.05	1.965	-0.802
IDUKKI	11.14	15.61	26.64	38.36	45.41	55.83	57.23	37.30	26.16	-1.06	0.747	-0.053
ERANAKULAM	13.93	19.42	37.59	62.16	73.56	84.90	91.70	57.10	43.17	-5.06	1.233	-0.253
THRISSUR	6.74	6.08	9.11	15.51	19.67	25.09	22.82	14.70	7.96	-0.81	0.227	-0.041
PALAKKAD	4.52	7.15	12.53	22.57	31.62	51.19	49.58	33.70	29.18	11.13	0.834	0.556
MALAPURAM	10.57	11.42	14.86	24.43	33.01	48.11	50.75	36.90	26.33	12.47	0.752	0.624
KOZHIKODE	10.73	8.60	12.77	19.49	22.87	29.94	29.92	21.50	10.77	2.01	0.308	0.101
WAYANAD		1.64	2.36	3.02	3.96	7.62	9.00	7.10	5.47	4.09	0.182	0.204
KANNUR	12.30	9.84	16.81	26.88	38.46	59.50	61.11	45.50	33.20	18.62	0.949	0.931
KASARGODE		7.42	13.15	18.97	24.02	33.36	41.26	30.20	22.78	11.23	0.759	0.561
TOTAL	140.32	184.56	307.52	474.56	579.87	739.23	770.58	507.70	367.38	33.15	10.497	1.657

Source: (1980-96) Indian Rubber Statistics, (2000-2011) Rubber Board,

(2014-2015) http://www.ecostat.kerala.gov.in/docs/pdf/reports/agristat/1516/dist_data_1415.pdf

Production of Rubber in Kerala– A District Wise Comparison

While going through the district wise data of production of rubber from 1980 to 2015 we can see in table 2.21 that production of rubber showed an increasing trend from 140.320 tonnes in 1980-‘81 to 507.700 tonnes in 2014-‘15 *i.e.,* a total increase of 367.38 tonnes, with a growth rate of 261.82%.In all the districts, production of rubber increased considerably. The highest increase in the production of rubber is noticed in Kottayam district *i.e.,* 68.768 tonnes. The lowest increase in the production of rubber is noticed in Alappuzha district *i.e.,* 1.429 tonnes.

When we analyse the post-WTO development in the production of rubber, we can see that increase in the production of rubber continued *i.e.,* a total increase of 33.145 tonnes, with a growth rate of 23.62%. Though net production of rubber increased, six districts, namely, Kollam, Pathanamthitta, Kottayam, Idukki, Ernakulam and Thrissur witnessed decrease in the production of rubber and other eight districts witnessed increase in the production of rubber. The highest increase in the production of rubber is noticed in Kannur district *i.e.,* 18.624 tonnes. The lowest increase in the production of rubber is noticed in Alappuzha district *i.e.,* 1.065 tonnes. The highest reduction in the production of rubber is noticed in Kottayam district *i.e.,* 16.046 tonnes. The lowest reduction in the production of rubber is noticed in Thrissur district *i.e.,* 0.813tonnes.

Increase in the production of rubber may be due to of increase in area, improvement in productivity, increase in the investment in rubber cultivation in response to the encouragement from the Rubber Board, increase in the relative profitability and favourable climatic conditions.

Reduction in the production of rubber may be because of shift of investment from rubber to other crops, neglect of rubber cultivation due to lack of profitability, climatic unpredictability and labour problems

2.4.9 Area, Production and Yield of Tapioca in Kerala (1980-2015)

Table 2.22
Area, production and yield of tapioca in Kerala (1980-2015)

Year	Area (in '000 hectares)	Production (in '000 tonnes)	Yield(in kg/hectares)
1980-81	245	4109.7	16774
1983-84	233	3903.2	16752
1986-87	192.9	3292.3	17067
1989-90	160.1	3054	19076
1992-93	135	2629.1	19475
1995-96	113.6	2500.1	22008
1998-99	112.8	2630.2	23317
2001-02	111.2	2455.9	22085
2004-05	88.5	2400	27119
2007-08	84	2556.5	30435
2010-11	72.3	2360.1	32643
2013-14	71.1	2581.4	36307
2014-15	87.6	1207.2	13781

Source: Directorate of Economics and Statistics; Department of Economics and Statistics. Ministry of agriculture and famers welfare Govt. of India

Area under Tapioca in Kerala

The cultivated area of tapioca showed a decreasing trend during 1980-2015. This can be seen in table 2.22. During 1980-'81 the cultivated area was 245 thousand hectares. It decreased to 87.6 thousand hectares in 2014-'15 with a negative growth rate of 64.24 % and an average negative growth rate of 1.84 % per annum. When we split up the study period,

1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015) period, we can see that during pre-WTO period the cultivated area of tapioca showed a decreasing trend. During 1980-‘81 the cultivated area was 245 thousand hectares, it decreased to 114.3 thousand hectares in 1994-’95 with a negative growth rate of 53 % and an average negative growth rate of 4% per annum in pre-WTO period. The main factors responsible for this trend are unfavourable climatic conditions and fall in profitability due to increasing labour costs. During 1995-‘96 the cultivated area was 113.6 thousand hectares, it decreased to 87.6 thousand hectares in 2014-’15 with a negative growth rate of 22.89% and an average negative growth rate of 1.14% per annum. The post-WTO period also showed a declining trend in the area. This may be due to a change in the cropping pattern *i.e.,* a shift from tapioca to plantain and coconut; lack of fertilizer. Besides these, decrease in area may be due to decrease in the domestic and international demand and price; decrease in product specific subsidies, non product specific subsidies, high labour.

Production of Tapioca in Kerala

During 1980-2015 the production of tapioca showed a decreasing trend. During 1980-‘81 the production of tapioca was 4109.7 thousand tonnes. It decreased to 1207.2 thousand tonnes in 2014-‘15 with a negative growth rate of 70.63% and an average negative growth rate of 2.02% per annum. When we split up the study period, 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) period and post-WTO (1995-2015) period, we can see that during the pre-WTO period the production of tapioca showed a declining trend. During 1980-‘81 the production of tapioca was 4109.7 thousand tonnes. It declined to 2344.3 thousand tonnes in 1994-‘95 with a negative growth rate of 43 % and an average negative growth rate of 3 % per annum. This may be due to the lack of profitability, decreasing in the area. The production of tapioca decreased

from 2500.1 thousand tonnes in 1995-‘96 to 1207.2 thousand tonnes in 2014-‘15 with a negative growth rate of 51.71 % and an average negative growth rate of 2.59% per annum. Post-WTO period showed a decreasing trend in the production of tapioca. The decrease in production may be due to less availability of high yielding varieties of the crop, decrease in area and increased labour costs.

Yield of Tapioca in Kerala

During 1980-2015 the productivity of tapioca showed a decreasing trend. During 1980-81 the productivity of tapioca was 16774 kg/hectare. It decreased to 13781kg/hectare in 2014-15 with a negative growth rate of 17.84% and an average negative growth rate of 0.51% per annum. When we split up the study period 1980-2015 into two parts, *i.e.,* pre-WTO (1980-1995) and post-WTO (1995-2015) period, we can see that during pre-WTO period the productivity of tapioca showed an increasing trend. In 1980-81 the productivity was 16774 kg/hectare, it increased to 20510 kg/hectare in 1994 -95 with a growth rate of 22% and an average growth rate of 1% per annum. This may be due to profitability of tapioca cultivation. The post-WTO period also showed an increasing trend in the productivity. During 1995-96 the productivity was 22008 kg/hectare, it decreased to 13781 kg/hectare in 2014-15 with a negative growth rate of 37.38% and an average negative growth rate of 1.87% per annum. This is because of lack of profitability and unfavourable climatic conditions.

2.4.10 Area and Production of Tapioca - A District Wise Comparison

This section examines the trends in area under cultivation and production levels of tapioca at the district-wise level of Kerala for the period 1980-2015.

Table 2.23
Area of tapioca in Kerala (in hectare) – A district wise comparison

DISTRICT	YEARS								CHANGE		AVERAGE	
	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	1980-2015	1995-2015	1980-2015	1995-2015
TRIVANDRUM	56545	51010	33153	25199	27084	19619	14261.47	15754	-40791	-9445	-1165.46	-472.25
KOLLAM	59097	35614	30736	24697	26484	23814	16172.48	17028	-42069	-7669	-1201.97	-383.45
PATHANAMTHITTA	-	13566	10637	7208	7681	7868	6124.23	5356	-8210	-1852	-273.67	-92.6
ALAPPUZHA	19094	11102	7466	6571	4843	2668	2788.49	2670	-16424	-3901	-469.26	-195.05
KOTTAYAM	23003	19741	12564	7737	8749	5727	5669.92	5588	-17415	-2149	-497.57	-107.45
IDUKKI	10824	9237	6490	7222	7794	6608	6222.55	7541	-3283	319	-93.80	15.95
ERANAKULAM	12462	10216	6690	4575	5208	5636	5484.11	5386	-7076	811	-202.17	40.55
THRISSUR	6191	5515	3756	2532	1637	1417	1361.72	1441	-4750	-1091	-135.71	-54.55
PALAKKAD	12644	11960	9924	8965	6646	3994	2474.53	2631	-10013	-6334	-286.09	-316.7
MALAPURAM	18111	14863	11583	7715	7508	5346	5499.89	5405	-12706	-2310	-363.03	-115.5
KOZHIKODE	7756	3461	3143	3335	4037	2476	1805.69	1826	-5930	-1509	-169.43	-75.45
WAYANAD	-	2395	1803	1574	1620	2348	2265.1	2327	-68	753	-2.27	37.65
KANNUR	18765	8719	6115	4786	6945	2442	1818.66	2127	-16638	-2659	-475.37	-132.95
KASARGODE	-	5520	2433	1485	1373	576	335.26	413	-5107	-1072	-170.23	-53.6
TOTAL	244492	202919	146493	113601	117609	90539	72284.1	75493	-168999	-38108	-4828.54	-1905.4

Source: (1980-1996) Kerala State Planning Board 2009, (2000-2015) Agriculture Statistics Division

Area of Tapioca in Kerala– A District Wise Comparison

While going through the district wise data of area of tapioca from 1980 to 2015 we can see in table 2.23 that area of tapioca showed a decreasing trend from 244492 hectares in 1980-81 to 75493 hectares in 2014-15 *i.e.,* a total reduction of 168999 hectares, with a negative growth rate of 69.12%. Here we can notice that, in all districts, between 1980 and 2015, area of cultivation of tapioca has decreased. The highest reduction in the cultivated area of tapioca is noticed in Kollam district *i.e.,* 42069 hectares. The lowest reduction in the cultivated area of tapioca is noticed in Wayanad district *i.e.,* 68 hectares.

When we analyse the post-WTO development in the area of tapioca cultivation, we can see that reduction of area of tapioca continued *i.e.,* a total reduction of 38108 hectares, with a negative growth rate of 33.54%. Though net area of tapioca decreased, three districts, namely, Idukki, Ernakulam and Wayanad witnessed increase in the area, and other eleven districts witnessed decrease in the cultivated area of tapioca. The highest increase in the cultivated area of tapioca is noticed in Ernakulam district *i.e.,* 811 hectares. The lowest increase in the cultivated area of tapioca is noticed in Idukki district *i.e.,* 319 hectares. The highest reduction in the cultivated area of tapioca is noticed in Trivandrum district *i.e.,* 9445 hectares. The lowest reduction in the cultivated area of tapioca is noticed in Kasaragode district *i.e.,* 1072 hectares.

Increase in the area of tapioca may be because of increased, increase in the investment in tapioca cultivation, production of value added products and convenient to cultivate in small area.

Reduction in the area of tapioca may be because of slower growth of price of tapioca relative to other food items due to diseases, attack from rat, neglect of tapioca cultivation, increase in the price of land, shortage of labourers, high wage, shift of investment from tapioca cultivation to other crops and labour problems.

Table 2.24
Production of tapioca in Kerala (in tonnes) – A district wise comparison

DISTRICT	YEARS								CHANGE		AVERAGE	
	1980-81	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11	2014-15	1980-2015	1995-2015	1980-2015	1995-2015
TRIVANDRUM	965789	769231	554956	466787	468213	463702	409253	586394	-379395	119607	-10839.9	5980.35
KOLLAM	989875	487200	525798	493085	566274	694984	454880	661600	-328275	168515	-9379.29	8425.75
PATHANAMTHITTA	-	295061	243211	156534	167849	255006	235257	233420	-61641	76886	-2054.7	3844.3
ALAPPUZHA	272917	192065	121342	124517	81313	62286	76992	87834	-185083	-36683	-5288.09	-1834.15
KOTTAYAM	408993	390477	308319	232401	256831	182262	214799	217348	-191645	-15053	-5475.57	-752.65
IDUKKI	234881	178274	185688	211507	267112	205293	240290	340911	106030	129404	3029.429	6470.2
ERANAKULAM	240267	190528	150091	107602	154559	182605	221248	229341	-10926	121739	-312.171	6086.95
THRISSUR	92555	65242	71478	62564	41524	28254	51158	64739	-27816	2175	-794.743	108.75
PALAKKAD	177648	158829	187468	165722	136341	105321	68341	78634	-99014	-87088	-2828.97	-4354.4
MALAPURAM	228742	196935	277675	206442	185143	164029	197190	191322	-37420	-15120	-1069.14	-756
KOZHIKODE	99277	39282	45882	79620	88366	61311	47770	53782	-45495	-25838	-1299.86	-1291.9
WAYANAD	-	48858	50553	45373	54917	85599	118923	99788	50930	54415	1697.667	2720.75
KANNUR	349967	177955	115832	116169	90706	63880	64802	85880	-264087	-30289	-7545.34	-1514.45
KASARGODE	-	86940	24708	31790	27755	13752	8059	12926	-74014	-18864	-2467.13	-943.2
TOTAL	4060911	3276877	2863001	2500113	2586903	2568284	2408962	2943919	-1116992	443806	-31914.1	22190.3

Source: (1980-1996) Kerala State Planning Board 2009, (2000-2015) Agriculture Statistics Division

Production of Tapioca in Kerala– A District Wise Comparison

While going through the district wise data of production of tapioca from 1980 to 2015 we can see in table 2.24 that production of tapioca showed a decreasing trend from 4060911 tonnes in 1980-‘81 to 2943919 tonnes in 2014-‘15 *i.e.,* a total reduction of 1116992 tonnes , with a negative growth rate of 27.50%. Though net production of tapioca decreased, two districts, namely, Idukki, and Wayanad witnessed increase in the production while the rest witnessed decrease in the production of tapioca. The highest increase in the production of tapioca is noticed in Idukki district *i.e.,* 106030 tonnes and lowest increase in the production was in Wayanad district *i.e,* 50930 tonnes. The highest reduction in the production of tapioca is noticed in Trivandrum district *i.e.,* 379395 tonnes. The lowest reduction in the production of tapioca is noticed in Ernakulam district *i.e.,* 10926 tonnes.

When we analyse the post-WTO development in the production of tapioca, we can see that increase in the production of tapioca *i.e.,* a total increase of 443806 tonnes, with a growth rate of 17.75%. Though net production of tapioca increased, seven districts, namely Alappuzha, Kottayam , Palakkad, Malappuram, Kozhikode, Kannur and Kasaragode witnessed decrease in the production and other seven districts witnessed increase in the production of tapioca. The highest reduction in the production of tapioca is noticed in Palakkad district *i.e.,* 87088 tonnes. The lowest decrease in the production of tapioca is noticed in Kottayam district *i.e.,* 15053 tonnes. The highest increase in the production of tapioca is noticed in Kollam district *i.e.,* 168515 tonnes. The lowest increase in the production of tapioca is noticed in Thrissur district *i.e.,* 2175 tonnes.

Increase in the production of tapioca may be because of shift of investment from non cultivated area of tapioca to cultivated area of

tapioca, cultivation of tapioca along with coconut and plantain; intensive cultivation and increase in the price of cereals.

Decrease in the production of tapioca may be because of reduction in the area, increase in the price of fertiliser, attack from rat, diseases, increase in the land price, lack of profitability and rise in the wages of labourers.

Chapter III

CHANGES IN AREA, PRODUCTION AND YIELD OF SELECTED CROPS: A MICRO LEVEL ANALYSIS

CHAPTER III

CHANGES IN AREA, PRODUCTION AND YIELD OF SELECTED CROPS – A MICRO LEVEL ANALYSIS

3.1 INTRODUCTION

This chapter deals with the results of the sample survey that was conducted by the researcher. The sample area of the survey included three blocks- Puzhakkal, Vypin and Lalam. These blocks were selected from three districts of Kerala in order to represent three diverse eco-zones largely found in the state of Kerala. Vypin is in Ernakulam district. It is primarily lowland, coastal area. Puzhakkal belongs to Thrissur district and represents the midland area. The third zone selected was Lalam from Kottayam district which is primarily a hilly highland area. From each block, farmer households having cropped area more than 40 cents were identified and from these, 100 farmers were selected on a random basis.

From the selected households, data were collected regarding socio economic variables like religion, education level, income status of the farmer, *etc*. Variables related to details of five major crops- rice, tapioca, rubber, coconut and pepper cultivated in these areas were also collected. Ten important determinants of crop cultivation patterns were identified- price of crop, cost of production, impact of subsidies, impact of fertilizers, availability of credit, income of the farmer, size of land holding, irrigation facilities. Data regarding these were collected for each crop being cultivated by the household. Besides these, opinions of the farmers

regarding the impact of the WTO policies and constraints faced by the farmers as a consequence of liberalising trade reforms were also recorded.

The chapter briefly discusses the socio-economic profile of the sample population that was surveyed.

3.2 FAMILY SIZE OF THE RESPONDENTS

Table 3.1Family size in blocks

BLOCKS		Category of families				
		1or 2 members	3 or 4 members	5 or 6 members	7 to 9 members	TOTAL
PUZHAKKAL	Frequency of families with numbers	16(5.33)	47(15.6)	36(12)	1(0.33)	100
VYPIN		29(9.66)	52(17.3)	18(6)	1(0.33)	100
LALAM		17(5.66)	60(20)	23(7.6)	0(0)	100
Total		62(20.66)	159(53)	77(25.66)	2(.66)	300(100)
Total farmers		300(100)	300(100)	300(100)	300(100)	300(100)

Primary survey: November 2016- December 2016

From table 3.1, we can see that out of 300 families, 62 families have 1 or 2 members, *i.e.*, 20.66%. In Puzhakkal Block, there are 16 families having 1 or 2 members, *i.e.*, 5.33%. In the case of Vypin and Lalam, there are 29 *i.e.,* 9.66% and 17 *i.e.,* 5.66% families respectively having 1 or 2 members. From this we can see that Vypin Block has more families in the 1 or 2 member-category compared to the other Blocks. About 159 families have 3 or 4 members, *i.e.*, 53% of total farmers. These families are spread over in Puzhakkal, Vypin and Lalam Blocks. In Puzhakkal Block, 47 families have 3 or 4 members, *i.e.*, 15.6% of total farmers; whereas about 52 families have 3 or 4 members in Vypin Block, *i.e.*, 17.3% of total farmers; and while 60 families in Lalam, *i.e.*, 20%

belongs to 3 or 4 member-category. We can also see that in Lalam Block, there are 60 farmers, *i.e.*, 20% of the farmers belong to 3 or 4 member-family group. Lalam Block has the highest number of 3 or 4 member-families. Majority of the families belong to 3 or 4 member-category. In all the three blocks, the number of families is the highest in 3 to 4 member-category. The present generation prefers nuclear families to joint families. Out of the 300 responded families, 77 families have 5 or 6 members, *i.e.*, 25.66%. In Puzhakkal Block, 36 families, *i.e.*, 12% have 5 or 6 members. In Vypin and Lalam, there are 18 families, *i.e.,* 6%, and 23 families, *i.e.*, 7.6%, having 5 and 6 members respectively. Compared to all the other categories, the families having 7 to 9 members are very few. Only 2 families out of 300 have 7 to 9 members in their family *i.e.*, 0.66% of the total agriculturalists. While there is only one family each having 7 to 9 members in Puzhakkal and Vypin Blocks, there is no family in Lalam under this group.

Table 3.2
Sex, religion and social group of farmers in blocks

BLOCK (DISTRICT) (LAND CATEGORY)	SEX		RELIGION		SOCIAL GROUP	
	Male	Female	Hindu	Christian	General	OBC
PUZHAKKAL	81 (31.8)	19 (41.3)	67 (69)	33 (16.3)	45 (20.7)	55 (66.3)
VYPIN	83 (32.7)	17 (36.9)	29 (30)	71 (34.9)	72 (33.2)	28 (33.7)
LALAM	90 (35.5)	10 (21.8)	1 (1)	99 (48.8)	100 (46.1)	0 (0)
Total responded	254 (84.7)	46 (15.3)	97 (32.3)	203 (67.7)	217 (72.3)	83 (27.7)
Total number of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

3.3 SOCIO-ECONOMIC CHARACTERISTICS OF SAMPLE HOUSEHOLDS

From table 3.2, we can understand that out of 300 farmers 254 respondents *i.e.,* 84.7% are males and 46 respondents *i.e.,* 15.3% are females. In Puzhakkal block, 81 farmers *i.e.,* 31.8% are males and 19 farmers *i.e.,* 6.3% are females. In Vypin Block, 83 farmers *i.e*., 32.7% are males and 17 farmers *i.e.,* 5.7% are females. In Lalam Block, 90 farmers *i.e.,* 30% are males and 10 farmers *i.e.,* 3.3% are females. Here we can see that in all 3 blocks, majority farmers are males.

Religion-wise, it can be seen that 97 respondents belong to Hindu religion *i.e*., 32.3% and 203 respondents *i.e.,* 67.7% are Christians. In Puzhakkal Block, 67 farmers *i.e.,* 22.3% are Hindus, and 33 farmers *i.e.,* 11% are Christians. In Vypin Block, 29 farmers *i.e.,* 9.7% are Hindus and 71 farmers *i.e.,* 23.7% are Christians. In the case of Lalam Block, 1 farmer *i.e.,* 0.3% belongs to Hindu religion and 99 farmers *i.e.,* 33% belong to Christian religion. There is nobody from Muslim religion among the 300 respondents.

When we consider social groups, we can see two categories *i.e*., General and OBC. Out of the 300 respondents, 217 respondents *i.e.,* 72.3% belong to General category and the balance 83 *i.e.,* 27.7% belong to OBC category. In Puzhakkal Block, 45 respondents *i.e.,* 15% belong to General category and 55 respondents *i.e.,* 18.3% belong to OBC category. Here there is no much variation in the number of respondents between the two social groups. In Vypin Block, 72 farmers *i.e.,* 24 % belong to General category and 28 respondents *i.e.,* 9.3% belong to OBC category. Here we can notice a dominance of General category respondents over OBC category respondents. In Lalam Block, 100 respondents *i.e.,* 33.33% belong to General category and no one belongs to OBC category. Besides General and OBC categories, there is no respondent from other social groups like SC and ST.

3.4 EDUCATIONAL AND OCCUPATIONAL DETAILS OF SAMPLE HOUSEHOLDS

Table 3.3
Education and occupation of respondents in blocks

Block	Education						Occupation			
	Illiterate	Primary	Secondary	Higher	Degree /diploma /professional	Total	Farming	Govt. employee	Others	Total
PUZHAKKAL	2 (.77)	29 (9.7)	44 (14.7)	11 (3.7)	14 (4.7)	100	69 (23)	14 (4.7)	17 (5.7)	100
VYPIN	0 (0)	7 (2.3)	30 (10)	13 (4.3)	50 (16.7)	100	52 (17.3)	8 (2.7)	40 (13.3)	100
LALAM	0 (0)	6 (2)	46 (15.3)	11 (3.7)	37 (12.3)	100	79 (26.3)	5 (1.7)	16 (5.3)	100
Total responded	2 (0.7)	42 (14)	120 (40)	35 (11.7)	101 (33.7)	300	200 (66.7)	27 (9)	73 (24.3)	300
Total number of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

When we look into the educational qualifications of 300 respondents, we can see that in table 3.3, 2 respondents, *i.e.,* 0.7% are illiterates. 42 respondents out of 300 are having primary education *i.e.,* 14%. 120 respondents out of 300 *i.e.,* 40% are having secondary school education. 35 respondents out of 300 *i.e.,* 11.7% are having higher secondary education. 101 respondents out of 300 *i.e.,* 33.7% are having diploma/degree/professional qualifications. In Puzhakkal Block, out of the 300 respondents, 2 respondents *i.e.,* 0.7% are illiterate. 29 respondents *i.e.,* 9.7% are having primary education. Forty four respondents are having secondary school education *i.e.,* 14.7%. Eleven respondents *i.e.,* 3.7% are having higher secondary education and 14 respondents *i.e.,* 4.7%are having diploma/degree/professional qualifications. In Vypin Block, out of the 300 respondents, 7 respondents *i.e.,* 2.3% are having primary education. Thirty respondents *i.e.,* 10% are having secondary school education. Thirteen respondents *i.e.,* 4.3% are having higher secondary education. Fifty respondents *i.e.,* 16.7% are having diploma/degree/professional qualifications. In Lalam Block, out of the 300 respondents, 6 respondents *i.e.,* 2% are having primary education. Forty six respondents *i.e.,* 15.3% are having secondary school education. 11 respondents *i.e.,* 3.7% are having higher secondary education, and 37 respondents *i.e.,* 12.3% are having diploma/degree/professional qualifications. Out of the 300 respondents, 2 farmers *i.e.,* 0.77% are illiterates and both the farmers are from Puzhakkal Block.

Based on the occupational pattern, it can be seen that out of 300 respondents, 200 respondents *i.e.,* 66.7% are having farming as their main occupation. 27 respondents *i.e.,* 9% are government employees. 73 respondents *i.e.,* 24.3% are neither full time farmers nor government employees. In Puzhakkal Block, out of 300 respondents 69 respondents *i.e.,* 23% are having farming as their main occupation. Fourteen

respondents *i.e.,* 4.7% are government employees and 17 respondents *i.e.,* 5.7% are neither full time farmers nor government employees. In Vypin Block, out of the 300 respondents 52 respondents *i.e.,* 17.3% are having farming as their main occupation. Eight respondents *i.e.,* 2.7% are government employees and 40 respondents *i.e.,* 13.3% are neither full time farmers nor government employees. In Lalam Block, out of 300 respondents, 79 respondents *i.e.,* 26.3% are having farming as their main occupation. Five respondents *i.e.,* 1.7% are government employees and 16 respondents *i.e.,* 5.3% are neither full time farmers nor government employees.

3.5 CROPPING PATTERN OF SAMPLE HOUSEHOLDS

While conducting the primary survey, five crops- rice, tapioca, pepper, rubber and coconut were covered as these are the five major crops related to the Kerala Economy. However, when it came to studying the implications of WTO regulations on these crops and the cropping pattern of Kerala, it was noticed that tapioca has been minimally affected by the Agreements. Therefore, while the tables reported here refer to data regarding tapioca as well, detailed explanation regarding this crop has not been given.

When we make a crop-wise classification, we can understand that 195 farmers *i.e.*, 65% of the 300 respondents cultivated coconut. We can see from table 3.4 that, one hundred coconut farmers out of the 300 total farmers *i.e.*, 33.3%, are from Puzhakkal. In the case of Vypin, 90 farmers *i.e.*, 30% are coconut farmers, but in Lalam only 5 of them *i.e.*, 1.7% are cultivating coconut. Coconut cultivation is dominant in Puzhakkal and Vypin Blocks because it is cultivated as an inter crop. In Lalam, coconut cultivation is comparatively less because they are cultivating coconut for domestic purpose.

Table 3.4 Crops cultivated in blocks					
Block	Crops				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	100 (33.3)	1 (0.3)	100 (33.3)	0 (0)	1 (0.3)
VYPIN	90 (30)	18 (6)	46 (15.3)	0 (0)	7 (2.3)
LALAM	5 (1.7)	34 (11.3)	1 (0.3)	96 (32)	20 (6.7)
Total respondents	195 (65)	53 (17.7)	147 (49)	96 (32)	28 (9.3)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Fifty-three pepper farmers out of the total 300 farmers, *i.e.*, 17.7% are from these 3 Blocks. While only 1 farmer *i.e.,* 0.3% cultivated pepper in Puzhakkal, 18 farmers *i.e.,* 6% cultivated pepper in Vypin, and 34 farmers *i.e.*, 11.3% cultivated pepper in Lalam. From this we can understand that pepper is not cultivated as a commercial crop in Puzhakkal, Vypin, and Lalam Blocks, because pepper cultivation is not as profitable as other crops.

Out of the 300 farmers, 147 farmers *i.e.*, 49% cultivated rice in 3 blocks. Out of this 300, 100 *i.e.*, 33.3 % cultivated rice in Puzhakkal Block. 46 of them, *i.e.*, 15.3% cultivated rice in Vypin. 1 of them *i.e.*, 0.3% cultivated rice in Lalam Block. Rice is cultivated as a commercial crop only in Puzhakkal Block.

96 out of 300 respondents cultivated rubber in 3 Blocks. Out of these rubber farmers, all are from Lalam Block. In Lalam Block, rubber

cultivation is more profitable than the cultivation of any other crop. Here rubber is cultivated as a commercial crop.

From this we can understand that in Puzhakkal Block all of them cultivated both coconut and rice. In Vypin Block, majority cultivated coconut and in Lalam Block majority cultivated rubber. We have surveyed in all 3 geographical areas, and have got respondents from agriculturalists cultivating all the five major crops. Few farmers cultivated more than one crop.

3.6 INTER-TEMPORAL CHANGES IN NUMBER OF FARMERS (1990-95)

Table 3.5

Number of farmers in different Blocks: before and after 1995

	PUZHAKKAL	VYPIN	LALAM	TOTAL
SINCE 1990	72 (24)	66 (22)	100 (33.3)	238 (79.3)
SINCE 1995	28 (9.3)	34 (11.3)	0 (0)	62 (20.6)
TOTAL	100 (33.3)	100 (33.3)	100 (33.3)	300 (100)

Primary survey: November 2016- December 2016

From table 3.5, we can understand that out of 300 farmers, 238 farmers *i.e.,* 79.3% have been cultivating since 1990. Among these farmers 72 of them *i.e.,* 24% belongs to Puzhakkal Block, 66 of them *i.e.,* 22% belongs to Vypin Block, and 100 of them *i.e.,* 33.3% belongs to Lalam Block.

Sixty two farmers *i.e.,* 20.6% of total 300 started cultivation since 1995. Out of these farmers, 28 of them *i.e.,* 9.3% belongs to Puzhakkal Block and 34 of them *i.e.,* 11.3% belongs to Vypin Block. No new farmer

started cultivation in Lalam Block since 1995. The WTO agreement of 1995 must have influenced the agriculturalist to start cultivation from 1995. In the case of Lalam Block, since all 100 farmers started cultivation from 1990, there were no new farmers to start cultivation from 1995.

3.7 CROPS CULTIVATED BEFORE 1990

In order to understand and check whether there have been any substantial changes in the cropping patterns, all farmers who reported intensive cultivation of any crop since 1990, were further asked as to which crop they cultivated before 1990. Similarly, those who reported intensive cultivation since 1995, were also asked as to which crops they cultivated before 1995.

Tables 3.6 and 3.7 show the crops cultivated before 1990 and the crops cultivated intensively since 1995. Out of the 300 agriculturalists surveyed, 134 *i.e.,* 44.66% cultivated coconut before 1990. In Puzhakkal Block, 70 respondents *i.e.,* 23.33% cultivated coconut before 1990. Traditionally, they have been cultivating coconut. In Vypin Block, 59 respondents *i.e.,* 19.7% cultivated coconut before 1990 because coconut cultivation was considered as the main occupation. Five respondents *i.e.,* 1.67% cultivated coconut in Lalam Block because they were cultivating it for domestic purpose only.

In the case of pepper, out of the 300 respondents 47 farmers *i.e.,* 15.7% cultivated pepper before 1990. In Puzhakkal Block, one farmer *i.e.,* 0.33% was cultivating pepper because pepper cultivation was done for domestic use only. In the case of Vypin Block, 12 farmers *i.e.,* 4% cultivated pepper. Here pepper cultivation was not a main occupation. But in Lalam Block, 34 respondents *i.e*., 11.3% cultivated pepper before 1990. Geographical area in Lalam is relatively good for pepper cultivation.

Table 3.6 & 3.7 **Crops cultivated before 1990 in blocks**					
BLOCKS	CROPS				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	70 (23.33)	1 (0.33)	71 (23.67)	0 (0)	1 (0.33)
VYPIN	59 (19.67)	12 (4)	33 (11)	0 (0)	5 (1.66)
LALAM	5 (1.67)	34 (11.33)	1 (0.33)	96 (32)	20 (6.67)
Total farmers (Crop wise)	134 (44.66)	47 (15.7)	105 (35)	96 (32)	26 (8.66)
Total farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)
Crops cultivated intensively by people from 1995 but started cultivation before 1990 in Blocks					
BLOCKS	CROPS				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	72 (24)	1 (0.33)	72 (24)	0 (0)	1 (0.33)
VYPIN	10 (3.33)	12 (4)	33 (11)	0 (0)	5 (1.67)
LALAM	5 (1.67)	34 (11.33)	1 (0.33)	96 (32)	20 (6.66)
Total farmers (Crop wise)	87 (29)	47 (15.66)	106 (35.33)	96 (32)	26 (8.66)
Total farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

In the case of rice, out of the 300 agriculturalists 105 *i.e.*, 35% cultivated rice before 1990. In Puzhakkal Block, 71 agriculturalists *i.e.*, 23.7% cultivated rice before 1990 because rice cultivation was considered as a main occupation in Puzhakkal Block. In Vypin Block, 33 farmers *i.e.,* 11% cultivated rice because rice cultivation was a way of life. In the case of Lalam, only one farmer *i.e.,* 0.33% cultivated rice because it was not the main occupation of people of that area.

In the case of rubber, out of the 300 farmers 96 *i.e.,* 32% cultivated rubber before 1990. In Puzhakkal Block no one cultivated rubber because cultivation of other crops is more attractive than rubber. In Vypin, no one cultivated rubber because the geographical area is not suitable for rubber cultivation. In Lalam Block, rubber is mostly cultivated because it is their traditional crop and geographical area is convenient for rubber cultivation, so that 96 farmers *i.e.,* 32% cultivated rubber before 1990.

Since 1995, out of the 300 farmers, 87 farmers *i.e.*, 29% cultivated coconut intensively. In Puzhakkal Block, 72 farmers *i.e.,* 24% cultivated coconut intensively because, besides other reasons the Agreement of WTO in 1995 might have encouraged them to cultivate coconut intensively. In Vypin, 10 agriculturalists *i.e.,* 3.33% cultivated coconut intensively since 1995 because there is some influence of WTO agreement. In Lalam Block, 5 agriculturalists *i.e.,* 1.67% cultivated coconut since 1995 because of the positive influence of WTO Agreement.

In the case of pepper 47, respondents *i.e.,* 15.66% cultivated pepper intensively since 1995. In Puzhakkal Block, one farmer *i.e.,* 0.33% cultivated intensively because pepper cultivation was done for domestic purpose only. In Vypin Block, 12 agriculturalists *i.e.,* 4% cultivated pepper intensively since 1995 because cultivation was attractive for them. In Lalam Block, 34 agriculturalists *i.e.,* 11.33% cultivated pepper intensively since 1995 because pepper cultivation was profitable for them.

Out of the 300 farmers 106 *i.e.,* 35.33% cultivated rice intensively since 1995. In Puzhakkal Block, 72 *i.e.,* 24% continued cultivation intensively. It may be because of cooperative effort of the farmers as well as the positive influence of WTO Agreement. In Vypin Block, 33 *i.e.,* 11% cultivated rice intensively. It may be because of availability of labour, encouragement by the government and positive influence of WTO Agreement. In the case of Lalam, one farmer cultivated rice since 1995. It may be because that farmer cultivated it for domestic purpose.

In the case of rubber, out of 300 farmers 96 respondents *i.e.,* 32% cultivated rubber intensively since 1995. In the case of Lalam Block, 96 farmers intensively cultivated since 1995 because of positive influence of WTO Agreement and the activities of the Rubber Board.

3.8 INTENSIVE CROP CULTIVATION SINCE 1995: REASONS

Table 3.8
Reasons to cultivate crops intensively from 1995 but started cultivation before 1990 in Blocks

Blocks	Reasons	Coconut farmer	Pepper farmers	Rice farmers	Rubber farmers	Tapioca farmers
TOTAL (Puzhakkal, Vypin, Lalam)	Increased profitability	79 (26.33)	47 (15.66)	93 (31)	92 (30.66)	26 (8.66)
	Increased govt. Support	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Increase in infrastructure	1 (.33)	0 (0)	8 (2.67)	2 (.67)	0 (0)
	Increase in productivity	4 (1.33)	0 (0)	5 (1.67)	2 (.67)	0 (0)
	Availability of subsidies	3 (1)	0 (0)	0 (0)	0 (0)	0 (0)
	Total	87 (29)	47 (15.66)	106 (35.3)	96 (32)	26 (8.66)
Total Farmers		300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

When we analyse table 3.8 we can see the reasons for cultivating intensively since 1995 but had started cultivation before 1990. 87 of the respondents *i.e.,* 29% of total farmers expressed different reasons to cultivate coconut intensively since 1995. Among them, 79 *i.e.,* 26.33% commented that increased profitability is the prime reason to cultivate coconut intensively from 1995. Other reasons like increase in infrastructure, and increase in productivity and availability of subsidies are expressed by a few farmers.

In the case of pepper, 47 farmers *i.e.,* 15.66% out of 300 commented that increased profitability is the prime reason for cultivating intensively since 1995.

In the case of rice, out of 300 farmers, 106 farmers *i.e.,* 35.3% responded about the reasons for intensive cultivation of rice. Out of them, 93 farmers *i.e.,* 31% intensively cultivated rice because of increased profitability. The other reasons commented are increase in infrastructure by 8 farmers *i.e.,* 2.6%, increase in productivity by 5 farmers *i.e.,* 1.67%.

In the case of cultivation of rubber, 96 *i.e.,* 32% farmers cited different reasons for intensive cultivation of rubber. Out of this, increased profitability is the main reason pointed out by 92 farmers *i.e.,* 30.66%. Two farmers *i.e.,* 0.67% commented that increase in infrastructure and increase in productivity are the next reasons for intensive cultivation of rubber.

3.9 CHANGES IN CROPPED AREA, PRODUCTION AND PRODUCTIVITY (CULTIVATION SINCE 1990)

The following section deals with response given by those farmers who had been cultivating since 1990. The questions mainly dealt with changes in area cropped, production and productivity.

3.9.1 Increase in Cropped Area- since 1995

Table 3.9

Number of farmers who increased area of crops since 1995 in Blocks (Farmers who cultivated crops since 1990)

Block	Farmers of Crops				
	Coconut farmers	Pepper farmers	Rice farmers	Rubber farmers	Tapioca farmers
PUZHAKKAL	65 (21.67)	1 (0.33)	65 (21.67)	0 (0)	1 (0.33)
VYPIN	10 (3.33)	7 (2.33)	23 (7.66)	0 (0)	5 (1.66)
LALAM	5 (1.66)	31 (10.33)	1 (0.3)	91 (30.33)	17 (5.66)
TOTAL	80 (26.66)	39 (13)	89 (29.66)	91 (30.33)	23 (7.66)
Total Farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Table 3.9 discusses about the increase in the number of agriculturalists of different crops since 1995. Increase in the number shows that 80 farmers *i.e.,* 26.66% out of 300 have increased the area under coconut cultivation. Here, 65 *i.e.,* 21.67% of the farmers from Puzhakkal Block have increased the area of crops since 1995. In Vypin Block, 10 farmers *i.e.,* 3.33 % have concentrated on coconut cultivation. In the case of Lalam Block, only 5 farmers *i.e.,* 1.66 % cultivated coconut on commercial basis.

In the case of pepper, out of the 300 farmers 39 farmers *i.e.,* 13% responded that they have increased the area of cultivation of pepper. In

Puzhakkal Block, only 1 farmer *i.e.,* 0.33% increased area of pepper because pepper is not commercially cultivated. Only seven farmers *i.e.,* 2.33% increased the area in Vypin Block because the geographical area is not very suitable for pepper cultivation. 31 farmers *i.e.,* 10.33% have increased the area in Lalam Block because majority farmers have concentrated on rubber cultivation, and pepper cultivation is not as profitable as rubber cultivation.

Out of the 300 farmers, 89 *i.e.,* 29.66% have increased the area of cultivation of rice since 1995. Here, 65 *i.e.,* 21.67% of the farmers from Puzhakkal Block have increased the area of crops since 1995 because majority have concentrated on rice cultivation. The reasons for increasing the area of rice cultivation in Puzhakkal Block may be the encouragement of group farming, good management, subsidies given to the farmers etc. and influence of the Agreement of WTO. From Vypin Block, there are 23 *i.e.,* 7.66% of farmers who increased their area of cultivation of rice because rice cultivation is a way of life for them. But in Lalam Block, only 1 *i.e.* 0.3% has increased the area of cultivation of rice because rice cultivation in Lalam Block is for domestic use only.

The area increased for cultivation of rubber is noticed only in Lalam Block. Out of the 300 farmers, 91 *i.e.,* 30.33% have increased the cultivation of rubber in Lalam Block. The farmers of the other two Blocks have not mentioned about increase in the area of rubber since 1995. From this we can infer that increase in the area of rubber cultivation may be due to the influence of WTO Agreement and suitable geographical area.

Table 3.10

No. of farmers who increased area of crops intensively since 1995 and the reasons

(Farmers who cultivated crops since 1990)

Block	Reasons	Crops				
		Coconut	Pepper	Rice	Rubber	Tapioca
TOTAL (Puzhakkal, Vypin, Lalam)	Increased profitability	76 (25.33)	39 (13)	80 (26.66)	88 (29.33)	17 (5.66)
	Increased govt. Support	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Increase in infrastructure	1 (0.33)	0 (0)	7 (2.33)	2 (0.67)	0 (0)
	Increase in productivity	0 (0)	0 (0)	2 (0.67)	2 (0.67)	0 (0)
	Availability of subsidies	3 (1)	0 (0)	0 (0)	0 (0)	0 (0)
	Crop wise total respondents	80 (26.66)	39 (13)	89 (29.66)	92 (30.66)	17 (5.66)
Total farmers		300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Table 3.10 explains the reasons for increase in area in cultivation of crops intensively since 1995. Out of the 300 farmers, increased profitability is the prime reason for 76 *i.e.,* 25.33% of coconut farmers. Here, we can understand that after the agreement of WTO, the coconut farmers are behaving with the orientation of profitability. This indicates that people have become more market-oriented and development-oriented since the Agreement of WTO. This may be a positive influence of WTO Agreement.

39 pepper farmers *i.e.,* 13% responded that increased profitability is the prime reason for increase in the area of cultivation of pepper intensively since 1995. Here, we can understand that people are very serious about profitability. This market-oriented and development-oriented approach may be due to the influence of WTO Agreement.

Out of the 89 farmers *i.e.,* 29.66% responded, 80 farmers *i.e.* 26.66% are of the opinion that increase in profitability is the prime reason for increase in the area of cultivation of rice since 1995. This shows the influence of profitability on these farmers. This may be the influence of incentives which is mentioned in the Agreement on Agriculture (AOA) in WTO Agreement.

Increased profitability is the prime reason for 88 rubber farmers *i.e.,* 29.33%, out of the 300 farmers who increased the area of cultivation of rubber intensively since 1995. Rubber is cultivated mainly in Lalam Block. It shows that majority of the rubber farmers are cultivating rubber based on profitability. It gives a clear picture that people are market-oriented. This may be the influence of 'domestic support' mentioned in the WTO Agreement.

3.9.2 Decrease in Cropped Area- Since 1995: Reasons

Farmers who have been cultivating since 1990 were asked whether they had reduced the area under crops after 1995. They were questioned regarding the main reasons for reducing the cropped area under the five major crops.

Of the total respondents, 50 coconut cultivators (16.67%) and 4 rubber cultivators (1.33%) reported lack of profitability as the main reason for reducing the cropped area. In the case of pepper, 5 farmers (1.67%), and in the case of rice, 10 farmers (3.33%) reported labour shortage as the main reason for decreasing area under cultivation.

3.9.3 Changes in Production since 1995

Table 3.11 shows the increase and decrease in the production of crops since 1995 in three Blocks. Out of the 300 farmers, 87 respondents *i.e.,* 29% increased the production of coconut. In Puzhakkal Block, 72 respondents *i.e.*, 24% increased the production of coconut. Coconut cultivation is dominant in Puzhakkal Block. In Puzhakkal Block, large number of agriculturalists increased the production of coconut; it may be due to influence of WTO Agreement. In Vypin Block, 10 respondents *i.e.,* 3.3% increased the production of coconut. Out of the 300 farmers responded, only 10 coconut farmers increased the production of coconut. Here though 10 farmers increased production, we can notice an influence of WTO Agreement on coconut cultivation because there were a lot of problems in Vypin Block like diseases, high wages and salinity of water. In Lalam Block, only 5 respondents *i.e.,* 1.6% increased the production of coconut. This is because coconut is not cultivated as a commercial crop in Lalam Block.

Table 3.11
Increase in production of crops since 1995 in Blocks
(Farmers who cultivated crops since 1990)

BLOCK	CROPS				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	72 (24)	1 (0.33)	72 (24)	0 (0)	1 (0.33)
VYPIN	10 (3.33)	12 (4)	32 (10.6)	0 (0)	5 (1.66)
LALAM	5 (1.66)	32 (10.6)	1 (0.33)	94 (31.33)	19 (6.33)
Total farmers responded	87 (29)	45 (15)	105 (35)	94 (31.33)	25 (8.33)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

In the case of pepper, out of the 300 farmers, 45 respondents *i.e.,* 15% increased the production of pepper since 1995. In Puzhakkal Block, only 1 respondent *i.e.*, 0.33 % increased production of pepper; it may be because they cultivated pepper only for domestic purpose. Twelve respondents from Vypin *i.e*. 4% increased the production of pepper; it may be because pepper cultivation was not done as a commercial crop in Vypin Block. Thirty two respondents *i.e.,* 10.66% increased the production of pepper from Lalam Block; it may be due to the profitability of pepper and influence of WTO Agreement in Lalam Block.

Out of the 300 farmers, 105 respondents *i.e.* 35% increased the production of rice since 1995. In Puzhakkal Block, out of the 300 farmers, 72 respondents *i.e.* 24% increased the production of rice. This may be due to profitability, government support, better organization of farmers, and the influence of WTO Agreement. In the case of Vypin Block, 32 respondents *i.e.* 10.66% increased the production of rice because rice cultivation is moderately profitable. One respondent *i.e.* 0.3% increased the production of rice in Lalam Block. In Lalam Block, rice would have been cultivated for domestic purpose.

94 farmers *i.e*. 31.33% increased the production of rubber. In Puzhakkal and Vypin Blocks, nobody cultivated rubber. Geographical area is not favourable for rubber cultivation in these two Blocks. Out of the 300 farmers, 94 respondents *i.e*. 31.33% increased the production of rubber in Lalam Block. It may be due to the influence of favourable geographical area and influence of WTO Agreement.

Similarly, farmers who have been farming since 1990 were also asked questions regarding decrease in production. It was only in the case of 49 coconut farmers (*i.e.,* 16.33%) of Vypin that a fall in production was reported. Only a negligible number of farmers reported a similar reduction in the rest of the crops.

Table 3.12
Reasons for increase in production of crops since 1995 in Blocks
(Farmers who cultivated crops since 1990)

Block	Reasons	Crops				
		Coconut	Pepper	Rice	Rubber	Tapioca
TOTAL (Puzhakkal, Vypin, Lalam)	Increased profitability	80 (26.67)	45 (15)	92 (30.6)	90 (30)	24 (8)
	Increased govt. Support	0 (0)	0 (0)	0 (0)	0 (0)	1 (.33)
	Increase in infrastructure	1 (.33)	0 (0)	7 (2.33)	2 (.67)	0 (0)
	Increase in productivity	5 (1.66)	0 (0)	6 (2)	2 (.66)	0 (0)
	Availability of subsidies	1 (0.33)	0 (0)	0 (0)	0 (0)	0 (0)
	Total	87 (29)	45 (15)	105 (35)	94 (31.33)	25 (8.33)
Total no: of farmers		300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Table 3.12 focuses on the reasons for increase in the production of crops since 1995. Increased profitability is the prime reason for increase in the production of crops in all the three Blocks since 1995. Out of the 300 farmers, 87 respondents *i.e.* 29% increased the production of coconut due to various reasons. Out of the 300 farmers, 80 respondents *i.e.* 26.67% increased the production of coconut due to increased profitability. This shows the influence of profitability on these farmers. People have become market oriented since the WTO Agreement.

Out of the 300 farmers, 45 respondents *i.e.*, 15% increased the production of pepper since 1995. Out of the 300 farmers, 45 pepper farmers *i.e.* 15% increased the production of pepper due to increased profitability. Though pepper is not cultivated as a commercial crop in 3

Blocks, people have become more money oriented and market oriented since 1995.

Out of the 300 farmers, 105 respondents *i.e.,* 35% increased the production of rice since 1995. Out of these 92 respondents *i.e.,* 30.6% increased the production of rice due to increased profitability since 1995. Here we can understand that since the Agreement of WTO, the rice farmers are behaving with the orientation of profitability and marketability. This may be a positive influence of WTO Agreement.

Out of the 300 farmers, 94 respondents *i.e.,* 31.33% increased the production of rubber. Out of the 300, 90 respondents *i.e.,* 30% increased the production of rubber due to increased profitability. Here we can understand that after the agreement of WTO, the rubber farmers were turned into market-orientated and development-oriented.

Through the primary survey, attempt was made to study the reasons for decrease in production of crops since 1995. As mentioned earlier, it was in the case of coconut that farmers mostly reported a decrease in production. In this case, the main reason reported by the majority (45 farmers) was lack of profitability.

Table 3.13 shows the productivity of given crops since 1995. In the case of coconut, 87 farmers *i.e.,* 29% out of 300 said that productivity was increased. Out of the 300, 72 *i.e.,* 24% of the respondents were from Puzhakkal Block. In Vypin, 10 *i.e.,* 3.33% of the farmers responded that productivity increased since 1995. In the case of Lalam Block, 5 *i.e.,* 1.66% of the farmers responded that productivity increased.

3.9.4 Changes in Productivity- since 1995

Table 3.13
Increase in productivity since 1995 Blocks
(Farmers who cultivated crops since 1990)

Block	Crop				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	72 (24)	1 (0.33)	72 (24)	0 (0)	1 (0.33)
VYPIN	10 (3.33)	12 (4)	32 (10.66)	0 (0)	5 (1.66)
LALAM	5 (1.66)	34 (11.33)	1 (0.3)	96 (32)	20 (6.66)
Total farmer responded	87 (29)	47 (15.6)	105 (35)	96 (32)	26 (8.66)
Total no: of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

For pepper, 47 respondents *i.e.,* 15.66% from the total 300 farmers reported that productivity was increased. These 47 farmers were: 1 from Puzhakkal *i.e.,* 0.3%, and 12 from Vypin *i.e.,* 4% and 34 from Lalam *i.e.,* 11.33% of the total farmers.

Out of the 300 farmers, 105 respondents *i.e.,* 35% commented that productivity of rice increased. Out of the 300 farmers, 72 from Puzhakkal *i.e.,* 24% commented that productivity increased for rice, this area is suitable for *Pokkali* rice cultivation. Thirty two from Vypin *i.e.,* 10.66% of the farmer reported that productivity of rice increased. In Lalam Block, only one farmer *i.e.,* 0.3% spoke about increase in the productivity of rice.

In the case of rubber, out of the 300 farmers, 96 respondents *i.e.,* 32% commented that productivity of rubber increased. These 96 *i.e.,* 32% of the farmers are from Lalam Block.

Increase in the productivity may be because of better infrastructure facilities, irrigation facilities, better use of non product-specific subsidies, advancement in technology, improvement in the quality of fertilizer, better availability of resources, better use of fund for disaster management, and better co-ordination of agricultural activities by farmers and respective organisations of different crops like Coconut Board, Spices Board, Paddy Research Institutes, Rubber Board, Tuber Research Institute and different agriculture universities.

Table 3.14
Reasons for increase in productivity of crops since 1995 in Blocks (Farmers who cultivated crops since 1990)

Blocks	Reasons	Crops				
		Coconut	Pepper	Rice	Rubber	Tapioca
(Puzhakkal, Vypin, Lalam)	Advancement in technology of machines	82 (27.3)	39 (13)	71 (23.6)	96 (32)	26 (8.66)
	Better infrastructure	0 (0)	0 (0)	7 (2.33)	0 (0)	0 (0)
	Increased availability of HYV seeds	3 (1)	0 (0)	8 (2.66)	0 (0)	0 (0)
	Improvement in the quality of fertiliser	2 (0.66)	0 (0)	2 (0.66)	0 (0)	0 (0)
	Better availability of resources	0 (0)	8 (2.66)	17 (5.66)	0 (0)	0 (0)
	Total	87 (29)	47 (15.66)	105 (35)	96 (32)	26 (8.66)
Total no. of farmers		300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

There was decrease in productivity of some crops since 1995. In the case of coconut, 49 *i.e.,* 16.33% of farmers reported that productivity of coconut decreased. All 49 farmers are from Vypin Block. The number of farmers reporting decrease in productivity for other crops was negligible. The decrease in productivity of different crops may be due to diseases and climatic unpredictability.

From table 3.14, it is clear that for the majority of the responded farmers, advancement in the technology of machines is the prime reason for increase in the productivity of crops like coconut, pepper, rice, rubber and tapioca. Out of the 300 farmers, 87 of them *i.e.,* 29% commented many reasons for increase in the productivity of coconut. Out of the 300 farmers, 82, *i.e.,* 27.3% have pointed out that advancement in technology of machines is the prime reason. 3 farmers *i.e.,* 1% of them reported that increased availability of HYV seeds is the prime reason for increase in productivity of coconut. In the case of pepper, out of the 300 farmers, 47 *i.e.,* 15.66% responded many reasons for the increase in the productivity of pepper. Out of the 300 farmers, 39 farmers *i.e.,* 13% said that productivity of pepper increased because of advancement of technology of machines. 8 farmers *i.e.*, 2.66% of them reported that better availability of resources is the prime reason for increase in the productivity of crops since 1995. In the case of rice, out of the 300 farmers, 71 farmers *i.e.,* 23.6% commented that advancement in technology of machines was the prime reason for increase in productivity. 17 farmers *i.e.,* 5.66% are of the opinion that better availability of resources was the main reason for increase in productivity of crops since 1995. 7 farmers *i.e.,* 2.33% are of the opinion that better infrastructure and 8 farmers *i.e.,* 2.66% are of the opinions that increase in availability of HYV seeds are the main reason for increase in productivity of crops since 1995. In the case of crops like rubber and tapioca, 96 and 26 farmers *i.e.,* 32% and 8.66% respectively

commented the advancement in technology of machines as the prime reason for increase in the productivity.

We also examined the reasons for decrease in the productivity of crops since 1995. Out of the 300 farmers, 49 coconut farmers reported decrease in the productivity of coconut since 1995. Out of the 300 farmers, 22 *i.e.,* 7.33% said that poor infrastructure is the prime reason for decrease in the productivity of coconut. Poor infrastructure makes transportation more difficult, and increase in transportation cost decreases productivity of coconut. Nineteen respondents *i.e.,* 6.33% commented that inadequate labour supply at the right time is the important reason for decrease in the productivity of coconut. Shortage in the labour supply forced farmers to discourage coconut cultivation. The remaining 8 respondents *i.e.,* 2.66% commented that climatic unpredictability is another reason for decrease in productivity of coconut.

3.9.5 Changes in Productivity- by Size of Land Holding

The table 3.15 looks at the changes in productivity as reported by respondents according to the size of land holding. Farmers with greater than 50 cents of owned land were classified as small famers while those owning greater than 50 cents were classified as large farmers.

From table 3.15 we can see that out of 300 farmers 86 *i.e.,* 28.67% coconut farmers said that productivity of coconut increased. Out of 86 *i.e.,* 28.67% coconut farmers, 30 *i.e.,* 10% large coconut farmers are of the opinion that productivity of coconut increased around 5% since 1995. In the case of large farmers, productivity of coconut increased by 5% due to better cultivation methods.

Table 3. 15

Increase in productivity since 1995 in Blocks - by size of land holding

(Farmers who cultivated crops since 1990)

Block		Crop				
		Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	Large farmers	21 (7)	0 (0)	69 (23)	0 (0)	0 (0)
	Small farmers	51 (17)	0 (0)	3 (1)	0 (0)	0 (0)
VYPIN	Large farmers	8 (2.67)	6 (2)	26 (8.67)	0 (0)	4 (1.33)
	Small farmers	2 (0.67)	6 (2)	7 (2.33)	0 (0)	1 (0.33)
LALAM	Large farmers	1 (0.33)	32 (10.67)	1 (0.33)	96 (32)	14 (4.67)
	Small farmers	3 (1)	2 (0.67)	0 (0)	0 (0)	5 (1.67)
Total farmer responded	Large farmers	30 (10)	38 (12.67)	99 (33)	96 (32)	18 (6)
	Small farmers	56 (18.67)	8 (2.67)	7 (2.33)	0 (0)	6 (2)
Total no: of farmers		300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

In the case of pepper, out of 300 farmers, 46 farmers *i.e.,* 15.34% are of the opinion that productivity increased. Out of this 38 *i.e.,* 12.67% large farmers are of the opinion that the productivity increased because of better cultivation methods. In the case of 8 small farmers *i.e.,* 2.67 % the

productivity increased at 10% because, small farms might have got better attention.

In the case of rice, 106 *i.e.,* 35.33% farmers are of the opinion that productivity increased. Out of 106 rice farmers 99 *i.e.,* 33% said that productivity increased at 20%. It may be due to active participation of agricultural associations. Seven farmers *i.e.,* 2.33% are of the opinion that productivity increased at 10%. It may be due to active participation by small farmers.

In the case of rubber 96 *i.e.,* 32% of the rubber farmers are of the opinion that productivity increased. All rubber farmers are large farmers and they are of the opinion that productivity increased at the rate of 20%. It is due to support given by Rubber Board and active participation by the farmers.

When we take the decrease in the productivity we can see that 49 *i.e.,* 16.33% coconut farmers out of 300 are of the opinion that productivity of coconut decreased. Of the large farmers producing the coconut, 28 are of the opinion that productivity of coconut decreased at the rate of 10 %. It is due to diseases and lack of interest in coconut cultivation. But 21small coconut farmers *i.e.,* 7% of 300 farmers are of the opinion that productivity of coconut decreased at the rate of 5%. This might be because small farms being situated around the dwelling units might have got better attention than large farms.

In the case of pepper and rubber none of the farmers reported a decrease in productivity. In the case of rice, only one large farmer reported that productivity of rice declined. This may be due to lack of interest in rice cultivation.

3.10 CHANGES IN CROPPED AREA, PRODUCTION AND PRODUCTIVITY (CULTIVATION SINCE 1995)

This section deals with changes in cropped area, production levels and productivity as reported by the respondent farmers who have been cultivating since 1995. As India became a signatory of the WTO Agreement, a large number of changes have taken place in relation to policies dealing with the agricultural sector.

In the tables that follow, we examine, in detail, the effects of factors such as- subsidies of different types, investments in infrastructure, availability of input services, variations in holdings of public stock of food grains- on the earlier variables.

3.10.1 Types and Forms of Subsidy

Table 3.16

Different types of subsidy since 1995 in Blocks

(Farmers who cultivated crops since 1995)

Block	Subsidy				
	Fertiliser	Electricity	Irrigation	Seed	Others
PUZHAKKAL	29 (9.66)	0 (0)	0 (0)	71 (23.66)	0 (0)
VYPIN	80 (26.66)	4 (1.3)	5 (1.7)	3 (1)	8 (2.6)
LALAM	0 (0)	0 (0)	0 (0)	0 (0)	100 (33.33)
TOTAL	109 (36.3)	4 (1.3)	5 (1.7)	74 (24.7)	108 (36)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Table 3.16 shows different types of subsidy that the farmers availed since 1995. We know that after the WTO Agreement was signed, several changes happened in agricultural sector. The implications of trade policies made an impact on the major crops in Kerala. Out of the 300 farmers, 109 respondents *i.e*., 36.3% got fertilizer subsidy. In Puzhakkal Block, out of the 300 farmers, 29 respondents *i.e.,* 9.66%, and 80 respondents from Vypin Block *i.e.,* 26.66% got fertilizer subsidy. Fertilizer is the more effective subsidy for these two Blocks. This may be the influence of AMBER BOX which is mentioned in the Agreement on Agriculture (AOA) in WTO Agreement. Amber box includes both product-specific and non-product specific support. Non-product specific support refers to agriculture as a whole *i.e.,* subsidies on inputs such as fertiliser, electricity, irrigation, seeds, credit etc. In Lalam Block, farmers did not receive fertiliser subsidy. They received only product specific subsidy.

Out of the 300 farmers, 4 respondents *i.e.,* 1.3% got subsidy for electricity in Vypin Block. In Puzhakkal Block, the farmers did not receive electricity subsidy but the cooperative society of farmers received electricity subsidy. In Lalam Block, no farmer got electricity (non-product specific) subsidy. The farmers here got product specific subsidy. Product specific and non- product specific subsidy come under the AMBER BOX, which is a part of WTO Agreement.

Out of the 300 farmers, 5 respondents *i.e.,* 1.7% got subsidy for irrigation in Vypin Block. In Vypin Block, the cultivated area is surrounded by water bodies so that they gave little importance for irrigation. In Puzhakkal Block, paddy fields are lying below sea level so that they do not want irrigation subsidy.

Out of the 300 farmers, 74 respondents *i.e.,* 24.7% got subsidy for seeds. Out of the 300 farmers, 71 respondents *i.e.,* 23.66% from

Puzhakkal Block got subsidy for seeds because the co-operative society of farmers gave importance to supply of HYV seeds. Three respondents *i.e.*, 1% of total farmers received subsidy for seeds in Vypin Block. In Vypin Block, only conventional seeds could be cultivated because of salinity of water. So they do not buy HYV seeds and avail seed subsidy.

Table 3.17
Forms of subsidy received in Blocks
(Farmers who cultivated crops since 1995)

Block	Subsidy		
	Cash only	Kind only	Both
PUZHAKKAL	0 (0)	0 (0)	100 (33.33)
VYPIN	7 (2.3)	0 (0)	93 (31)
LALAM	100 (33.33)	0 (0)	0 (0)
TOTAL	107 (35.66)	0 (0)	193 (64.33)
Total no of farmers	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

From table 3.22, we can understand that farmers received different forms of subsidy in Blocks. Mainly, they received subsidies in the form of cash only, kind only or both. 107 farmers out of the 300 received subsidy in the form of cash only *i.e.,* 35.7%. Here all the farmers from Lalam Block received this subsidy. Here majority of farmers preferred cash only subsidy because they will be able to use subsidy amount as they like. Only 7 *i.e.,* 2.3% of the total 300 farmers received cash subsidy in Vypin

Block. In Puzhakkal Block, no one received cash only subsidy. The cooperative society of farmers of Puzhakkal preferred neither cash only nor kind only subsidies, but both.

No one has received kind only subsidy in these three Blocks. But 193 of the farmers out of 300 received both the subsidies. In Puzhakkal Block, all 100 *i.e.,* 33.33% farmers received both subsidies. This is because farmers are very active and they have received maximum subsidies. Ninety three *i.e.,* 31% of farmers in Vypin Block, also received both subsidies because the farmers are much organised in getting both types of subsidies. In Lalam Block, the farmers received cash only subsidy.

Table 3.18
Types of subsidy (kind) in Blocks
(Farmers who cultivated crops since 1995)

Block	Subsidy			
	Fertiliser	Electricity	Irrigation	Seed
PUZHAKKAL	44 (14.7)	0 (0)	0 (0)	56 (18.7)
VYPIN	79 (26.3)	4 (1.3)	6 (2)	3 (1)
LALAM	0 (0)	0 (0)	0 (0)	0 (0)
TOTAL	123 (41)	4 (1.33)	6 (2)	59 (19.6)
Total no of farmer	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Table 3.18 explains the types of subsidy (kind only) received by the farmers who cultivate the crops since 1995. 123 farmers *i.e.,* 41% farmers received fertilizer subsidy. Forty-four *i.e.,* 14.7% farmers received fertiliser subsidy in Puzhakkal Block. Seventy nine *i.e.,* 26.33% farmers in Vypin Block got fertiliser subsidy. In Lalam Block nobody received fertilizer subsidy.

Four farmers *i.e.,* 1.33% of total farmers received electricity subsidy. In Puzhakkal Block, no farmer received electricity subsidy. In Vypin Block, four farmers *i.e.,* 1.33% of total farmers received electricity subsidy. In Lalam Block, nobody received electricity subsidy.

Six farmers *i.e.,* 2% of the 300 farmers received irrigation subsidy. In Puzhakkal Block, no one received irrigation subsidy. Six farmers *i.e.,* 2% of the 300 farmers received irrigation subsidy from Vypin Block. In Lalam Block, nobody received irrigation subsidy.

Fifty nine farmers *i.e.,* 19.6% received seed subsidy. In Puzhakkal Block, 56 farmers *i.e.,* 18.7% received seed subsidy, and in Vypin Block 3 farmers *i.e.,* 1% received seed subsidy. In Lalam Block, nobody received seed subsidy. Fertilizer, electricity, irrigation and seed subsidies are mentioned in the AMBER BOX of WTO Agreement.

3.10.2 Type of Subsidy Preferred-Reasons

We further asked a question to the respondents regarding the types of subsidy that they preferred. 189 farmers out of 300 *i.e.,* 63% preferred fertiliser subsidy. Out of the 300 farmers, 100 *i.e.,* 33.33% from Puzhakkal Block preferred fertilizer subsidy, and 89 farmers *i.e.,* 29.7% from Vypin Block preferred fertilizer subsidy because farmers of Puzhakkal and Vypin Block preferred fertilizer subsidy, which is a part of non product specific subsidy of AMBER BOX. From Lalam Block, no body preferred fertilizer subsidy. It is clear that all of them preferred cash

subsidy over the other subsidies on fertiliser, electricity, irrigation and seed.

The Table 3.19 compares the preference of farmers for product specific and non-product specific subsidies.

Table 3.19
Types of subsidy preferred by the farmers in Blocks

Blocks	Types of Subsidy		
	Product specific	Non-product specific	Both
PUZHAKKAL	12 (4)	0 (0)	88 (29.33)
VYPIN	19 (6.33)	0 (0)	81 (27.33)
LALAM	100 (33.33)	0 (0)	0 (0)
Total farmers responded	131 (43.7)	0 (0)	169 (56.33)
Total no: of farmers	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Out of the 300 farmers, 131 respondents *i.e*., 43.7% preferred product specific subsidy. In Puzhakkal Block, 12 respondents *i.e.,* 4% chose product specific subsidy. In Vypin Block, 19 respondents *i.e.,* 6.33% chose product specific subsidy, and in Lalam Block, 100 respondents *i.e.,* 33.3% choose product specific subsidy. It may be because product-specific subsidy increases income and farmers could spend money as they like. No one preferred non-product specific subsidy alone because they might not have received the inputs in right time and right quantity.

Out of the 300 farmers, 169 *i.e.,* 56.3% preferred both *i.e.,* product specific and non product specific subsidies together. Out of the 300 farmers, 88 farmers *i.e.,* 29.3% preferred both the product specific and non product specific subsidies together in Puzhakkal Block. Eighty one farmers *i.e.,* 27% in Vypin Block received both *i.e.,* product specific and non product specific subsidies together. Here we can understand that most of the farmers in Puzhakkal and Vypin Block preferred both. This is because even if they did not get non product specific subsidy in right time and right quantity, farmers could utilize the product specific subsidy as they liked. Both the subsidies are mentioned in DEMINIMUM-SUPPORT of WTO Agreement.

Table 3.20

Reasons for preference of product specific subsidy in Blocks

Blocks	Reasons		
	Increases income and farmers can spend as they like	Country's preference of crop can be understood	It gives guidance to the production of next crop
PUZHAKKAL	12 (4)	0 (0)	0 (0)
VYPIN	19 (6.33)	0 (0)	0 (0)
LALAM	100 (33.33)	100 (33.33)	100 (33.33)
Total farmers responded	131 (43.7)	100 (33.3)	100 (33.3)
Total no. of farmers	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

In Lalam Block, nobody preferred both the subsidies together because they could not wait for the inputs supplied through non product specific subsidy.

In table 3.20, 131 farmers *i.e.,* 43.7% preferred product specific subsidy. Out of the 300 farmers, 12 farmers *i.e.,* 4% from Puzhakkal Block preferred product specific subsidy because it can increase farmers' income and they could spend as they like. Out of the 300 farmers, 19 *i.e.,* 6.3% preferred product specific subsidy because government gave remunerative price for their agriculture products. Out of the 300 farmers, 100 *i.e.,* 33.33% are from Lalam Block and they preferred product specific subsidy because it could increase farmers' income and they could spend as they liked.

In Puzhakkal and Vypin Blocks, the farmers did not prefer product specific subsidy because their production was on a small scale and they did not look for the country's preference of crops. However, in Lalam Block all 100 farmers *i.e.,* 33.33% preferred product specific subsidy because country's preference of crop could be understood.

In Puzhakkal and Vypin Blocks, the farmers did not prefer product specific subsidy because they did not look in to the guidance for the production of the next crop. However, in Lalam Block all 100 farmers *i.e.,* 33.33% preferred product specific subsidy because it gave some guidance to the production of next crop.

Out of the 300 respondents, no one preferred non product specific subsidy. The farmers thought that inputs were not received in right time, right quality and right quantity. They thought that they are the best judge of themselves, and they did not think that non product specific subsidy had any educative role. They also thought that non product specific subsidy had any innovative role.

We also look into the reasons for preferring both the subsidies. Out of the 300 farmers, 169 respondents *i.e.,* 56.3% preferred 'increase in income and farmers can spend as they like' as the prime reason. In Puzhakkal Block, out of the 300 farmers, 88 *i.e.,* 29.3% preferred 'increase in income and farmers can spend as they like' as the prime reason and 81 farmers *i.e.,* 27% from Vypin Block preferred both the subsidies because they thought that these can increase their income and they can spend the money as they like. In Lalam Block, no one preferred both the subsidies. Though there are other reasons like countries preference of crops, influence on the production of next crop, use of input in right time and right purpose, and educative and innovative effect, they gave importance to their income and freedom only.

3.10.3 Effect of Product Specific Subsidy- Increase in Area and Production

Increase in area of cultivation due to the receipt of product specific subsidy was reported only by the farmers from Vypin block. Of these, 10 (*i.e.,* 3.33%) were coconut farmers, 3 (*i.e.,* 1%) were pepper farmers, 2 (*i.e.,* 0.67%) were rice farmers and 3 (*i.e.*1%) were tapioca farmers. None of the farmers from the other blocks reported an increase in area of any crop as a direct effect of product specific subsidy.

The farmers were also asked as to how the receipt of product specific subsidy could help them increase net area under cultivation. Although only 18 farmers from Vypin block reported an actual increase in cultivated area, 49 farmers of the total 300 admitted that such subsidy could help them do so as it provides additional income which can fund an increase in the cropped area. None of these famers felt that the subsidy encourages double cropping or multi-cropping.

Table 3.21

Increase in production of crops due to product specific subsidy in Blocks

Blocks	Crop				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	0 (0)	0 (0)	98 (32.67)	0 (0)	0 (00
VYPIN	38 (12.67)	4 (1.33)	37 (12.33)	0 (0)	4 (1.33)
LALAM	0 (0)	1 (.33)	1 (.33)	95 (31.37)	2 (.67)
Total farmers responded	38 (12.67)	5 (1.7)	136 (45.3)	95 (31.7)	6 (2)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Though only a few farmers reported an increase in cultivated area due to receipt of product specific subsidy, a large number of farmers admitted that it had a positive influence on the production levels. This is because bringing more area under cultivation requires a large amount of financial capital.

In table 3.21, the increase in the production of crops due to product specific subsidy is mentioned. Out of the 300 farmers, 38 farmers *i.e.,* 12.7% increased the production of coconut. In Puzhakkal Block, there was no increase in production of coconut due to product specific subsidy. This was because coconut was not cultivated in large scale. In Vypin Block, out of the 300 farmers, 38 farmers *i.e.,* 12.7% increased the production of coconut due to product specific subsidy. They used the amount received through product specific subsidy for increasing the production of coconut. In Lalam Block, there was no increase in

production of coconut due to product specific subsidy. This was because coconut was not cultivated in large scale.

Out of the 300 farmers, 5 farmers increased production of pepper *i.e.,* 1.7%. In Puzhakkal Block, there was no increase in production of pepper due to product specific subsidy. This was because pepper was not cultivated in large scale. In Vypin Block, out of the 300 farmers, 4 farmers *i.e.,* 1.33% increased the production of pepper due to product specific subsidy. They used the amount received through product specific subsidy for increasing the production of pepper. In Lalam Block, one farmer *i.e.*, 0.33% increased the production of pepper due to product specific subsidy. This is because they utilised the amount received through product specific subsidy for increasing the production of pepper.

In the case of rice, 136 of the 300 farmers *i.e.,* 45.3 % increased the production due to product specific subsidy. Out of the 300 farmers, 98 *i.e*., 32.67% from Puzhakkal Block increased the production of rice. This is because they utilised the amount received through product specific subsidy for increasing the production of rice. Out of the 300 farmers, 37 *i.e*., 12.33% from Vypin Block increased the production of rice. This is because they utilised the amount received through product specific subsidy for increasing the production of rice. Out of the 300 farmers, only one farmer from Lalam Block increased the production of rice. This is because the farmer utilised the amount received through product specific subsidy for increasing the production of rice.

In the case of rubber, 95 farmers from 300 *i.e.,* 31.7% increased the production due to product specific subsidy. In Puzhakkal and Vypin Blocks, there is no increase in production of rubber due to unsuitable geographical area. In Lalam Block out of the 300 farmers, 95 *i.e*., 31.7% increased the production of rubber. This is because they utilised the

amount received through product specific subsidy for the large scale production of rubber.

Here we can understand that after the Agreement of WTO, the farmers increased production with the orientation of profitability and productivity. This shows that people have become more market-oriented and development-oriented since the Agreement of WTO.

The farmer respondents were asked as to how the product specific subsidy helped them increase the production of crops. They were asked to select from the following categories- additional subsidy income helped to expand production, encourage double cropping, encourages multi-cropping and facilitates use of better agricultural inputs.

Forty eight agriculturalists from 300 *i.e.,* 16% responded that the additional subsidy income helped to expand the production. In the case of Vypin Block, 48 farmers *i.e.,* 16% increased the production of rice due to additional subsidy-income received. They utilised the funds they received via product specific subsidy for reclaiming backwaters for *Pokkali* cultivation.

Hundred and fifty agriculturalists out of 300 *i.e.,* 50% responded that the additional subsidy-income encouraged double cropping which enabled increase the production. Of these, 98 farmers *i.e.,* 39.2% belonged to Puzhakkal Block. Rice farmers of this block increased production successfully by utilising short duration, dwarf variety of rice such as *Jyothi* and *Uma*. In the case of Vypin Block, 52 farmers *i.e.,* 20.8% responded that the additional subsidy-income encouraged double cropping. This is because they utilised the funds they received via product specific subsidy for fish (*chemmeen* or prawn) farming. None of the farmers selected any of the other mentioned reasons.

3.10.4 Effect of Non Product Specific Subsidy- Increase in Area and Production

Respondents were asked if the receipt of non-product specific subsidy helped them to increase the area of production. Only farmers from Vypin block responded affirmatively to the question. Of these, 10 respondents *i.e.,* 3.33% were coconut farmers, 3 respondents *i.e.,*1% were tapioca farmers, 4 respondents *i.e.,* 1.33% increased the area of pepper and 18 respondents *i.e.,* 6% increased the area of rice and due to non product specific subsidy.

Although 35 farmers from Vypin block reported to an actual increase in area under cultivation, 48 famers admitted that the additional income helped them to utilise the inputs at the right time for the right purpose. These farmers were also from Vypin Block alone. This is because in this block, the subsidy income could be successfully used to reclaim backwater lands by building bunds. This reclaimed land is highly fertile and apt for *Pokkali* rice cultivation. None of the other farmers responded to any of the other reasons.

Table 3.22
Increase in production of crops due to non product specific subsidy in Blocks

Blocks	Crop				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	0 (0)	0 (0)	78 (26)	0 (0)	0 (0)
VYPIN	31 (10.3)	3 (1)	30 (10)	0 (0)	3 (1)
LALAM	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total farmers responded	31 (10.3)	3 (1)	108 (36)	0 (0)	3 (1)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

In table 3.22, increase in the production of crops due to non product specific subsidy is mentioned. Out of the 300 farmers, 31 farmers *i.e.,* 10.3% increased the production of coconut. In Puzhakkal Block, there is no increase in production of coconut due to non product specific subsidy. This is because coconut was not cultivated in large scale. In Vypin Block, out of the 300 farmers, 31 farmers *i.e.,* 10.3% increased the production of coconut due to non product specific subsidy. They used the amount received through non product specific subsidy for increasing the production of coconut. In Lalam Block, there is no increase in production of coconut due to non product specific subsidy. This is because coconut was not cultivated in large scale.

Out of the 300 farmers, 3 farmers *i.e.,* 1% increased the production of pepper. In Puzhakkal Block, there is no increase in the production of pepper due to non product specific subsidy. This is because pepper was not cultivated in large scale. In Vypin Block, out of the 300 farmers, 3 farmers *i.e.,* 1% increased the production of pepper due to non product specific subsidy. They used the amount received through non product specific subsidy for increasing the production of pepper. In Lalam Block, no farmer increased the production of pepper due to non product specific subsidy. This is because they utilised the amount received through non product specific subsidy for increasing the production of pepper.

In the case of rice, 108 farmers out of the 300 *i.e.,* 36% increased the production due to non product specific subsidy. Out of the 300 farmers, 78 *i.e*., 26% from Puzhakkal Block increased the production of rice. This is because they utilised the amount received through non product specific subsidy for increasing the production of rice. Out of the 300 farmers, 30 *i.e*., 10% from Vypin Block, increased the production of rice. This is because they utilised the amount received through non product specific subsidy for increasing the production of rice. Out of the

300 farmers, no farmer from Lalam Block increased the production of rice. This is because farmers did not cultivate rice on a large scale.

In the case of rubber, no farmer increased the production due to non product specific subsidy. In Puzhakkal and Vypin Blocks, there was no increase in production of rubber due to unsuitable geographical area. In Lalam Block, cultivable land has already been efficiently cultivated.

Thus all the farmers who utilised non product specific subsidy received inputs at right time, with right quality and quantity, which is mentioned in the DI–MINIMUM of WTO Agreement. This made cultivation of different crops convenient for them.

Table 3.23

Reasons for increase in production of crops due to non product specific subsidy in Blocks

Blocks	Reasons		
	Helps the farmer to utilise the inputs in the right time and for right purpose	Educative effect	Easy to innovate
PUZHAKKAL	78 (26)	0 (0)	0 (0)
VYPIN	81 (27)	0 (0)	0 (0)
LALAM	0 (0)	0 (0)	0 (0)
Total farmers responded	159 (53)	0 (0)	0 (0)
Total no. of farmers	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

In the schedule, farmer respondents were asked as to how the receipt of non-product specific subsidy helped them to increase production of crops. The reasons were given in three categories- helps to utilise agricultural inputs in a timely and efficient manner, educative effect and encourages innovation. One fifty nine agriculturalists from the 300 *i.e.,* 53% agreed that it helped the farmers to utilise inputs in right time and for right purpose. In Puzhakkal Block, 78 agriculturalists *i.e.,* 26% selected this reason. Moreover, the farmers have intensively cultivated crops and increased the production due to non product specific subsidy. In the case of Vypin Block, 81 agriculturalists from 300 *i.e.,* 27% responded that it helped the farmers to utilise inputs in right time and for right purpose. Thus they utilised the subsidies they received via non product specific subsidy for intensive cultivation. In Lalam Block, the farmers did not respond to any of the reasons mentioned.

3.10.5 Effect of Investment Subsidy- Increase in Area and Production

In Vypin Block, 2 respondents *i.e.,* 0.67% increased the area of coconut due to investment subsidy. One respondent *i.e.,* 0.33% increased the area of pepper due to investment subsidy. Six respondents *i.e.,* 2% increased area of rice due to investment subsidy. None of the other farmers reported an increase in area under production due to the receipt of investment subsidies.

Here we can understand that the increase in area of crops due to investment subsidy may be because of the positive influence of WTO Agreement.

Table 3.24

Increase in production of crops due to investment subsidy in Blocks

Blocks	Crop				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	0 (0)	0 (0	32 (10.67)	0 (0)	0 (0)
VYPIN	12 (4)	1 (0.33)	16 (5.33)	0 (0)	0 (0)
LALAM	0 (0)	1 (0.33)	1 (0.33)	67 (22.3)	1 (.33)
Total farmers responded	12 (4)	2 (0.67)	49 (16.3)	67 (22.3)	1 (0.33)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

In table 3.24, the increase in the production of crops due to investment subsidy is mentioned. Out of the 300 farmers, 12 farmers *i.e.,* 4% increased the production of coconut. In Puzhakkal Block, there is no increase in the production of coconut due to investment subsidy. This is because coconut was not cultivated in large scale. In Vypin Block, out of the 300 farmers, 12 farmers *i.e.,* 4% increased the production of coconut due to investment subsidy. This is because they efficiently used the amount received through investment subsidy for increasing the production of coconut. In Lalam Block, there is no increase in the production of coconut due to investment subsidy. This is because coconut was not cultivated in large scale.

Out of the 300 farmers, 2 farmers *i.e.,* 0.67% increased the production of pepper. In Puzhakkal Block, there is no increase in the

production of pepper due to investment subsidy. This is because pepper was not cultivated on a large scale. In Vypin Block, out of the 300 farmers, one farmer *i.e.,* 0.33% increased the production of pepper due to investment subsidy. The farmer used the amount received through investment subsidy for increasing the production of pepper. In Lalam Block, one farmer *i.e.,* 0.33% increased the production of pepper due to investment subsidy. This is because they utilised the amount received through investment subsidy for increasing the production of pepper.

In the case of rice, out of the 300 farmers, 49 *i.e.,* 16.3% increased the production due to investment subsidy. Out of the 300 farmers, 32 *i.e*., 10.67% from Puzhakkal Block increased the production of rice. This is because they utilised the amount received through investment subsidy for increasing the production of rice. Out of the 300 farmers, 16 *i.e*., 5.33% from Vypin Block increased the production of rice. This is because they utilised the amount received through investment subsidy for increasing the production of rice. Out of the 300 farmers, only one farmer from Lalam Block increased the production of rice. This is because the farmer utilised the amount received through investment subsidy for increasing the production of rice.

In the case of rubber, 67 of the 300 farmers *i.e.,* 22.3% increased the production due to investment subsidy. In Puzhakkal and Vypin Blocks, there is no increase in the production of rubber due to investment subsidy. This is because of unsuitable geographical area. In Lalam Block, out of the 300 farmers, 67 *i.e*., 22.3% increased the production of rubber due to investment subsidy. This is because they utilised the amount received through investment subsidy for efficient production of rubber.

3.10.6 Types of Infrastructural Facilities Preferred and Benefits

The farmers were asked about the different types of infrastructural facilities enjoyed by them. Out of the 300 farmers, 292 respondents *i.e*., 97.3% received road, bridge and canal facilities. In the case of Puzhakkal Block, 92 respondents *i.e.,* 30.67% received road, bridge and canal facility. In Vypin and Lalam Blocks, road, bridge and canal facilities were received by 100 agriculturalists each *i.e.,* 33.33%. Transportation thus becomes easier and cost of transportation is reduced. Here we can understand that people are very serious about infrastructure development mentioned in the AMBER BOX. This market-oriented and development-oriented approach may be due to the influence of WTO Agreement.

Only 8 out of 300 *i.e.,* 2.67% received machinery facility and these farmers are from Puzhakkal Block. In Vypin and Lalam Blocks, no one has received machinery as infrastructure facility. None of the farmers received other infrastructural facilities such as pest control facilities, support for research, training, extension and advisory services.

Development of infrastructural facilities is associated with different types of benefits such as reduction in transportation cost, increased profitability, increase in production and productivity, improved knowledge about agriculture. All the farmers surveyed reported having received all these benefits. This may be due to the positive influence of green box support mentioned in the WTO Agreement.

3.10.7 Impact of Training, Extension and Advisory services.

The respondents were asked details about increase in the area of cultivation of different crops due to training, extension and advisory services since 1995. In the case of coconut, pepper and rice, only 2 farmers (from Vypin) *i.e.,* 0.67% out of the 300 respondents increased the area of cultivation due to these services.

Increase in the area of different crops may be due to the influence of green box which is mentioned in the Agreement on Agriculture (AOA) in WTO Agreement.

3.10.8 Effect of Direct Payment- Increase in Area and Production

On examining the influence on the area of cultivation under different crops due to direct payments received by the farmers, only 7 from Vypin block reported an increase in area due to receipt of such assistance.

Table 3.25

Increase in production of different crops due to direct payment received in Blocks

(Farmers who cultivated crops since 1995)

Blocks	Crops				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	0 (0)	0 (0)	100 (33.3)	0 (0)	0 (0)
VYPIN	36 (12)	4 (1.3)	37 (12.3)	0 (0)	4 (1.3)
LALAM	0 (0)	4 (1.3)	1 (0.3)	96 (32)	2 (0.7)
Total farmers responded	36 (12)	8 (2.7)	138 (46)	96 (32)	6 (2)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Table 3.25 focuses on the increase in production of different crops due to direct payment received. In the case of coconut, 36 *i.e.,* 12% out of 300 farmers increased production due to direct payment received. In Puzhakkal Block, no farmers have increased the production of coconut due to direct payment received because coconut cultivation was not done

on commercial basis. In Vypin Block, out of the 300, 36 *i.e.,* 12% have increased the production of coconut due to direct payment received because the farmers look for better coconut cultivation. In Lalam Block, no farmer has increased production of coconut due to direct payment received because in Lalam Block coconut cultivation was not done on commercial basis.

In the case of pepper, 8 out of 300 farmers *i.e.,* 2.7% increased the production due to direct payment received. In Puzhakkal Block, no farmer has increased the production of pepper due to direct payment received because pepper cultivation was not done on commercial basis. In the case of Vypin Block, 4 farmers *i.e.,* 1.3% increased the production of pepper due to direct payment received because they took to pepper cultivation in a better way. In Lalam Block, 4 farmers *i.e.,* 1.3% increased the production of pepper due to direct payment received because they cared the pepper cultivation in a better way.

Out of 300 farmers 138, *i.e.,* 46% increased the rice production due to direct payment. Out of the 300 farmers, 100 farmers *i.e.,* 33.33% increased the production in Puzhakkal Block due to direct payment received because there was effective co-operative farming. In Vypin Block, 37 farmers *i.e.,* 12.3% increased the production due to direct payment received because the responded farmers considered rice cultivation as a profitable occupation. In Lalam Block, though there is only one farmer *i.e.,* 0.33% who increased the production due to direct payment because he took to better rice cultivation.

In the case of rubber, cultivation is considered as a commercial activity. So out of the 96 farmers *i.e.,* 32% utilised direct payment to increase the production. In Puzhakkal Block, no farmer has increased the production of rubber due to direct payment received because in Puzhakkal Block geographical area is not favourable to rubber cultivation. In Vypin

Block, no farmer has increased the production of rubber due to direct payment received because in Vypin Block land area is not favourable to rubber cultivation. In Lalam Block, 96 farmers *i.e.,* 32% increased the production of rubber due to direct payment received because in Lalam Block rubber cultivation is considered as a commercial activity.

3.10.9 Effect of Assistance Received for Disaster Management- Increase in Area and Production

The survey asked the farmers as to whether the assistance for disaster management helped to avoid and manage disaster in a better way leading to increase in the area of crops. It was only in Vypin block that farmers reported having increased the area under cultivation due to the assistance received for disaster management. Nine coconut farmers and 10 rice farmers were the ones who had increased their area under cultivation.

Table 3.26

Increase in production of crops due to assistance received for disaster management in Blocks (Farmers who cultivated crops since 1995)

Blocks	Crops				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	0 (0)	0 (0)	46 (15.33)	0 (0)	0 (0)
VYPIN	23 (7.7)	0 (0)	17 (5.66)	0 (0)	0 (0)
LALAM	0 (0)	0 (0)	0 (00	0 (0)	0 (0)
Total farmers responded	23 (7.7)	0 (0)	63 (21)	0 (0)	0 (0)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Table 3.26 shows increase in production of crops due to assistance received for disaster management since 1995. In Vypin Block From the total of 300 farmers, only 23 of them *i.e.,* 7.7% farmers increased the production of coconut. They utilized the fund received for disaster management, and thus increased the production.

Out of the 300 farmers, 63 respondents *i.e.,* 21% increased the production of rice due to the assistance received for disaster management. In Puzhakkal Block, 46 rice farmers *i.e.,* 15.3% increased the production due to assistance received for disaster management because they utilised the fund for constructing bunds. In Vypin Block, the remaining 17 rice farmers *i.e*., 5.7% increased the production of rice. Even though the paddy fields are lying below the sea level, they utilised the assistance received for disaster management in proper manner and increased production.

3.10.10 Effect of Input Services-Increase in Area, Production and Productivity

In Vypin Block, 31 respondents *i.e.,* 10.3% increased the area of coconut due to input services. 17 respondents from the same block *i.e.,* 5.7% increased the area of pepper due to input services. None of the other farmers reported having increased the area of crop due to input services.

In table 3.27, increase in the production of crops due to input services is mentioned. Out of the 300 farmers, 65 farmers *i.e.,* 21.7% increased the production of coconut. In Puzhakkal Block, there is no increase in the production of coconut due to input services. This is because coconut was not cultivated on a large scale. In Vypin Block, out of the 300 farmers, 65 farmers *i.e.,* 21.7% increased the production of coconut due to input services. This is because they efficiently used input services for increasing the production of coconut. In Lalam Block, there is

no increase in the production of coconut due to input services. This is because coconut was not cultivated on a large scale.

Table 3.27

Increase in production of crops due to input services in Blocks

Blocks	Crop				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	0 (0)	0 (0)	100 (33.3)	0 (0)	0 (0)
VYPIN	65 (21.7)	0 (0)	33 (11)	0 (0)	1 (0.33)
LALAM	0 (0)	1 (0.33)	1 (0.33)	96 (32)	2 (0.67)
Total farmers responded	65 (21.7)	1 (0.33)	134 (44.7)	96 (32)	3 (1)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Out of the 300 farmers, one farmer *i.e.,* 0.33% increased the production of pepper. In Puzhakkal Block, there is no increase in the production of pepper due to input services. This is because pepper was not cultivated on a large scale. In Vypin Block, out of the 300 farmers, no farmer increased the production of pepper due to input services. This is because they cultivated pepper on a small scale. In Lalam Block, one farmer *i.e.,* 0.33% increased the production of pepper due to input services. This is because the farmer utilised input services for increasing the production of pepper.

In the case of rice, 134 of the 300 farmers *i.e.,* 44.7% increased the production due to input services. Out of the 300 farmers, 100 *i.e*., 33.33%

from Puzhakkal Block increased the production of rice. This is because they utilised input services for increasing the production of rice. Out of the 300 farmers, 33 *i.e*., 11% from Vypin Block increased the production of rice. This is because they utilised input services for increasing the production of rice. Out of the 300 farmers, only one farmer i.e., 0.33% from Lalam Block increased the production of rice. This is because farmer utilised input services for increasing the production of rice.

In the case of rubber, 96 of the 300 farmers *i.e.,* 32% increased the production due to input services. In Puzhakkal and Vypin Blocks, there was no increase in the production of rubber due to input services. This is because of unsuitable geographical area. In Lalam Block, out of the 300 farmers, 96 *i.e*., 32% increased the production of rubber due to input services. This is because they utilised input services for the efficient production of rubber.

Table 3.28

Increase in productivity of crops due to input services in Blocks

Blocks	Crop				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	0 (0)	0 (0)	100 (33.33)	0 (0)	0 (0)
VYPIN	64 (21.3)	0 (0)	34 (11.33)	0 (0)	1 (0.33)
LALAM	0 (0)	1 (0.33)	1 (0.33)	96 (32)	2 (0.67)
Total farmers responded	64 (21.3)	1 (0.33)	135 (45)	96 (32)	3 (1)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

In table 3.28, the increase in the productivity of crops due to input services is mentioned. Out of the 300 farmers, 64 farmers *i.e.,* 21.3% increased the productivity of coconut due to input services. In Puzhakkal Block, there is no increase in productivity of coconut due to input services. This is because coconut was not cultivated on large scale. In Vypin Block, out of the 300 farmers, 64 farmers *i.e.,* 21.3% increased the productivity of coconut due to input services. This is because they efficiently used input services for increasing the productivity of coconut. In Lalam Block, there is no increase in the productivity of coconut due to input services. This is because coconut was not cultivated on a large scale.

Out of the 300 farmers, one farmer *i.e.,* 0.33% increased the productivity of pepper. In Puzhakkal Block, there is no increase in the productivity of pepper due to input services. This is because pepper was not cultivated on a large scale. In Vypin Block, out of the 300 farmers no farmer increased the productivity of pepper due to input services. This is because they cultivated pepper on a small scale. In Lalam Block, one farmer *i.e.,* 0.33% increased the productivity of pepper due to input services. This is because the farmer utilised input services for increasing the productivity of pepper.

In the case of rice, 135 of the 300 farmers *i.e.,* 45% increased the productivity due to input services. Out of the 300 farmers, 100 *i.e.,* 33.33% from Puzhakkal Block increased the productivity of rice. This is because they efficiently utilised input services for increasing the productivity of rice. Out of the 300 farmers, 34 *i.e*., 11.33% from Vypin Block increased the productivity of rice. This is because they utilised input services for increasing the productivity of rice. Out of the 300 farmers, only one farmer *i.e.,* 0.33% from Lalam Block increased the

productivity of rice. This is because the farmer utilised input services for increasing the productivity of rice.

In the case of rubber, 96 of the 300 farmers *i.e.,* 32% increased the productivity due to input services. In Puzhakkal and Vypin Blocks, there is no increase in the productivity of rubber due to input services. This is because of unsuitable geographical area. In Lalam Block, out of the 300 farmers, 96 *i.e*., 32% increased the productivity of rubber due to input services. This is because they efficiently utilised input services.

3.10.11 Effect of Increasing Size of Public Stock- Decrease in Area and Production

The Green Box support of the WTO Agreement allows nations to maintain and increase the size of public stock of essential food items in the interest of ensuring food security. The Public Distribution System (PDS) of India has also been working over the years by central procurement of food grains- mainly rice and wheat by the Food Corporation of India (FCI). This has an important economic impact of limiting the rise in price of these grains.

In Kerala, this has slowed down the rise in price of rice. This could have affected the area under cultivation of the food crop. When asked, only 5 farmers from Vypin block reported reduction in both, area under cultivation and production of rice, due to lack of rise in prices under the effect of increase in the public stock for food security. None of the other farmers reported a similar complaint.

3.11 NEW PROBLEMS RELATED TO PRODUCTION OF CROPS SINCE 2001

Although signed in 1995, the terms of the WTO Agreement were not fully followed by all the member countries. Though shift from non-tariff to tariff system took place as specified under the WTO Agreement,

improvement in market access was limited. Members were of the opinion that the developing countries had not been given a fair deal. In 2001, the fourth ministerial conference took place in Doha, Qatar where the members agreed to introduce a new round of multilateral trade negotiations including negotiations on agricultural trade liberalisation. The new round focussed on combining developing countries into the world trading system. This resulted in what came to be known as the Doha Declaration.

In the schedule, attempt was made to elicit the opinions of the respondents regarding new problems related to production of crops since 2001.

Table 3.29

New problems related to production of crops since 2001 in Blocks

Blocks	Crop				
	Coconut	Pepper	Rice	Rubber	Tapioca
PUZHAKKAL	0 (0)	0 (0)	6 (2)	0 (0)	0 (0)
VYPIN	3 (1)	1 (0.3)	3 (1)	0 (0)	0 (0)
LALAM	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total farmers responded	3 (1)	1 (0.3)	9 (3)	0 (0)	0 (0)
Total no. of farmers	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

Table 3.29 explains the new difficulties related to the production of crops since 2001. Out of the 300 farmers, only 3 coconut farmers *i.e.,* 1%

of total farmer reported that they faced new difficulties related to the production of coconut since 2001. In Puzhakkal Block, no farmer faced any new difficulties related to the production of coconut since 2001. In Vypin Block, 3 farmers *i.e.,* 1% of the total 300 farmers faced new difficulties related to the production of coconut since 2001. It may be because of the reduction of price of coconut due to the reduction or elimination of tariff on primary products mentioned in the NON-AGRICULTURAL MARKET ACCESS (NAMA) of DOHA DECLARATION in 2001. In Lalam Block, no coconut farmers faced such difficulties in the production of coconut since 2001.

In the case of pepper, one farmer *i.e.,* 0.3% faced new difficulties related to production of pepper. In Puzhakkal Block, no farmer has faced any new difficulties related to the production of pepper since 2001. In Vypin Block, only one farmer *i.e.,* 0.3% faced new difficulties related to the production of pepper since 2001. It may be because of the reduction of price of pepper due to reduction or elimination of tariff on primary products mentioned in the NON-AGRICULTURAL MARKET ACCESS (NAMA) of DOHA DECLARATION in 2001. In Lalam Block, no pepper farmers faced such difficulties in the production of pepper since 2001.

In the case of rice, 9 respondents out of the 300 farmers *i.e.,* 3% faced new difficulties related to production since 2001. In Puzhakkal Block, 6 farmers *i.e.,* 2% faced new difficulties related to production of rice since 2001.In Vypin Block, 3 farmers *i.e.,* 1% faced new difficulties related to rice production since 2001. It may be because of the reduction of price of rice due to reduction or elimination of tariff on primary products mentioned in the NON-AGRICULTURAL MARKET ACCESS (NAMA) of DOHA DECLARATION in 2001. In Lalam Block, no

farmer reported that they faced new difficulties related to the production of rice since 2001.

In the case of rubber, no farmer in all the three Blocks reported any difficulty related to production since 2001. It may be due to the non reduction in the price of rubber or elimination of tariff on primary products mentioned in the NON-AGRICULTURAL MARKET ACCESS (NAMA) of DOHA DECLARATION in 2001.

Table 3.30

Types of new difficulties related to production of crops since 2001 in Blocks

Blocks	Difficulties		
	reduction in the price of agriculture products due to reduction or elimination of tariffs on primary products	Did not receive sufficient fund for disaster management	Reduction in the price of agriculture products due to import of close substitutes
PUZHAKKAL	6 (2)	0 (0)	0 (0)
VYPIN	6 (2)	0 (0)	0 (0)
LALAM	0 (0)	0 (0)	0 (0)
Total farmers responded	12 (4)	0 (0)	0 (0)
Total no. of farmers	300 (100)	300 (100)	300 (100)

Primary survey: November 2016- December 2016

In table 3.30, we can see 3 new difficulties faced by the farmers related to the production of crops since 2001. Out of the 300 farmers, 12 *i.e.,* 4% reported that they faced the difficulty of "reduction in the price of agriculture products due to reduction or elimination of tariffs on primary products." In Puzhakkal Block, 6 farmers *i.e.,* 2% out of the 300 farmers, reported that this difficulty. In Vypin Block, 6 farmers *i.e.,* 2% reported that they faced it. In Lalam Block, none of the farmers reported facing this difficulty.

Besides this, the two other difficulties faced by farmers in general and mentioned in the NON-AGRICULTURIAL MARKET ACCESS (NAMA) of DOHA DECLARATION IN 2001 are- *"*did not receive sufficient fund for disaster management" and *"*reduction in the price of farmer products due to import of close substitutes." However, none of the farmers out of the 300 who were surveyed from Puzhakkal, Vypin and Lalam Blocks reported any of these other difficulties.

3.12 CHANGES IN TOTAL CULTIVATED AREA DUE TO DIFFERENT REASONS SINCE 1995

Table 3.31 mentions the total area increased due to various reasons in 3 blocks from 1995. The farmers increased a total area of 23.2 acres of land due to infrastructure facility. The improved infrastructure facility reduced the transportation cost and this helped the farmers to increase their cultivated area of different crops. Among these, 0.33 acres of land was increased by coconut farmers, 0.14 acres of land by pepper farmers, 20.55 acres of land by rice farmers, 2 acres by rubber farmers and 0.18 acres by tapioca farmers. Here we can understand that people are very serious about infrastructure development. This may be due to the influence of GREEN BOX which is mentioned in the Agreement on Agriculture (AOA) in WTO Agreement.

Table 3.31
Increase in total area (in acre) due to different reasons in 3 blocks since 1995

Reasons	Different crops					
	Coconut	Pepper	Rice	Rubber	Tapioca	Total
Infrastructure facilities	.33	.14	20.55	2	.18	23.2
Support for research	0	0	0	0	0	0
Control of pest & diseases	0	0	0	0	0	0
Training, extension & advisory services	.04	.09	20.29	0	.03	20.45
Direct payments	0	0	.14	0	.16	.30
Disaster management	.50	0	20.15	0	0	20.65
Product specific subsidy	.21	.14	20.57	0	.18	21.1
Non-product specific subsidy	.21	.14	20.57	0	.18	21.1
Investment subsidy	.20	.10	20.13	0	0	20.43
Agricultural input service	.14	.5	0	0	0	.64
Shift from quota to tariff system	0	0	0	0	0	0

Primary survey: November 2016- December 2016

The support for research encourages the farmers for adopting new methods and increase cultivable land. But here no farmer increased cultivable land due to the support received for the research.

The control of pest and diseases increase the production and productivity. But here no farmer increased the cultivable land due to control of pest and diseases.

Through the programmes of training, extension and advisory services, the farmers get new methods and techniques of farming. As a result of modern training, they increased the total area by 20.45 acres of land since 1995. The coconut farmers increased 0.04 acres of land, the pepper farmers increased 0.09 acres of land, the rice farmers increased 20.29 acres of land, and the tapioca farmers increased 0.03 acres of land due to training extension and advisory services. This may be due to the influence of GREEN BOX which is mentioned in the Agreement on Agriculture (AOA) in WTO Agreement. No one increased the area of rubber cultivation due to training extension and advisory services.

The farmers increased the total area by 0.30 acres of land due to direct payment received. The rice farmers increased the total area by 0.14 acres of land, and the tapioca farmers increased the total area by 0.16 acres of land due to direct payment received. This may be due to the influence of GREEN BOX which is mentioned in the Agreement on Agriculture (AOA) in WTO Agreement. No one increased the area of coconut, pepper and rubber cultivation due to direct payment.

The farmers increased the total area by 20.65 acres of land due to incentives for disaster management. The coconut farmers increased the area by 0.50 acres of land, and the rice farmers increased the area by 20.15 acres of land due to assistance received for disaster management. This may be due to the influence of GREEN BOX which is mentioned in the Agreement on Agriculture (AOA) in WTO Agreement. No one increased the area of pepper, rubber and tapioca cultivation due to assistance received for disaster management.

The farmers increased the total area by 21.1 acres of land since 1995 due to product specific subsidy received. The coconut farmers increased the area by 0.21 acres of land, the pepper farmers increased by 0.14 acres of land, the rice farmers increased by 20.57 acres of land, and the tapioca farmers increased by 0.18 acres of land due to product specific subsidy received. This may be due to the influence of AMBER BOX which is mentioned in the WTO Agreement. No one increased the area of rubber cultivation due to product specific subsidy.

The farmers increased the total area by 21.1 acres of land since 1995 due to non product specific subsidy. The coconut farmers increased the area by 0.21 acres of land, the pepper farmers increased by 0.14 acres of land, the rice farmers increased by 20.57 acres of land, and the tapioca farmers increased by 0.18 acres of land due to non product specific subsidy. This may be due to the influence of AMBER BOX which is mentioned in the WTO Agreement. No one increased the area of rubber cultivation due to non product specific subsidy.

The farmers increased the total area by 20.43 acres of land since 1995 due to investment subsidy they received. The coconut farmers increased the area by 0.20 acres of land, the pepper farmers increased by 0.10 acres of land, and the rice farmers increased by 20.13 acres of land due to investment subsidy they received .This may be due to the influence of special and differential treatment which is mentioned in the WTO Agreement. No one increased the area of rubber and tapioca cultivation due to investment subsidy.

The farmers increased total area by 0.64 acres of land since 1995 due to the agricultural input service. The coconut farmers increased the area by 0.14 acres of land, and the pepper farmers increased the area by 0.5 acres of land due to agricultural input service. This may be due to the influence of special and differential treatment which is mentioned in the

Agreement on Agriculture (AOA) in WTO Agreement. No one increased the area of rice, rubber and tapioca cultivation due to agricultural input service. No one increased the area of five crops since 1995 due to shift from quota to tariff system.

The respondents were also asked as to how much area was decreased and the various reasons for the decrease in area under cultivation since 1995. According to the response of the farmers, we observed that only 2 acres of cultivated land devoted to rice cultivation has been reported as reduced due to the effect of increase in the size of the public stock of the food grain.

In this chapter, we have made an attempt to examine the implications of WTO on cropping pattern in the state. In order to attempt this we consider the area under cultivation in different time periods. The inter-temporal assessment reviled that there are no significant implications for WTO clauses on the cropping pattern of Kerala. This is mainly because majority of the farmers are small in size and continue cultivation as part of their years old activity. This argument is valid because a clear distinction seen between the farming activities of small and large farmers because of their commercial interest which follow and observe WTO clauses. This is very much relevant in the case of rubber and coconut where Free Trade Agreement operate. Since Lalam block is having more rubber plantations formers at Lalam are having concerns about changing WTO clauses and agreements. But in short WTO has not significantly influenced Kerala's agricultural activities, particularly cropping pattern.

Chapter IV

CROPPING PATTERN IN KERALA: DETERMINANTS

CHAPTER IV

CROPPING PATTERN IN KERALA – DETERMINANTS

4.1 INTRODUCTION

In the previous chapter we have seen that WTO has not considerably influenced cropping pattern. At the same time it is well established that cropping pattern in the state was turned in favour of plantation crops in recent years. At present the gross cropped area is split into food crops and non food crops and for non agricultural purposes. The declining returns from rice production and better returns from plantation crops are responsible for this shift. The input supply and input efficiency also determines the cropping pattern. Hence below an attempt is made to assess the influence of important factors on deciding cropping pattern.

4. 2 INFLUENCE OF IRRIGATION ON 5 MAJOR CROPS

Table 4.1 shows that the influence of irrigation on 5 major crops like coconut, pepper, rice, rubber and tapioca in the 3 blocks. In the case of coconut, 195 farmers out of 300 respondents, *i.e.,* 65% cultivated coconut. Out of these coconut farmers 37 farmers *i.e.,* 12.33% responded that the influence of irrigation was one of the reason for the cultivation of coconut. In Puzhakkal block 33 farmers *i.e.,* 11% reported that irrigation has influenced coconut cultivation. These 33 coconut farmers cultivate coconut commercially. These coconut farmers are having subsidised electricity for irrigation. But the small scale farmers are not giving importance for irrigation because they have only domestic electricity

connection for irrigation. Small scale farmers, who cultivate around their house, use water from their house for irrigation. And for domestic purpose the house owners use 1 HP pump set but for irrigation purpose they use 2 HP or more powerful pump sets. Using 1 HP pump set for irrigation is not practical and economical. In Vypin Block 89 farmers *i.e.,* 29.67% responded that there is no influence of irrigation in coconut cultivation because there is water 2 to 3 feet below the soil. In Lalam block 4 farmers *i.e.,* 1.33% responded that irrigation has influence on coconut cultivation. These 4 farmers cultivate coconut on large scale.

Table 4.1
Influence of irrigation on 5 major crops

BLOCKS	CROPS				
	COCONUT	PEPPER	RICE	RUBBER	TAPIOCA
PUZHAKKAL	33 (11)	0 (0)	100 (33.33)	0 (0)	0 (0)
VYPIN	0 (0)	0 (0)	46 (15.33)	0 (0)	0 (0)
LALAM	4 (1.33)	0 (0)	1 (0.33)	0 (0)	0 (0)
TOTAL FARMER (INFLUENCE OF IRRIGATION)	37 (12.33)	0 (0)	147 (49)	0 (0)	0 (0)
TOTAL NO. OF FARMERS	195 (65)	53 (17.67)	147 (49)	96 (32)	29 (9.67)
TOTAL NO. OF RESPONDENTS	300 (100)	300 (100)	300 (100)	300 (100)	300 (100)

Primary Survey: November 2016- December 2016

In the case of pepper 53 farmers out of 300 respondents *i.e.,* 17.67% cultivated pepper. Out of 53 farmers, only 1 farmer *i.e.,* 0.33% cultivated pepper in Puzhakkal block. Pepper cultivation need dry climate. In wet climate pepper wine will affect root wilt disease so they do not use irrigation facilities. In Vypin there are no large scale farmers who cultivated pepper. Small farmers did not use irrigation facilities. In

Lalam there are no pepper farmers who cultivated pepper on large scale. Small farmers did not use irrigation. In Lalam block there is cool climate so the pepper farmers do not need addition irrigation.

In the case of rice 147 farmers out of 300 respondents *i.e.,* 49% cultivated rice. Since rice is cultivated below sea level in Puzhakkal block, there is sufficient water. For pumping out excess water they use irrigation canals. All the farmers avail the facilities of irrigation in Puzhakkal block. In Vypin block there are 46 rice farmers. All the farmers use irrigation facilities for pumping out excess water. In Lalam there is only one rice farmer who used irrigation facility.

In the case of rubber in Puzhakkal and Vypin blocks no one cultivated rubber but in Lalam block there are large number of farmers who cultivated rubber. But usually rubber is not irrigated. There for no farmers responded that there is no influence of irrigation on rubber cultivation.

In the case of tapioca, in Puzhakkal block tapioca is not irrigated. Some farmers make small scale cultivation of tapioca using irrigation i.e., very negligible in percentage. In Vypin there is sufficient water below the soil so they do not irrigate tapioca. In Lalam too farmers do not use irrigation facilities for the cultivation of tapioca. So no one responded that there is influence of irrigation on tapioca cultivation.

4.3 INFLUENCE OF FERTILIZER ON 5 MAJOR CROPS

Table 4.2 shows that the influence of fertilizer on 5 major crops like coconut, pepper, rice, rubber and tapioca in the 3 blocks. In the case of coconut, 195 farmers out of 300 respondents, *i.e.,* 65% cultivated coconut. Out of these coconut farmers 100 farmers *i.e.,* 33.33% responded that the influence of fertilizer was the one of reason for the cultivation of coconut. All 100 farmers in Puzhakkal use fertilizer usually the farmers

use cow dung, ash, Murat of potash, urea, bone powder, phosphate fertilizer. Only in irrigated field they use chemical fertilizers. Chemical fertilizers should not be used without sufficient water. With excess water the chemical fertilizer drain away into soil in rainy season they use little quantity of chemical fertilizers. Generally all farmers use fertilizer but only large scale farmers use chemical fertilizers. The farmers are of the opinion that chemical fertilizer increase productivity but the tree loses its resistance and gets spoiled within few years.

Table 4.2
Influence of fertilizer on 5 major crops

BLOCKS	CROPS				
	COCONUT	PEPPER	RICE	RUBBER	TAPIOCA
PUZHAKKAL	100 (33.33)	1(0.33)	100(33.33)	0(0)	2(.67)
VYPIN	90 (30)	18(6)	46(15.33)	0(0)	7(2.33)
LALAM	5(1.67)	34(11.33)	1(0.33)	96(32)	20(6.67)
TOTAL FARMERION (INFLUENCE OF FERTILIZER)	195(65)	53(17.67)	147(49)	96(32)	29(9.67)
TOTAL NO. OF FARMERS	195(65)	53(17.67)	147(49)	96(32)	29(9.67)
TOTAL NO. OF RESPONDANTS	300 (100)	300(100)	300(100)	300(100)	300(100)

Primary Survey: November 2016- December 2016

In the case of Vypin 90 farmers *i.e.,*30% responded that the influence of fertilizer was the one of reason for the cultivation of coconut. Generally they use cow dung, ash, Murat of potash, urea, bone powder,

phosphate fertilizers. Since in Vypin soil is sandy, they use less chemical fertilizers in rainy season. Even when they use, they use in small quantity. In case of Lalam 5 farmers *i.e.,*1.67% responded that the influence of fertilizer was the one of reason for the cultivation of coconut. In Lalam these farmers use fertilizer. Only large scale farmers use chemical fertilizer.

In the case of pepper, 53 farmers out of 300 respondents, *i.e.,* 17.66% cultivate pepper. All farmers reported that there is influence of fertilizer for the pepper cultivation. In Puzhakkal only 1 farmer cultivates pepper and he uses fertilizer for cultivation. Only large farmers use chemical fertilizers. In Vypin 18 farmers cultivate pepper. All of them use fertilizers. Only large scale farmers use chemical fertilizers. In the case of Lalam 34 farmers cultivate pepper. They all use fertilizers. Only large scale farmers use chemical fertilizers.

In the case of rice, 147 farmers out of 300 respondents, *i.e.,* 49% cultivated rice. All rice farmers use fertilizer for cultivation. In Puzhakkal block all, 100 farmers *i.e.,* 33.33% cultivate rice. All these farmers use fertilizers for cultivation of rice. They mainly use lime as fertilizer to reduce the effect of salinity. In Vypin block 46 farmers cultivates rice. They all responded that they use fertilizers. They mainly use lime as fertilizer to reduce the effect of salinity. In Lalam only one farmer cultivates rice. This farmer use fertilizer for rice cultivation. They use all type of fertilizers. Only large scale farmers use chemical fertilizers.

In the case of rubber, 96 farmers out of 300 respondents, *i.e.,* 32% cultivated rubber. These 96 farmers reported positive influence of fertilizer on rubber cultivation. There is no rubber cultivation in Puzhakkal and Vypin blocks. In Lalam 96 farmers *i.e.,* 32% cultivates rubber. They cultivate rubber on large scale and they reported that there is influence of fertilizer on rubber cultivation. In Lalam they use cow dung,

chicken waste, urea, ammonium phosphate sulphate and bone powder as fertilizers. In the case of rubber they put the fertilizer without digging the soil. If they dig, the root will get spoiled.

In the case of tapioca, 29 farmers out of 300 respondents, *i.e.,* 9.66% cultivates tapioca. These farmers responded that fertilizer have influence on cultivation of tapioca. In Puzhakkal 2 farmers *i.e.,* 0.67% cultivates tapioca. These 2 farmers responded the positive influence of fertilizer on tapioca. Only large scale farmers use chemical fertilizers others only use cow dung and ash. In Vypin 7 farmers *i.e.,* 2.33% cultivates tapioca. These 7 farmers responded fertilizer have influence on tapioca cultivation. Only large scale farmers use chemical fertilizers others only use cow dung and ash. In Lalam block 20 farmers *i.e.,* 6.67% cultivates tapioca. There 20 tapioca farmers responded positive influence of fertilizer. Only large scale farmers use chemical fertilizers others only use cow dung and ash.

4.4 AREA, PRODUCTION, AVERAGE ANNUAL PRICE AND GROWTH RATE OF PRICE OF RUBBER IN INDIA

Table 4.3 shows area, production, average annual price and growth rate of price of rubber. Between 2004-05 and 2014-15 the price of rubber increased from Rs.58.18/kg to Rs.111.53/kg. But considering the inflation rate and other income generating opportunities, rubber cultivation was not attractive to the farmers. Though price increased by 91.70% during the same period, the production decreased by14% *i.e.,* 750 thousand tons in 2004-05 to 645 thousand tons in 2014-15. Till 2011-12 price and production increased almost every year except in 2007-08. But from 2012-13 the price and production declined continuously. Between 2004-05 and 2014-15 area of rubber increased by 21.36% and price of rubber increased by 91.7%. Till 2011-12 both the price and area increased almost every year. Though rubber farmers increased the area of

cultivation of rubber they did not tap the rubber efficiently during 2012-2015 because of low price. Since rubber is a perennial crop, shifting of crop was not possible in a short period. Hence we can infer that price is not a determining factor in the case of area of rubber in short run.

Table No. 4.3

Area, production, average annual price and growth rate of price of rubber in India

Year	Average Price (Rs./kg)	Annual Growth rate of price	Production (in '000 tons)	Area Tapped (Million hectares)
2004-05	58.18		750	440
2005-06	74.96	28.84	802.63	447
2006-07	97.78	30.44	852.89	454
2007-08	97.4	-0.39	825	459
2008-09	102.91	5.66	865	463
2009-10	110.85	7.72	831	468
2010-11	194.87	75.80	862	477
2011-12	206.6	6.02	904	491
2012-13	173.97	-15.79	914	504
2013-14	154.9	-10.96	774.03	518
2014-15	111.53	-28.00	645	534

Source: Rubber price- World Bank

Rubber area & production- EPW Research Foundation, 2014 & Rubber Board

4.5 AREA, PRODUCTION, AVERAGE ANNUAL PRICE AND GROWTH RATE OF PRICE OF RICE IN INDIA

Table No. 4.4

Area, production, average annual price and growth rate of price of rice in India

Year	Average Price (Rs./kg)	Annual Growth Rate of price	Production (in Million tons)	Area (in Million hectares)
2004-05	11.83		83.1	41.9
2005-06	12.75	7.77	91.8	43.7
2006-07	14.02	9.98	93.4	43.8
2007-08	15.35	9.47	96.7	43.9
2008-09	32.97	114.81	99.2	45.5
2009-10	27.36	-17.01	89.1	41.9
2010-11	23.11	-15.53	96	42.9
2011-12	26.87	16.25	105.3	44.0
2012-13	31.76	18.20	105.2	42.8
2013-14	29.31	-7.70	106.6	44.1
2014-15	25.54	-12.86	105.5	44.1

Source: price of Rice -World Bank

Area & Production of Rice- Ministry of Agriculture & Farmers Welfare, Govt. of India

Table 4.4 shows area, production, average annual price and growth rate of rice. When we study about the price of rice from 2004-05 to 2014-15, we can see that price increased from Rs.11.83/kg to Rs.25.54/kg *i.e.,* a growth rate of 115.9%. Till 2008-09 price of rice increased consistently as a result production and area also steadily increased. Since then price of rice did not increase consistently so that area did not increase steadily.

Hence we can conclude that price is an important factor in determining the preference for the cultivation of rice.

4.6 AREA, PRODUCTION, AVERAGE ANNUAL PRICE AND GROWTH RATE OF PRICE OF DRIED COCONUT IN INDIA

TABLE NO. 4.5

Area, production, average annual price and growth rate of price of dried coconut in India

Year	Average Price (Rs./kg)	Annual Growth Rate of price	Production (in '00 million nuts)	Area (in Million hectares)
2004-05	20.55		128.33	1.94
2005-06	17.59	-14.42	148.11	1.95
2006-07	19.48	10.77	158.4	1.94
2007-08	28.55	46.56	147.44	1.90
2008-09	31.33	9.72	101.48	1.90
2009-10	24.03	-23.30	108.24	1.90
2010-11	43.42	80.67	108.4	1.90
2011-12	49.71	14.48	149.4	2.07
2012-13	35.08	-29.43	156.09	2.14
2013-14	43.37	23.64	149.11	2.14
2014-15	50.06	15.43	140.67	1.97

Source: Dried coconut price- World Bank

Dried coconut area and production- Ministry of Agriculture & Farmers' Welfare, Govt. of India

Table 4.5 shows area, production, average annual price and growth rate of price of dried coconut. When we study the price of dried coconut, we can see that it increased from Rs.20.55/kg in 2004-05 to Rs.50.06/kg in 2014-15 *i.e.,* a growth rate of 143.60%. But it did not increase

consistently. As a result the production increased only by 9.61% *i.e.,* 128.33 million nuts in 2004-05 to 140.67 million nuts in 2014-15. Similarly, area increased only by 1.54% *i.e.,* 1.94 million hectares in 2004-05 to 1.97 million hectares in 2014-15. This may be due to increase in cost of production, attack from pest and diseases and import of edible oil from international markets. Hence we can conclude that inconsistent increase in the price was the major reason for not having a visible and considerable positive change in the cropping pattern.

4.7 AREA, PRODUCTION, AVERAGE ANNUAL PRICE AND GROWTH RATE OF PRICE OF PEPPER IN INDIA

Table 4.6
Area, production, average annual price and growth rate of price of pepper in India

Year	Average Price (Rs./kg)	Annual Growth Rate of price	Production (in '000 tons)	Area (in '000 hectares)
2004-05	65.88		81.9	267.1
2005-06	62.47	-5.18	50	260.2
2006-07	95.46	52.81	50	246.0
2007-08	133.53	39.88	47.1	197.0
2008-09	123.01	-7.88	50	181.3
2009-10	131.09	6.57	51	199.0
2010-11	191.55	46.12	48	201.4
2011-12	307.41	60.49	40.6	200.3
2012-13	398.18	29.53	52.6	124.6
2013-14	448.29	12.58	50.9	123.8
2014-15	686.64	53.17	65	129.0

Source: Pepper price- 2004-05 to 2011-12 compiled from Pepper Statistical Yearbook, 2012 & 2012-13 to 2014-15 from Spices Board, India
Pepper area & production- Spices Board, India

Table 4.6 shows area, production, average annual price and growth rate of price of pepper. When we study the price of pepper, we can see

that it increased from Rs.65.88/kg in 2004-05 to 686.64/kg in 2014-15 *i.e.,* a growth rate of 944.17%. However, the production showed a declining trend from 81.9 thousand tonnes in 2004-05 to 65 thousand tonnes in 2014-15 *i.e.,* a negative growth rate of 20.63% and area also showed a decreasing trend from 267.1 thousand hectares in 2004-05 to 129.0 thousand hectares in 2014-15 *i.e.,* a negative growth rate of 51.7%. This may be due to the increased presence of diseases, labour shortage, climatic fluctuations and fluctuations in the price of pepper in the international market.

Table 4.7

Influence of price on 5 major crops

Blocks	**Crops**				
	Coconut	**Pepper**	**Rice**	**Rubber**	**Tapioca**
Puzhakkal	32 (10.6)	1(0.33)	0(0)	0(0)	1(0.33)
Vypin	48(16)	5(1.66)	1(0.33)	0(0)	4(1.33)
Lalam	2(0.66)	32(10.66)	0(0)	96(32)	16(5.33)
Total Farmer (Price Influence)	82(27.33)	38(12.66)	1(0.33)	96(32)	21(7)
Total No. of farmers	195(65)	53(17.66)	147(49)	96(32)	29(9.66)
Total No. of respondents	300(100)	300(100)	300(100)	300(100)	300(100)

Primary Survey: November 2016- December 2016

4.8 INFLUENCE OF PRICE ON 5 MAJOR CROPS

Table 4.7 shows the influence of price on 5 major crops like coconut, pepper, rice, rubber and tapioca in the 3 blocks. In the case of coconut, 195 farmers out of 300 respondents, *i.e.,* 65% cultivated coconut. Out of these coconut farmers 82 farmers *i.e.,* 27.33% responded that the influence of price was one of the major reasons for the cultivation of coconut. 82 farmers cultivate coconut commercially, they said that when the price of coconut increases they take more interest in cultivation of coconut and when price decrease they take less interest in cultivation. The balance 113 farmers cultivated coconut because of other factors. Change in price does not influence other 113 coconut farmers. They use the coconut for domestic purpose; they dry the coconut and extract oil from copra. In the case of pepper, 53 farmers out of 300 respondents, *i.e.,* 17.66% cultivate pepper. 38 farmers *i.e.,* 12.66% reported that price was one of the major reasons for the cultivation of pepper. 38 pepper farmers cultivated pepper commercially. The change in price influenced their cultivation. The balance 15 farmers cultivated pepper because of other factors like for cooking. In Lalam block 32 farmers cultivated pepper intensively, *i.e.,* 10.66% they opined that price influenced pepper cultivation. In the case of rice, 147 farmers out of 300 respondents, *i.e.,* 49% cultivated rice. Out of these rice farmers only 1 farmer *i.e.,* 0.33% responded that the influence of price was the one of reason for the cultivation of rice. The balance 146 farmers cultivated rice because of other factors. There were 147 rice farmers in 3 blocks. The farmers in Puzhakkal block cultivated rice along with farmers association. They could not cultivate rice independently because paddy field is submerged under water. Subsidy and credit received by the farmers associations influenced them more. The one farmer who responded about influence of price is from Vypin block. In the case of rubber, 96 farmers out of 300

respondents, *i.e.,* 32% cultivated rubber. All rubber farmers responded that the influence of price was the major reason for the cultivation of rubber. Rubber is a cash crop and cultivated commercially. In Puzhakkal and Vypin there was no rubber cultivation. All 96 rubber farmers cultivated with commercial calculation. In the case of tapioca, 29 farmers out of 300 respondents, *i.e.,* 9.66% cultivated tapioca. Out of these tapioca farmers 21 farmers *i.e.,* 7% responded that the influence of price was the major reason for the cultivation of tapioca. The balance 8 farmers cultivated tapioca because of other factors like domestic consumption. Except in the case of rice, price was major reason for farmers who cultivated commercially. For rice farmers group farming and credit were major reasons that influenced cultivation.

4.9 INFLUENCE OF OTHER CROPS ON 5 MAJOR CROPS

Table 4.8
Influence of other crops on 5 major crops

Blocks	Crops				
	Coconut	Pepper	Rice	Rubber	Tapioca
Puzhakkal	16(5.33)	0(0)	0(0)	0(0)	0(0)
Vypin	48(16)	12(4)	0(0)	0(0)	0(0)
Lalam	1(0.33)	3(1)	0(0)	0(0)	0(0)
Total farmer (Other crop influence)	65(21.66)	15(5)	0(0)	0(0)	0(0)
total No. of farmers	195(65)	53(17.66)	147(49)	96(32)	29(9.66)
Total No. of respondents	300(100)	300(100)	300(100)	300(100)	300(100)

Primary survey: November 2016- December 2016

Table 4.8 shows the influence of other crops on 5 major crops like coconut, pepper, rice, rubber and tapioca in 3 blocks. The plantain, pepper, tapioca, areca nut, nut mug and elephant foot yam are the major crops cultivated along with coconut cultivation. 195 farmers out of 300 respondents, *i.e.,* 65% cultivated coconut. Out of these , coconut farmers 65 farmers *i.e.,* 21.66% responded that the influence of other crops was the one of the major reasons for the cultivation of coconut. The multi cropping preferred by 65 coconut farmers because they get more benefit from multi cropping. The balance 130 farmers cultivated coconut because of other factors. Along with pepper areca nut and coconut are mainly cultivated. 53 farmers out of 300 respondents, *i.e.,* 17.66% cultivate pepper. 15 farmers *i.e.,* 5% reported that influence of other crops was one of the major reasons for the cultivation of pepper. There was no much multi cropping along with pepper in these blocks because more sun light is needed for the cultivation of pepper. Sun light should fall down on the mud. The balance 38 farmers cultivated pepper because of other factors. In the case of rice, 147 farmers out of 300 respondents, *i.e.,* 49% cultivated rice. But none of these rice farmers responded that other crops have influence for rice cultivation. This is because no other crop could be cultivated along with rice. In the case of rubber, 96 farmers out of 300 respondents, *i.e.,* 32% cultivated rubber. But none of these rubber farmers responded that other crops have influence on rubber cultivation. This is because the Rubber Board did not permit the cultivation of other crops along with rubber. In the case of tapioca, 29 farmers out of 300 respondents, *i.e.,* 9.66% cultivated tapioca. But none of these tapioca farmers responded that other crops have influence on tapioca cultivation. This is because tapioca is cultivated mainly for the domestic purposes rather than for commercial sale.

4.10 INFLUENCE OF CREDIT ON 5 MAJOR CROPS

Table 4.9

Influence of credit on 5 major crops

Block	CROPS				
	Coconut	Pepper	Rice	Rubber	Tapioca
Puzhakkal	32(10.66)	0(0)	95(31.66)	0(0)	1(0.33)
Vypin	46(15.33)	7(2.33)	32(10.66)	0(0)	4(1.33)
Lalam	3(1)	30(10)	2(0.66)	95(31.66)	14(4.66)
Total farmer (credit)	81(27)	37(12.33)	129(43)	95(31.66)	19(6.33)
Total No. of farmers	195(65)	53(17.66)	147(49)	96(32)	29(9.66)
Total No. of respondents	300(100)	300(100)	300(100)	300(100)	300(100)

Primary Survey November 2016- December 2016

Table 4.9 shows the influence of credit on 5 major crops like coconut, pepper, rice, rubber and tapioca in 3 blocks. In the case of coconut, 195 farmers out of 300 respondents, *i.e.,* 65% cultivated coconut. Out of these coconut farmers, 81 farmers *i.e.,* 27% responded that the influence of availability of credit was one of the major reasons for the cultivation of coconut. They get more benefit from taking loans such as long term and short term. So they depend on credit facilities available to them. The balance 114 farmers cultivated coconut because of other factors. In the case of pepper, 53 farmers *i.e.,* 17.66% out of 300 respondents, cultivate pepper. 37 farmers *i.e.,* 12.33% reported that credit was one of the major reasons for the cultivation of pepper. The balance 16 farmers cultivated pepper because of other factors. There was no much pepper farmers of who are influenced by credit facilities in three blocks. Majority of the pepper farmers are in Lalam *i.e.,* 30 farmers. In the case

of rice, 147 farmers out of 300 respondents, *i.e.,* 49% cultivated rice. Out of these rice farmers 129 farmers *i.e.,* 43% responded that the influence of credit was the one of reason for the cultivation of rice. The balance 18 farmers cultivated rice because of other factors. The farmers association is very active in Puzhakkal and Vypin blocks, so they get more loans for the cultivation of rice. But in Lalam the farmers association is not much active as Puzhakkal. In the case of rubber, 96 farmers out of 300 respondents, *i.e.,* 32% cultivated rubber. Out of these farmers 95 *i.e.,* 31.66% responded that the influence of credit was one of the major reasons for the cultivation of rubber. All rubber farmers in Lalam block depend on credit system. There were no rubber farmers in Puzhakkal and Vypin blocks. The Rubber Board is also helping the rubber farmers to get convenient credit facilities. In the case of tapioca, 29 farmers out of 300 respondents, *i.e.,* 9.66% cultivated tapioca. Out of these tapioca farmers 19 farmers *i.e.,* 6.33% responded that the influence of credit was the one reason for the cultivation of tapioca. The balance 10 farmers cultivated tapioca because of other factors. In Vypin and Lalam the credit is available in the form of gold loan at low interest rates.

4.11 INFLUENCE OF COST ON 5 MAJOR CROPS

Table 4.10 shows the influence of cost of production on 5 major crops like coconut, pepper, rice, rubber and tapioca in three blocks. In the case of coconut, 195 farmers out of 300 respondents, *i.e.,* 65% cultivated coconut. Out of these coconut farmers 81 farmers *i.e.,* 27% of responded that the influence of cost of production was the major reason for the cultivation of coconut. All the farmers said that labour cost is the reason which influenced the cultivation of coconut when labour cost increases they neglect cultivation. The balance 114 farmers cultivated coconut because of other factors. In the case of pepper, 53 farmers out of 300 respondents *i.e.,* 17.66% cultivate pepper.37 farmers *i.e.,* 12.33% reported

that cost of production was one of the major reasons for the cultivation of pepper. The pepper farmers also said that labour cost is the major reason which influenced the cultivation of pepper. The balance 16 farmers cultivated pepper because of other factors. In the case of rice, 147 farmers out of 300 respondents, *i.e.,* 49% cultivated rice. Out of these rice farmers 129 farmers *i.e.,* 43% responded that the influence of cost of production was major reasons for the cultivation of rice. Majority of the respondents are from Puzhakkal block *i.e.,*95 farmers.

Table 4.10

Influence of cost on 5 major crops

Blocks	CROPS				
	COCONUT	PEPPER	RICE	RUBBER	TAPIOCA
Puzhakkal	32(10.66)	0 (0)	95(31.66)	0(0)	1(0.33)
Vypin	46(15.33)	7(2.33)	32(10.66)	0(0)	4(1.33)
Lalam	3(1)	30(10)	2(0.66)	95(31.66)	14(4.66)
Total farmer (Cost of production)	81(27)	37(12.33)	1 29(43)	95(31.66)	19(6.33)
Total No. Of farmers	195(65)	53(17.66)	147(49)	96(32)	29(9.66)
Total No. of respondents	300(100)	300(100)	300(100)	300(100)	300(100)

Primary Survey: November 2016- December 2016

The labour cost is one of the major reasons which influenced the cultivation of rice. The balance 18 farmers cultivated rice because of other factors. In the case of rubber, 96 farmers out of 300 respondents, *i.e*., 32% cultivated rubber. Out of these rubber farmers 95 farmers *i.e*., 31.66% responded that the influence of cost of production was the one of the major reason for the cultivation of rubber. Rubber tapping is a professional job. Rubber is cultivated commercially. It is not easy for an

owner to do tapping of these whole areas in the early morning. So it will incur tapping labours and the cost for tapping influenced a lot. In the case of tapioca, 29 farmers out of 300 respondents, *i.e*., 9.66% cultivated tapioca. Out of these tapioca farmers 19 farmers *i.e*., 6.33% responded that the influence of cost of production was the reason for the cultivation of tapioca. The labour cost is the reason which influenced the cultivation of tapioca. The balance 10 farmers cultivated tapioca because of other factors. When crops are cultivated in large scale then the cost of production will be high because the owners' participation in the cultivation will be less. This will increase the cost of production. This resulted in decrease in profit.

4.12 INFLUENCE OF INCOME ON 5 MAJOR CROPS

Table 4.11

Influence of income on 5 major crops

BLOCKS	CROPS				
	COCONUT	PEPPER	RICE	RUBBER	TAPIOCA
PUZHAKKAL	32(10.66)	0(0)	95(31.66)	0(0)	1(0.33)
VYPIN	46(15.33)	7(2.33)	32(10.66)	0(0)	4(1.33)
LALAM	3(1)	30(10)	2(0.66)	95(31.66)	14(4.66)
TOTAL FARMER (INCOME)	81(27)	37(12.3)	129(43)	95(31.66)	19(6.33)
TOTAL NO. OF FARMERS	195(65)	53(17.66)	147(49)	96(32)	29(9.66)
TOTAL NO. OF RESPONDENTS	300(100)	300(100)	300(100)	300(100)	300(100)

Primary Survey: November 2016- December 2016

Table 4.11 shows the influence of income on 5 major crops like coconut, pepper, rice, rubber and tapioca in the three blocks. In the case

of coconut, 195 farmers out of 300 respondents, *i.e*., 65% cultivated coconut. Out of these coconut farmers 81 farmers *i.e*., 27% responded that the influence of income from production was the major reason for the cultivation of coconut. The balance 114 farmers cultivated coconut because of other factors. If the critical minimum is received then the intensity for the cultivation of coconut will increase. In the case of pepper, 53 farmers out of 300 respondents, *i.e*., 17.66% cultivate pepper. 37 farmers *i.e*., 12.33% reported that income was one of the major reasons for the cultivation of pepper. The balance 16 farmers cultivated pepper because of other factors. If pepper cultivation gave more returns then the cultivation of pepper is increased. In the case of rice, 147 farmers out of 300 respondents, *i.e.,* 49% cultivated rice. Out of these rice farmers 129 farmers *i.e*., 43% responded that the influence of income was the major reason for the cultivation of rice. The balance 18 farmers cultivated rice because of other factors. Rice is a seasonal crop. The farmer will get a considerable or a bulk of amount after the seasonal harvesting. In the case of rubber, 96 farmers out of 300 respondents, *i.e*., 32% cultivated rubber. Out of these rubber farmers 95 farmers *i.e*., 31.66% responded that the influence of income was the one of major reasons for the cultivation of rubber. Rubber tapping is a professional job. Rubber is cultivated commercially. It is not easy for a person to do tapping in early morning. So it will incur tapping labours then the cost for tapping will increase. So if they cultivate a critical minimum of area, then only they will have a minimum profit. They cultivate based on cost benefit analysis. In the case of tapioca, 29 farmers out of 300 respondents, *i.e*., 9.66% cultivated tapioca. Out of these tapioca farmers 19 farmers *i.e.,* 6.33% responded that the influence of income was the reason for the cultivation of tapioca. The balance 10 farmers cultivated tapioca because of other factors. The commercial farmers of tapioca cultivated it expecting considerable income for special purposes like festivals etc.

4.13 INFLUENCE OF SIZE OF LAND HOLDINGS ON 5 MAJOR CROPS

Table 4.12

Influence of size of land holdings on 5 major crops

BLOCKS	CROPS				
	COCONUT	PEPPER	RICE	RUBBER	TAPIOCA
PUZHAKKAL	32(10.66)	0 (0)	95(31.66)	0(0)	1(0.33)
VYPIN	46(15.33)	7(2.33)	32(10.66)	0(0)	4(1.33)
LALAM	3(1)	30(10)	2(0.66)	95(31.66)	14(4.66)
TOTAL FARMER (INFLUENCE OF SIZE OF LAND HOLDINGS)	81(27)	37(12.33)	1 29(43)	95(31.66)	19(6.33)
TOTAL NO. OF FARMERS	195(65)	53(17.66)	147(49)	96(32)	29(9.66)
TOTAL NO. OF RESPONDENTS	300(100)	300(100)	300(100)	300(100)	300(100)

Primary Survey: November 2016- December 2016

Table 4.12 shows the influence of size of land holdings on 5 major crops like coconut, pepper, rice, rubber and tapioca in the three blocks. In the case of coconut, 195 farmers out of 300 respondents, *i.e.,* 65% cultivated coconut. Out of these coconut farmers 81 farmers *i.e.,* 27% of them responded that the influence of size of land holdings was the major reason for the cultivation of coconut. In the case of pepper, 53 farmers out of 300 respondents *i.e.,* 17.66% cultivated pepper. 37 farmers *i.e.,* 12.33% reported that influence of size of land holdings was one of the major reasons for the cultivation of pepper. In the case of rice, 147 farmers out of 300 respondents, *i.e.,* 49% cultivated rice. Out of these rice farmers 129 farmers *i.e.,* 43% responded that the influence of size of

land holdings was one of the major reasons for the cultivation of rice. Majority of the respondents are from Puzhakkal block *i.e.,* 95 farmers. The balance 18 farmers cultivated rice because of other factors. In the case of rubber, 96 farmers out of 300 respondents, *i.e*., 32% cultivated rubber. Out of these rubber farmers 95 farmers *i.e*., 31.66% responded that the influence of size of land holdings was one of the major reasons for the cultivation of rubber. In the case of tapioca, 29 farmers out of 300 respondents, *i.e*., 9.66% cultivated tapioca. Out of these tapioca farmers 19 farmers *i.e*., 6.33% responded that the influence of size of land holdings was the reason for the cultivation of tapioca.

4.14 INFLUENCE OF SUBSIDY ON 5 MAJOR CROPS

Table 4.13

Influence of subsidy on 5 major crops

BLOCKS	CROPS				
	COCONUT	PEPPER	RICE	RUBBER	TAPIOCA
PUZHAKKAL	32(10.66)	0 (0)	95(31.66)	0(0)	1(0.33)
VYPIN	46(15.33)	7(2.33)	32(10.66)	0(0)	4(1.33)
LALAM	3(1)	30(10)	2(0.66)	95(31.66)	14(4.66)
TOTAL FARMER (INFLUENCE OF SUBSIDY)	81(27)	37(12.33)	1 29(43)	95(31.66)	19(6.33)
TOTAL NO. OF FARMERS	195(65)	53(17.66)	147(49)	96(32)	29(9.66)
TOTAL NO. OF RESPONDENTS	300(100)	300(100)	300(100)	300(100)	300(100)

Primary Survey: November 2016- December 2016

Table 4.13 shows the influence of subsidy on 5 major crops like coconut, pepper, rice, rubber and tapioca in the three blocks. In the case of coconut, 195 farmers out of 300 respondents, *i.e.,* 65% cultivated

coconut. Out of these coconut farmers 81 farmers *i.e.,* 27% of responded that the influence of subsidy was one of the major reasons for the cultivation of coconut. In the case of pepper, 53 farmers out of 300 respondents *i.e.,* 17.66% cultivated pepper. 37 farmers *i.e.,* 12.33% reported that influence of subsidy was one of the major reason for the cultivation of pepper. In the case of rice, 147 farmers out of 300 respondents, *i.e.,* 49% cultivated rice.

4.15 INFLUENCE OF PROFITABILITY ON 5 MAJOR CROPS

Table 4.14

Influence of profitability on 5 major crops

BLOCKS	CROPS				
	COCONUT	PEPPER	RICE	RUBBER	TAPIOCA
PUZHAKKAL	32(10.66)	0 (0)	95(31.66)	0(0)	1(0.33)
VYPIN	46(15.33)	7(2.33)	32(10.66)	0(0)	4(1.33)
LALAM	3(1)	30(10)	2(0.66)	95(31.66)	14(4.66)
TOTAL FARMER (INFLUENCE OF PROFITABILITY)	81(27)	37(12.33)	1 29(43)	95(31.66)	19(6.33)
TOTAL NO. OF FARMERS	195(65)	53(17.66)	147(49)	96(32)	29(9.66)
TOTAL NO. OF RESPONDENTS	300(100)	300(100)	300(100)	300(100)	300(100)

Primary Survey: November 2016 - December 2016

Out of these rice farmers 129 farmers *i.e.,* 43% responded that the influence of subsidy was the major reason for the cultivation of rice. Majority of the respondents are from Puzhakkal block *i.e.,* 95 farmers. In the case of rubber, 96 farmers out of 300 respondents, *i.e*., 32% cultivated rubber. Out of these rubber farmers 95 farmers *i.e*., 31.66% responded that the influence of subsidy was the major reason for the cultivation of rubber. In the case of tapioca, 29 farmers out of 300 respondents, *i.e*.,

9.66% cultivated tapioca. Out of these tapioca farmers 19 farmers *i.e.*, 6.33% responded that the influence of subsidy was the reason for the cultivation of tapioca.

Table 4.14 shows the influence of profitability on 5 major crops like coconut, pepper, rice, rubber and tapioca in the three blocks. In the case of coconut, 195 farmers out of 300 respondents, *i.e.,* 65% cultivated coconut. Out of these coconut farmers 81 farmers *i.e.,* 27% responded that the influence of profitability was the major reason for the cultivation of coconut. In the case of pepper, 53 farmers out of 300 respondents *i.e.,* 17.66% cultivated pepper. 37 farmers *i.e.,* 12.33% reported that influence of profitability was the major reasons for the cultivation of pepper. In the case of rice, 147 farmers out of 300 respondents, *i.e.,* 49% cultivated rice. Out of these rice farmers 129 farmers *i.e.,* 43% responded that the influence of profitability was the major reason for the cultivation of rice. Majority of the respondents are from Puzhakkal block *i.e.,* 95 farmers. In the case of rubber, 96 farmers out of 300 respondents, *i.e.*, 32% cultivated rubber. Out of these rubber farmers 95 farmers *i.e.*, 31.66% responded that the influence of profitability was the major reason for the cultivation of rubber. In the case of tapioca, 29 farmers out of 300 respondents, *i.e.*, 9.66% cultivated tapioca. Out of these tapioca farmers 19 farmers *i.e.*, 6.33% responded that the influence of profitability was reason for the cultivation of tapioca.

4.16 ESTIMATION USING MULTIPLE REGRESSION MODEL

In the above pages we have seen the farmer decision behaviour with respect to different inputs. Consolidating all these, a multiple regression is estimated using following model.

$$A = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \mu$$

A = Area cultivated

X_1 = irrigation

X_2 = Fertilizer

X_3 = Price

X_4 = competing crops

X_5= Credit

X_6 = Cost of cultivation

X_7 = Size of holding

X_8 = Subsidy

X_9 = Profitability

N = max 300

α = 0.05 level

Table 4.15

Estimated multiple regression model

	α	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9
Coconut	1020	1067	1.94	3042	1.01	2.67	0.64	1.89	0.03	0.84
	(26.9)	(0.04)	(0.96)	(0.07)	(1.03)	(0.62)	(3.71)	(0.06)	(5.31)	(4.87)
t	37.91	41.75*	0.97	48.85*	0.98	4.30*	0.17	31.5*	0.05	0.17
Pepper	757	0.04	0.08	0.003	1.64	0.06	0.70	0.64	0.17	1.34
	(27.3)	(1.64)	(2.83)	(0.07)	(0.62)	(0.03)	(0.01)	(0.97)	(3.41)	(0.73)
t	0.27	0.23	0.02	0.04	2.60*	20	70	0.65	1.73	1.83
Rice	623	0.04	0.52	2.71	0.003	2.74	1.87	1.32	0.04	0.07
	(58.1)	(1.34)	(1.71)	(0.34)	(5.31)	(0.07)	(0.4)	(0.53)	(0.61)	(1.71)
t	10.7	0.03	0.30	7.97*	0.00	39.14*	4.6*	2.49*	0.06	0.04
Rubber	2307	0.07	1.83	3.84	0.73	5.82	1.11	2.32	3.94	3.82
	(108)	(0.01)	(0.31)	(0.002)	(1.89)	(2.37)	(0.32)	(0.94)	(0.92)	(1.03)
t	21.36	7*	5.90*	1920*	0.38	2.45*	3.46*	2.46*	4.28*	3.70*

Source: Estimated from data based on Primary survey November 2016-December 2016.

From the estimated model given above it is seen that significant determinants of coconut cultivation are quantity of irrigation, price, and availability of credit and size of holding. In the case of pepper it is quite

interesting to notice that only significant determinant is price. The price of pepper is influenced by international factors at the same time the cost of cultivation of pepper is insignificant, since it is a crop attached to other plantations like coconut, areca nut, mango, *etc*. The multiple regression estimates for rubber is quite revealing and out of competing crops all variables are highly significant. Insignificants for competing crop is quite natural since there is no competing crop. The computed 'Z' value is so high for rubber which indicates that a preference for rubber cultivation very much depends on price. This is absolutely true in the case of Kerala. When the prevailing price is very high, farmers start rubber cultivation and vice versa. This "Naive" behaviour leads to instability in rubber economy also. At higher price farmer all together shift towards rubber plantation leading to a spurt in rubber production without a corresponding demand. This inequality between the demand and supply generates cob web phenomena in rubber plantation.

Availability of credit, size of holding and subsidy also significantly influenced area under rubber. In the case of rice, price, credit cost of cultivation and size of holding influenced area under rice. In the case of rice it is seen that significant but negative coefficient reduces rice production. Low price for rice compared with high cost of cultivation limits the farmers from rice production. From the multiple regression estimates it is found that common determinants of area under cultivation are price, availability of credit and size of holding. So to continue with existing area of crops or higher area of crops prices are to be stabilised, credit availability is to be ensured and joint agricultural operations like co operative farming, group farming are to be encouraged. It is well admitted that in the estimation of these types of model, there will be the problem of multi co linearity, but better to tolerate it.

4.17 CONSTRAINTS

As a part of the survey, an attempt was also made to identify the constraints faced by the respondents practising agriculture under the WTO regime. As mentioned earlier majority of the farmers are unaware about WTO clauses and hence find it difficult to identify them. From the response of the farmers via interview and conversations, we were able to list the following constraints.

- **Unpredictability of weather**: Due to unpredictability of weather, productivity of pepper, coconut, rubber and rice reduced drastically. In Kerala, over the years, the amount of rainfall received every year has not been uniform.

In the case of pepper, the pepper flowers need the right temperature to turn into pepper corns. The rainwater should flow down the central tendril of the peppercorn to give it a cold temperature that assists in its maturing. However, excess humidity without proper rains causes the flowers and corn to wilt and fall before it matures.

Yield per coconut tree saw a reduction mainly due to lack of sufficient rain. In the case of rubber, both excess of rains and lack of sufficient rains are harmful as it reduces the number of tapping days. Rice mainly depends on rain-fed paddy cultivation. Insufficient rains make rice cultivation difficult.

- **Import of Rubber and Palm oil:** Import of synthetic and natural rubber reduces domestic price of rubber. Competition from these substitutes affects the profitability of Indian rubber cultivation. Similarly, one of the most important sources of demand for coconut is for its derivative- coconut oil. The import of cheaper palm oil puts a downward pressure of the prices of coconut oil which in turn impacts prices of coconut.

- **New varieties of seeds are susceptible to diseases**: New varieties of coconut, pepper, rubber and rice are easily susceptible to diseases which reduce productivity. In comparison, the indigenous varieties of the crop are more disease resistant but have lower yields.

- **Problems related to public stock holding**: Increase in the public stock of food grains especially rice discourages rise in its prices. This discourages rice production.

- **Salinity of water:** This constraint was mainly reported by the farmers of Vypin block. Vypin is an island surrounded by backwaters on three sides and the sea on the other side. This geographical location is therefore prone to salination of soil as the salty water from the seas invades the cultivable area. Proper bunds need to be created every year so as to prevent the entry of the sea water into the area.

The increase in salt content causes most paddy varieties to rot and thereby reduces the productivity of the crop. Some indigenous varieties such as *Pokkali* rice are more salt resistant, but its cultivation is much more expensive. Productivity of coconut is also affected negatively due to increased salinity.

- **Labour shortage:** Farmers in all blocks are of the opinion that lack of sufficient labourers is a serious constraint faced by all farmers. Lack of labour for tapping rubber, plucking coconut and harvesting rice is a constraint in cultivation of these crops.

- **Delay in getting subsidy:** The transaction costs for receiving the subsidies is quite high. Respondents complained that for getting even a small amount of subsidy, they were forced to travel to the concerned offices several times.

- **Increase in the price of land:** The increase in the commercial value of land has been a major disincentive to farming in general. It causes people to reduce cultivation and use it for non agriculture purposes.
- **Higher wages and labour problems:** High wages and labour union interference in employing agricultural labourers are a major disincentive to farmers and discourage cultivation.
- **Poor social status of farmers:** In the Kerala society, farming is not considered as a respectable job. Thus, younger generation is reluctant to engage solely in farming activity.

Chapter V

IMPLICATIONS OF WTO

CHAPTER V

IMPLICATIONS OF WTO

5.1 Introduction

In previous chapters we have clearly stated that the implications of WTO agreement are minimum on Kerala agriculture because of the reason cited. However in exports and imports we definitely experience shocks and gains as a result of WTO. Thus in this chapter an attempt is made to analyse trends in exports and imports of three crops namely pepper, coconut and rubber. It is also felt that state alone analysis is difficult because of the non availability of data. Here we make an analysis of three crops—pepper, coconut, rubber—which have implications for world trade. Indian exports, to a great extent, represent export from Kerala because these crops are mainly cultivated in Kerala. Of course it is well admitted that the supremacy of Kerala state in coconut cultivation is almost lost.

Before analysing, it is appropriate to have a glimpse of WTO and Doha Agreement.

5.2 World Trade Organisation (WTO) and Doha Agreement

In 1944 members of western countries in order to reconstruct war affected economies met at Bretton Woods to form an International organisation called International Bank for Reconstruction and Development (IBRD) now called the World Bank. Another organisation

was planned to form for banking purpose that was later called as International Monetary Fund (IMF). When reconstruction started trade increased that led to need of another organisation for meeting the purpose of international trade this was later called as International Trade Organisation (ITO). In order to have an unchanging measuring rod for measuring the different international currencies, revival of gold standard was thought. To solve the problems related to bilateral trade agreements between nations, the idea of a multilateral trade agreement was conceived and this marked the beginning of General Agreement on Tariff and Trade (GATT).

5.2.1 History and Basic information:

The United Kingdom (UK) and the United States (US) took initiative to form the Economic and Social Council (ECOSOC) of the United Nations. To consider the proposals put forward by UK and US a conference (United Nations Trade and Employment) was convened by ECOSOC to discuss about trade of goods and movement of man power in 1946. The ideas of the nations which were anxious to begin the process of trade liberalisation signed a general agreement in 1947. The ITO charter which was prepared by the preparatory committee was approved in 1948 at the conference in Havana, Cuba. Thus ECOSOC was an idea born in the minds of economically- politically- militarily strong two nations of the early twentieth century and to maintain upper hand over the newly liberated and Pro NATO countries.

Even before 1948 discussions on trade liberalisation were going on. Results of these discussions were included in the General Agreement of 1947 and which came into force in 1948. However original agreement did not contained much institutional framework, but later on this General Agreement functioned as an international organisation known as GATT. The 8^{th} round i.e., Uruguay round concluded with the signing of the Final

Action on April 15, 1994 and produced the World Trade Organization (WTO). Thus creation of WTO was an institutionalisation of series of discussions for tariff reduction and non tariff elimination.

5.2.2 Background of Doha Declaration

The Uruguay round from 1988 to 1994 was the first international trade agreement to include agricultural policy reform. The Uruguay round's Agreement on Agriculture was the first multilateral agreement concentrated entirely to agriculture. For developed countries the implementation period of Agreement on Agriculture was for six years (1995-2000) and for developing countries it was for 10 years (1995-2004). Before Doha agreement previous negotiations' result was not followed by the member countries. Though shift from non tariff system to tariff system took place, improvement in market access was limited. So Doha ministerial meeting was needed to achieve better market access, reduction in the tariff, reduction in the export subsidies and reduction in the trade distorting domestic support. Domestic support, export subsidies and market access were three pillars of agricultural negotiations.

The WTO's fourth ministerial conference took place in Doha, Qatar, on November 9-14, 2001 which is known as Doha Declaration. In this conference, WTO member countries agreed to introduce a new round of multilateral trade negotiations, including negotiations on agricultural trade liberalisation. The new round, focussed on combining developing countries into the world trading system, was called the Doha Development Agenda (DDA). The Doha round made a comprehensive frame work and included industrial tariffs, services, anti-dumping and countervailing duty measures, dispute settlement and other trade issues along with agriculture.

5.2.3 THE FOURTH WTO MINISTERIAL CONFERENCE, DOHA, 2001

The main objective of the Doha Agreement is "Clarifying and Improving Disciplines" under the WTO Agreements on Anti-dumping (AD) and on subsidies and countervailing measures (ASCM).

PRINCIPLES OF DOHA DECLARATION:

- ★ Single undertaking- single undertaking emphasises that all member countries should fully agree and not partially to negotiated points
- ★ Transparency – all negotiations must be fair and clear
- ★ Special and differential treatment - Special and differential treatment should be provided to developing and least developed countries.
- ★ Sustainable development – all trade activities should be kept in mind the protection of environment of member countries when trade agreements are signed.

Provisions of Doha

- ➢ The Director - General should ensure that WTO technical assistance gives prime concern to support developing countries in implementing existing WTO obligations, and to enlarge their capacity to involve more effectively in the future negotiations.
- ➢ The WTO secretariat should cooperate closely with other international organisations thereby the technical assistance is more efficient and effective.

146 WTO member nations agreed to think about liberalised trade and reduction of tariff and removal of trade barriers. The member countries agreed upon completion of Doha development agenda by January 2005. One major item of agenda was to reduce agricultural subsidies in European Union and United States. However, European Union rejected the idea of total elimination of all agricultural subsidies.

Though Doha declaration contains many provisions for protecting agriculture in developing countries via, differential treatment for developing countries and by reducing subsidies drastically in developed countries, because of non cooperative attitude of European countries Doha declaration's aims did not became fruitful.

The Agreement on Trade- Related Aspects of Intellectual Property Rights (TRIPS)

It is an international agreement under the World Trade Organization (WTO). It provides minimum provisions of intellectual property (IP) regulation as applied to nationals of other WTO Members. It was discussed at the end of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) in 1994 but the discussions did not go further.

The TRIPS agreement is a comprehensive international agreement on intellectual property rights. In 2001, developing countries were demanding more liberal interpretation of TRIPS so that more intellectual knowledge would be parted to developing countries.

TRIPS also specify enforcement of procedures, remedies, and dispute. Protection and enforcement of all intellectual property rights would help to contribute to the promotion of technological innovation and transfer and dissemination of technology

NON-AGRICULTURAL MARKET ACCESS (NAMA):

NON-AGRICULTURAL MARKET ACCESS (NAMA) which is mentioned in the Doha declaration focussed on "tariff peaks, high tariffs and tariff escalation". It also aims at reduction of tariff and elimination of non tariff barriers. Though NAMA does not directly influence trade in agricultural goods, there is a possibility of exporting agricultural goods to a second country and re export it to a third country as a finished industrial

good. For example, If Sri Lanka has got a high competitive edge over India in the case of coconut; Sri Lanka can export coconut to Bangladesh and after processing Bangladesh can re export coconut as by-product to India.

Features and need of reforms in Agriculture: An overview

The following are the needs and features of reforms in agriculture:

Reduction of tariff barriers, providing most favoured nation treatment, providing national treatment of goods, providing common institutional framework, improving standard of living, ensuring full employment, increasing effective demand, enlarging production and trade of goods, increasing trade in services, ensuring optimum use of world resources, protecting environment, accepting the concept of sustainable development, conducting trade without discrimination, increasing predictability in growing market access, promoting fair competition, encouraging development, administering trade agreements, forming of forum of trade negotiations, settling trade disputes, reviewing national trade policies, providing technical assistance and training programme, increasing cooperation with international organisations; modernising domestic support, aggregate measurement support, blue box support, green box support, di minimum support, special and differential treatment, export subsidy; increasing transparency in quality improvement, improving the advantages of comparative cost, achieving food security, increasing diversification, reducing price distorting subsidies, harmonising sanitary and phytosanitary measures and imposing anti dumping duties.

- Reduction of tariff barriers –Because of reforms the tariff barriers at the whole world level have to come down. Only by reducing tariff

barriers trade can be increased and welfare of people can be improved. So that people are able to enjoy the goods at reduced prices.

- Providing most favoured nation treatment- under this condition, the participating countries must consider each other as most favoured nation for improving trade among member countries.
- Providing national treatment of goods - All countries participating in reform should consider product of other participating country as their own product, then only there will be equality among products of these countries.
- Providing common institutional framework – in order to guide reforms in trading activities there was a need for a common institutional framework. This will smoothen the working of reform activities.
- Improving standard of living-In order to improve the standard of living reforms activities must take place. The reduction in the tariff rate would lead to decrease in price of goods. Thus overall standard of living will improve.
- Ensuring full employment – Full employment of labour is a must. The reduction in the tariff will lead to reduction in the overall price level. This will increase production and employment.
- Increasing effective demand – Effective demand of middle income people should increase. Reform activities will lead to increase in the income levels of middle income people. This will increase effective demand.
- Enlarging production and trade of goods – Production and trade of goods should take place. Reform activities would lead to reduction in the tariffs and decrease in the overall price level and increase in production.

- Increasing trade in services – increase in the trade in services is a must for technological transfer. Thus there will be an overall increase in the production of goods.
- Ensuring optimum use of world resources–in order to reduce the over exploitation of resources in every country, a minimum standard is imposed in resource utilization and thereby protecting of environment can be done.
- Accepting the concept of sustainable development – in order to achieve the goal of sustainable development, reforms have to be implemented in resource utilization. Thus future generation is assured of sufficient resources.
- Conducting trade without discrimination – in order to check the discriminatory treatment in trade against poor nations, a reform is needed in trade activities. This will reduce the exploitation of poor countries by rich nations.
- Increasing Predictability in growing market access– a shift from quota system to tariff system led to predictability in price and thereby increases the market access. Thus exploitation by powerful nations can be restricted.
- Promoting fair competition–in order to have a fair competition at world level, a system and an organisation is needed. The reform activity implements a fair competition in trade.
- Encouraging development - in order to shift from low growth rate economy to highly developed economy, the reform process is a must. In India, Hindu growth rate of 3 to 3.5% changed to new Hindu growth rate of 5 to 5.5 %. This is the result of reforms.
- Administering trade agreements – to administer the multilateral trade agreements, an organisation is a must. This organisation can monitor

the day to day functioning of the trade agreements and ensure smooth international trade.

- Forming of forum of trade negotiations – An impartial forum can function as a better trade negotiator. It can monitor and negotiate disputes and conflicts of ideas between member nations.
- Reviewing national trade policies – in order to have a global view for trade policies for different nations, a global level reform agenda is necessary. This will help the nations to modify their trade policies aiming at an international cooperation.
- Providing technical assistance and training programme–only through technical assistance and training programme productivity can be improved. Through reform process under developed countries get better technology and training from developed nations through technological transfer.
- Modernising domestic support – increase in consumption subsidies in under developed countries and reducing production subsidies in developed countries are unavoidable. By reducing the production subsidies in developed countries, poor economies can be brought to international competitive process, at the same time poor consumers of under developed countries can be protected from starvation by increasing consumption subsidies.
- Modernising aggregate measurement support – by modernising aggregate measurement support, the agriculturist of poor economies have to be protected and agriculturist of developed countries should be open competition. Then only the reform will have a human face. Though the idea of reform is very good to say but when it is implemented rich economies are over protected and poor economies are under protected. When a minimum level of protection is not

assured through aggregate measurement support agriculturist of poor countries suffer a lot.

- Modernising Blue box support–in order to avoid over production, sometimes production has to be curtailed and thus price stability can be achieved. This kind of support is given mainly in developed nations. Sometimes blue box support is given for rural development of poor countries. This will reduce poverty.
- Modernising Green Box Support: Green Box Support is given to agriculturists as direct payment without restrictions. Following are the major elements of Green Box Support.

a) Support for research - the idea of support for research is very attractive and competitive. But the people of under developed countries are less aware about research activities. By increasing research in under developed countries it is not easy to increase the production in short run in under developed countries and compete internationally.

b) Control of pest and diseases –control of pest and disease is necessary but it cannot be easily implemented. When one pest is controlled in under developed countries, another pest emerges. Though poor agriculturists can control existing pest, they are in a dilemma when new pest attack their crops. When conventional varieties of seeds are used there is less productivity but when modern varieties of seeds are used there is high level of pest and disease attack.

c) Training, extension and advisory services – people's welfare will be improved through training, extension and advisory services. These are very suitable for the agriculturists of developed countries. Uneducated agriculturists of underdeveloped countries cannot reap the advantage out of training, extension and advisory services.

d) Public stock for food security –by implementing public stock for food security, consumers of poor countries can benefit. In developed countries the agriculturists get a lot of production based subsidies. Through increase in the public stock for food security the agriculturists of developed countries are less adversely affected. This is because production subsidy is dominating in developed countries than consumption subsidy. In under developed countries like India consumption subsidy is dominating than production subsidy. So when public stock for food security is increased, the price of agriculture goods comes down and the poor agriculturists suffer.

e) Direct payment to producers–the idea of direct payment to producers is very attractive but since most of the land is sublet, direct payment is received not by the agriculturists but by the land owners.

f) Farm income insurance–by farm income insurance agriculturist will be protected. But when crop failure happened, farm income insurance is received by land owners and not by the agriculturists. This is because of the practice of subletting of land which is prevailing in Indian economy.

g) Disaster management – the amount spend on disaster management will help the agriculturist a lot. But the huge amount spend on disaster management will not increase the production and productivity in under developed countries in short period of time and thus the agricultural goods of underdeveloped countries will not be a competitor for products of other developed nations.

h) Government financial participation in income, insurance and income safety notes programme–Government financial participation in income, insurance and income safety notes programme are very attractive to agriculturist of developed nations. The poor agriculturists

of underdeveloped countries usually do not respond to this idea. Income received through insurance will not directly increase production. Thus agricultural goods from under developed countries will not compete with agricultural goods from developed countries.

i) Promotion and infrastructural services – Promotion and infrastructural services can improve the production in the long run. But the money spend for promotion and Infrastructural services would not increase production directly especially in the underdeveloped countries because agriculturist of underdeveloped countries are influenced by non economic factors than economic factors. Thus goods from under developed countries will not be able to compete with goods of developed countries.

j) Investments subsidies and agricultural input services to resource poor farmers – this will help the agriculturist a lot. But the poor agriculturist of underdeveloped countries do not have huge amount to invest. Since they do not have enough money to invest they cannot enjoy the subsidies. Even if they get subsidies and services it cannot usually increase production immediately. Thus it did not create any competition for farmers of developed countries.

- Modernising Diminimum support- generally two types of subsidies are given by the countries. One is product specific and another is non product specific. In the reform process 5% each subsidy is allowed under product specific and non product specific subsidy. If any subsidy is below 5%, aggregate subsidy can be increased to 10% by increasing the latter part.

- Modernising Special and differential treatment – unless and until developing countries get a special and differential treatment they cannot be protected from the international competition. In the case of

under developed countries, sufficient amount is not received under this head.

- Modernising export subsidy – only by reducing export subsidies real competition can be achieved at international level. All countries should reduce export subsidies. Thus the whole world can improve efficiency. But under developed countries should get more time to reduce export subsidy.
- Increasing Transparency–only by increasing transparency a positive climate in trade can be created. All countries should be transparent, at the same time all should be benefited out of reform process.
- Increasing Quality – by improving the quality of goods, welfare of people can be increased. Different countries have different quality of goods and services. By sharing technology all nations can either improve their quality of goods or improve their economic situation.
- Improving the advantages of comparative cost – by concentrating on competitively efficient good all nations can benefit. Even economically and technologically better off countries can further improve their positions by reform process. That is through comparative cost advantage in production and trade.
- Achieving Food security- All must be ready to avoid global starvation. For this minimum food availability should be assured in every country. Through technological transfer and supply of food materials to needy global starvation can be avoided.
- Increasing Diversification – by diversifying economic activities different countries could specialise in what they are expert. Different people have got different expertise. Instead of concentrating on all productive activities, countries can develop faster by global diversification and specialisation.

- Reducing price distorting subsidies-price distorting subsidies are not correct ethically and economically. By subsidising the export and price distorting optimum production will not happen. When developed countries give production and export subsidies, they indirectly discourage efficient production.
- Harmonising sanitary and phytosanitary measures - sanitary and phytosanitary measures will improve the quality of goods. But without harmonisation in sanitary and phytosanitary measures, production and trade will not take place smoothly.
- Reducing antidumping- dumping is an economic evil. Developed nations will be able to dump the goods which are over produced, but this will eliminate agriculture production in underdeveloped countries.

5.3 INDIA'S EXPORT AND IMPORT OF PEPPER DURING PRE AND POST WTO PERIOD

India is one of the major pepper producing countries in the world. In pre-WTO period (1990-91 to1994-95), we can see that the production of pepper showed an increasing trend from 48 thousand tonnes in 1990-91 to 60.7 thousand tonnes in 1994-95 *i.e.,* a growth rate of 26.45% and an average growth rate of 5.29% per annum. The quantity of export of pepper also showed an increasing trend from 29985 tons in 1990-91 to 37264 tons in 1994-95 *i.e.,* a growth rate of 24.28% and an average growth rate of 4.86% per annum. India signed a free trade agreement with Bhutan in 1972 and Singapore in 1992. The production and export quantity of pepper have increased between 1990-91 and 1994-95 (Table 5.1) .During this period productivity of pepper has increased. The quantity of import of pepper during the pre-WTO period, increased from 1488 tons in 1990-91 to 2413 tons in 1994-95 *i.e.,* a growth rate of

62.16% and an average growth rate of 12.43% per annum. In this period the production and productivity of pepper increased in India.

Table 5.1

India's export and import of pepper during pre (1990-91 to1994-95) and post (1995-96 to 2014-15) WTO period

Year	Production (in '000 tons)	Export (in tons)	Export as % of production	Import (in tons)
1990-91	48	29985	62.46875	1488
1991-92	52	20535	39.49038	2163
1992-93	50.8	23821	46.89173	1686
1993-94	51.3	48743	95.01559	873
1994-95	60.7	37264	61.39044	2413
1995-96	61.6	26244	42.6039	2186
1996-97	55.4	47893	86.44946	1911
1997-98	57.3	35907	62.66492	2022
1998-99	70.2	35109	50.01282	3516
1999-00	50.1	42824	85.47705	3048
2000-01	63.7	21830	34.27002	4028
2001-02	61.5	22877	37.19837	6328
2002-03	70.6	21609	30.60765	15392
2003-04	74.3	16635	22.38896	14334
2004-05	81.9	14148	17.27473	17733
2005-06	50	17363	34.726	16870
2006-07	50	28726	57.452	15701
2007-08	47.1	35000	74.30998	13500
2008-09	50	25250	50.5	10750
2009-10	51	19750	38.72549	18100
2010-11	48	18850	39.27083	16100
2011-12	40.6	26700	65.76355	17565
2012-13	52.6	15363	29.20722	15600
2013-14	50.9	21250	41.74853	15680
2014-15	65	21450	33	21300

Source: Pepper Production - Spices Board, India; Export and Import (DGCI & SKOLKATA)

Pepper Productivity – Spices Board, India & Ministry of Finance Agriculture and Farmers Welfare, GOI

the import quantity of pepper increased from 2186 tons in 1995-96 to 21300 tons in 2014-15 which showed a growth rate of 874.38% and an average growth rate of 43.72% per annum. In post-WTO period the production, productivity and the import quantity of pepper increased in India. Increase in the import quantity may be because of increase in the production of pepper in the global market and the free trade agreement with some of the major pepper producing countries and regional associations like Sri Lanka (2001), Thailand (2004), SAFTA (2006), ASEAN (2010), and Malaysia (2011). Decrease in the exports and increase in the imports may be because of efficient production by other major pepper producing nations compared to India, increase in the internal demand, influence of trade agreements (*i.e.,* second element of market access mentioned in WTO agreement which necessitates that member countries should import minimum quantity for domestic consumption, even though they usually did not consume these imported goods) and dumping of pepper by those countries who do not consume these products, but forced to import because of WTO agreements.

5.4 INDIA'S EXPORT AND IMPORT OF COCONUT DURING PRE AND POST WTO PERIOD

In the case of coconut, India is a major producer in the world. During pre- WTO period (1990-91 to 1994-95), the production of coconut increased from 1436586 tons in 1990-91 to 1963679 tons in 1994-95 *i.e.,* a growth rate of 36.69% and an average growth rate of 7.3% per annum. The quantity of export of coconut also increased from 3.9 tons in 1990-91 to 551.95 tons in 1994-95. India signed a free trade agreement with Bhutan in 1972 and with Singapore in 1992.The increase in the production of coconut and increase in the productivity might have led to increase in export quantity of coconut between 1990-91 and 1994-95.

Table 5.2				
India's export and import of coconut during pre (1990-91 to1994-95) and post (1995-96 to 2014-15) WTO period				
Year	Production (in tons)	Export (in tons)	Export as % of production	Import (in tons)
1990-91	1436586	3.9	0.000271	3090
1991-92	1488262	70.2	0.004717	1408
1992-93	1659678	112.36	0.00677	617
1993-94	1768050	1855.07	0.104922	3545
1994-95	19613679	551.95	0.028108	3859
1995-96	1912299	1090.9	0.057047	364
1996-97	1928392	1006.87	0.052213	4779.9
1997-98	1877602	1298.01	0.069131	2313.79
1998-99	1850878	950.33	0.051345	1373.28
1999-00	1790787	1585.17	0.088518	4010.97
2000-01	1859885	4626.7	0.248763	49826.1
2001-02	1913923	3145.97	0.164373	33109.6
2002-03	1850731	12111	0.65439	56597.1
2003-04	1798022	6495.19	0.361241	84347.6
2004-05	1894729	10233.6	0.540109	65896.2
2005-06	2186771	5649.64	0.258355	98419.4
2006-07	2338698	3742.03	0.160005	18352.5
2007-08	2176879	7035.04	0.323171	38967.8
2008-09	1498302	23509.1	1.569049	37363.8
2009-10	1598110	28424.1	1.778607	84399.6
2010-11	1600472	21181	1.323422	36570.9
2011-12	2205817	45038.9	2.041824	42680.1
2012-13	2304592	24529.5	1.064375	38928.4
2013-14	2201536	19061.5	0.865828	27443.4
2014-15	2076923	15414.4	0.742175	126752

Source: Coconut Production – compiled from 'Indian Agriculture at a Glance', published by Ministry of Agriculture and Farmers Welfare, Govt. of India
Coconut Productivity - Ministry of Agriculture and Farmers Welfare, Govt. of India;
Coconut Export and Import (1990-2007) - Coconut Development Board & 2008-2015- DGCI&SKOLKATA

In post-WTO period (1995-96 to 2014-15) the production of coconut increased from 1912299 tons in 1995-96 to 2076923 tons in 2014-15 *i.e.,* a growth rate of 8.61% and an average growth rate of 0.43% per annum. The quantity of export of coconut also increased from 1090.9 tons in 1995-96 to 15414.4 tons in 2014-15 *i.e.,* a growth rate of 1312.99% and an average growth rate of 65.65% per annum. During the post - WTO period, India signed free trade agreements with some of the major coconut producing countries like Sri Lanka (2001), Thailand (2004), SAFTA (2006), ASEAN (2010) and Malaysia (2011). The production and productivity of coconut increased in this period. The import quantity of coconut also increased from 364 tons in 1995-96 to 126752 tons in 2014-15 *i.e.,* a growth rate of 34721.98% and an average growth rate of 1736.10% per annum. During 1995-2015, India signed free trade agreements with some of the major coconut producing countries like Sri Lanka (2001), Thailand (2004), SAFTA (2006), ASEAN (2010), and Malaysia (2011). In post-WTO period, the production and productivity of coconut increased but India also witnessed an increase in import quantity of coconut. Increased production and productivity of coconut, increased demand in the international market and the influence of different trade agreements signed since 1995 are the main reasons for the increase in exports during this period. Several factors could explain the increasing trend of imports of coconut. They are mainly- increase in internal demand, increased supply in the international market by cost effective nations, import of coconut for processing it into value added products and for re-exporting and the influence of different trade agreements.

5.5 INDIA'S EXPORT AND IMPORT OF RUBBER DURING PRE AND POST WTO PERIOD

Table 5.3

India's export and import of rubber during pre (1990-91 to1994-95) and post (1995-96 to 2014-15) WTO period

Year	Production ('000 tons)	Export (in tons)	Export as % of production	Import (in tons)
1990-91	329.6			49013
1991-92	366.7	5834	1.590946	15070
1992-93	393.5	5939	1.509276	17884
1993-94	435.2	186	0.042739	19940
1994-95	472	1961	0.415466	8093
1995-96	507	1130	0.22288	51635
1996-97	549	1598	0.291075	19770
1997-98	550	1415	0.257273	32070
1998-99	605	1840	0.304132	29534
1999-00	622	5989	0.962862	20213
2000-01	630	13356	2.12	8970
2001-02	631	6995	1.108558	49769
2002-03	649	55311	8.522496	26217
2003-04	712	75905	10.66081	44199
2004-05	750	46150	6.153333	72835
2005-06	802.63	73830	9.19851	45285
2006-07	852.89	56545	6.629812	89699
2007-08	825	60353	7.315515	86394
2008-09	865	46926	5.424971	77762
2009-10	831	25090	3.019254	176756
2010-11	862	29851	3.4622993	188337
2011-12	904	27145	3.002765	214433
2012-13	914	30594	3.347265	217364
2013-14	774.03	5398	0.697389	388664
2014-15	645	1002	0.155349	442130

Rubber Production - EPW Research Foundation, 2014 &Rubber Board
Rubber Export and Import -www.indiastat.com
Rubber Productivity – EPW Research Foundation 2014, 2014-15 yield – www.rubberboard.org.in

availability of synthetic rubber as a cheaper substitute to natural rubber had a dampening effect on the international market for rubber. This reduced demand for natural rubber could also be an explanatory factor for the decrease in the import quantity.

In post-WTO period (1995-96 to 2014-15) the production of rubber increased from 507 tons in 1995-96 to 645 tons in 2014-15 *i.e.,* a growth rate of 27.22% and an average growth rate of 1.36% per annum. In this period the quantity of export of rubber showed a decreasing trend from 1130 tons in1995-96 to 1002 tons in 2014-15 *i.e.,* a negative growth rate of 11.33% and an average negative growth rate of 0.57% per annum. During post - WTO period India signed free trade agreements with some of the major rubber producing countries like Sri Lanka (2001), Thailand (2004), SAFTA (2006), ASEAN (2010) and Malaysia (2011). Though production and productivity of rubber increased, India was not able to increase the export quantity of rubber. In the post - WTO period (1995-96 to 2014-15) the quantity of import of rubber showed an increasing trend from 51635 tons in 1995-96 to 442130 tons in 2014-15 *i.e.,* a growth rate of 756.20% and an average growth rate of 37.81% per annum.

The main reason for the decrease in the exports of rubber is that Indian producers could not face the tough competition from more cost effective producers. In addition to this, the fact that most of the major free trade agreements that India signed during this period were with major rubber producing nations. The removal of tariff protection thus reduced the capacity of the Indian producer to face the competition.

The increase in internal demand along with greater access to cheaper imports of rubber due to the influence of the various free trade agreements explain the increasing trend of rubber imports in spite of increased production and productivity. Increase in demand for imports of rubber could also be for converting it into value added products.

In the above paragraph we have seen exports import details. The exports and imports are influenced by different trade agreements. Thus in the succeeding paragraph an attempt is made to evaluate the trade performance under different free trade agreements. The study period varies for different trade agreements depending on launching of that trade agreement.

5.6 DIFFERENT FREE TRADE AGREEMENTS

In this section we discuss ten different free trade agreements signed by India with different countries and regional associations

5.6.1 INDIA – BHUTAN FREE TRADE AGREEMENT

Table 5.4 shows that the export and import of quantity of pepper, coconut and rubber between1990 and 2015 since the India – Bhutan Trade Agreement. The export of quantity of pepper showed a decreasing trend with a negative growth rate of 6.28% and an average negative growth rate of 0.251%. In 1990 the quantity of export was 29985 tonnes but in the year 2015 it decreased to 28100 tonnes. Though production of pepper increased in India since India – Bhutan agreement, India was not able to increase the export quantity of pepper.

Under the influence of free trade agreements, India could not face the competition from cheaper producers. Another important explanatory factor behind the trend could be the second element of 'market access' of WTO agreement. The WTO requires each signatory member to compulsorily import a minimum quantity of various agricultural products for domestic consumption even if the country did not generally consume the product. The intention behind this clause is to build up trade relations among the member countries.

In the case of coconut the quantity of export increased from 3.9 tonnes in 1990 to 15299.2 tonnes in 2015. The production of coconut

increased and export quantity of coconut increased. This may be due to the increase in the production of coconut in India.

Table 5.4
India – Bhutan Free Trade Agreement

YEAR	EXPORT(quantity in tonnes)			IMPORT(quantity in tonnes)		
	Pepper	Coconut	Rubber	Pepper	Coconut	Rubber
1990	29985	3.9		1488	3090	49013
1991	20535	70.2	5834	2163	1408	15070
1992	23821	112.36	5939	1686	617	17884
1993	48743	1855.07	186	873	3545	19940
1994	37264	551.95	1961	2413	3859	8093
1995	26244	1090.9	1130	2186	364	51635
1996	47893	1006.87	1598	1911	4779.9	19770
1997	35907	1298.01	1415	2022	2313.79	32070
1998	35109	950.33	1840	3516	1373.28	29534
1999	42824	1585.17	5989	3048	4010.97	20213
2000	21830	4626.7	13356	4028	49826.1	8970
2001	22877	3145.97	6995	6328	33109.6	49769
2002	21609	12111	55311	15392	56597.1	26217
2003	16635	6495.19	75905	14334	84347.6	44199
2004	14148	10233.6	46150	17733	65896.2	72835
2005	17363	5649.64	73830	16870	98419.4	45285
2006	28726	3742.03	56545	15701	18352.5	89699
2007	35000	7035.04	60353	13500	38967.8	86394
2008	25250	23509.1	46926	10750	37363.8	77762
2009	19750	28424.1	25090	18100	84399.6	176756
2010	18850	21181	29851	16100	36570.9	188337
2011	26700	45038.9	27145	17565	42680.1	214433
2012	15363	24529.5	30594	15600	38928.4	217364
2013	21250	19061.5	5398	15680	27443.4	388664
2014	21450	15414.4	1002	21300	126752	442130
2015	28100	15299.2	865	19365	139255	458374

Source: Pepper - (DGCI&SKOLKATA/EXPORTERS RETURNS/ DLE/ DLI FROM CUSTOMS)
Coconut- (1990-2007) Coconut Development Board, Ministry of Agriculture Department of Agricultural And Co-Operation, Govt. of India,, Kerala Bhavan, Kochi.(2008-2015) DGCI&SKOLKATA)
Rubber - (http://www.indiastat.com)2016

The quantity of export of rubber showed a decreasing trend *i.e.,* 5834 tonnes in 1991 to 865 tonnes in 2015 which showed a negative growth rate of 85.17% and a negative average growth rate of 3.54%. Though production of rubber increased in India since the India – Bhutan agreement, India was not able to increase the export quantity of rubber. This must be due to the influence of free trade agreement.

The quantity of import of pepper from 1990 to 2015 showed an increasing trend with a growth rate of 1201.41% and an average growth rate of 48.05%. Though production of pepper increased in India since The India – Bhutan agreement India was not able to decrease the import quantity of pepper. This must be due to the influence of free trade agreement.

The quantity of import of coconut from 1990 to 2015 showed an increasing trend with a growth rate of 4406.61% and an average growth rate of 176.26% *i.e.,* from 3090 tonnes in1990 to 139255 tonnes in 2015. Though production of coconut increased in India since The India – Bhutan agreement, India was not able to decrease the import quantity of coconut. This must be due to the influence of free trade agreement.

The quantity of import of rubber increased from 49013 tonnes in 1990 to 458374 tonnes in 2015 which showed a growth rate of 835.209% and an average growth rate of 33.408%. Though production of rubber increased in India since The India – Bhutan agreement, India was not able to decrease the import quantity of rubber. This must be due to the influence of free trade agreement.

After India – Bhutan agreement in 1972, in the case of pepper, the quantity of export declined but the quantity of import increased. The quantity of export and import of coconut showed an increasing trend over these years. After this agreement, in the case of rubber, the quantity of

import showed an increasing trend, but the quantity of export of rubber decreased.

5.6.2 INDIA – SINGAPORE FREE TRADE AGREEMENT

Table 5.5
India – Singapore Free Trade Agreement

YEAR	EXPORT(quantity in tonnes)			IMPORT(quantity in tonnes)		
	pepper	coconut	rubber	Pepper	coconut	Rubber
1992	23821	112.36	5939	1686	617	17884
1993	48743	1855.07	186	873	3545	19940
1994	37264	551.95	1961	2413	3859	8093
1995	26244	1090.9	1130	2186	364	51635
1996	47893	1006.87	1598	1911	4779.9	19770
1997	35907	1298.01	1415	2022	2313.79	32070
1998	35109	950.33	1840	3516	1373.28	29534
1999	42824	1585.17	5989	3048	4010.97	20213
2000	21830	4626.7	13356	4028	49826.1	8970
2001	22877	3145.97	6995	6328	33109.6	49769
2002	21609	12111	55311	15392	56597.1	26217
2003	16635	6495.19	75905	14334	84347.6	44199
2004	14148	10233.6	46150	17733	65896.2	72835
2005	17363	5649.64	73830	16870	98419.4	45285
2006	28726	3742.03	56545	15701	18352.5	89699
2007	35000	7035.04	60353	13500	38967.8	86394
2008	25250	23509.1	46926	10750	37363.8	77762
2009	19750	28424.1	25090	18100	84399.6	176756
2010	18850	21181	29851	16100	36570.9	188337
2011	26700	45038.9	27145	17565	42680.1	214433
2012	15363	24529.5	30594	15600	38928.4	217364
2013	21250	19061.5	5398	15680	27443.4	388664
2014	21450	15414.4	1002	21300	126752	442130
2015	28100	15299.2	865	19365	139255	458374

Source: Pepper - (DGCI&SKOLKATA/EXPORTERS RETURNS/DLE/DLI FROM CUSTOMS)
Coconut- (1990-2007) Coconut Development Board, Ministry of Agriculture Department of Agricultural And Co-Operation, Govt. of India,, Kerala Bhavan, Kochi.(2008-2015) DGCI&SKOLKATA)
Rubber - (http://www.indiastat.com)2016

Data regarding the quantity of export and import of crops like pepper, coconut and rubber since India-Singapore free trade agreement are presented in table 5.5. The quantity of export of pepper increased from 23821tonnes in1992 to 28100 tonnes in 2015 which showed a growth rate of 17.96% and an average growth rate of 0.78%. The production of pepper increased and export quantity of pepper also increased. This may be due to the increase in the production of pepper.

In the case of coconut the quantity of export increased from 112.36 tonnes in 1992 to 15299.2 tonnes in 2015 *i.e.,* a growth rate of 13516.22 % and an average growth rate of 587.66%. The production of coconut increased and export quantity of coconut also increased. This may be due to the increase in the production of coconut.

The quantity of export of rubber showed a decreasing trend *i.e.,* from 5939 tonnes in 1992 to 865 tonnes in 2015 which showed a negative growth rate of 85.43% and an negative average growth rate of 3.71%. Though production of rubber increased in India since The India-Singapore agreement, India was not able to increase the export quantity of rubber. This must be due to the influence of free trade agreement.

The quantity of import of pepper increased from 1686 tonnes in 1992 to 19365 tonnes in 2015 which showed a growth rate of 1048.57% and an average growth rate of 45.59%. Though production of pepper increased in India since The India-Singapore agreement, India was not able to decrease the import quantity of pepper. This must be due to the influence of free trade agreement.

In the case of coconut the quantity of import increased from 617 tonnes in 1992 to 139255 in 2015. Though production of coconut increased in India since The India-Singapore agreement, India was not

able to decrease the import quantity of coconut. This must be due to the influence of free trade agreement.

The quantity of import of rubber showed an increasing trend from 17884 tonnes in 1992 to 458374 tonnes in 2015 *i.e.,* a growth rate of 2463.04% and an average growth rate of 107.08%. Though production of rubber increased in India since The India-Singapore agreement, India was not able to decrease the import quantity of rubber. This must be due to the influence of free trade agreement.

The quantity of export and import of pepper which showed an increasing trend after India signed a free trade agreement with Singapore. Over these years, in the case of coconut the quantity of import increased and the quantity of export also increased. The import of rubber showed an increasing trend but export showed a decreasing trend. After this agreement the international trade of coconut and rubber are not beneficial to India.

5.6.3 INDIA – SRI LANKA FREE TRADE AGREEMENT

Table 5.6 shows that the quantity of export and import of crops like pepper, coconut and rubber, after India signed a free trade agreement in 2001 with Sri Lanka. The quantity of export of pepper increased from 21609 tonnes in 2002 to 28100 tonnes in 2015 *i.e.,* a growth rate of 30.03% and an average growth rate of 2.31%. Though production of pepper decreased in India since The India-Sri Lanka agreement, India was able to increase the export quantity of pepper. This must be due to the influence of free trade agreement.

The quantity of export of coconut increased from 12110.96 tonnes in 2002 to 15299.18 tonnes in 2015 *i.e.,* a growth rate of 26.32% and an average growth rate of 2.02%. The production of coconut increased and

export quantity of coconut also increased. This may be due to the increase in the production of coconut.

Table 5.6
India – Sri Lanka Free Trade Agreement

YEAR	EXPORT(quantity in tonnes)			IMPORT(quantity in tonnes)		
	pepper	Coconut	rubber	pepper	coconut	Rubber
2002	21609	12110.96	55311	15392	56597.13	26217
2003	16635	6495.19	75905	14334	84347.58	44199
2004	14148	10233.55	46150	17733	65896.17	72835
2005	17363	5649.64	73830	16870	98419.42	45285
2006	28726	3742.03	56545	15701	18352.46	89699
2007	35000	7035.04	60353	13500	38967.79	86394
2008	25250	23509.08	46926	10750	37363.81	77762
2009	19750	28424.14	25090	18100	84399.57	176756
2010	18850	21180.99	29851	16100	36570.92	188337
2011	26700	45038.88	27145	17565	42680.14	214433
2012	15363	24529.45	30594	15600	38928.43	217364
2013	21250	19061.48	5398	15680	27443.36	388664
2014	21450	15414.37	1002	21300	126751.5	442130
2015	28100	15299.18	865	19365	139254.5	458374

Source: Pepper - (DGCI&SKOLKATA/EXPORTERS RETURNS/DLE/DLI FROM CUSTOMS)

Coconut- (1990-2007) Coconut Development Board, Ministry of Agriculture Department of Agricultural And Co-Operation, Govt. of India,, Kerala Bhavan, Kochi.(2008-2015) DGCI&SKOLKATA)

Rubber - (http://www.indiastat.com)2016

The quantity of export of rubber decreased from 55311 tonnes in 2002 to 865 tonnes in 2015 *i.e.,* a negative growth rate of 98.43% and an average negative growth rate of 7.75%. The production of rubber decreased in India since The India-Sri Lanka agreement, the export

quantity of rubber also decreased. This may be due to the decrease in the production of rubber.

The quantity of import of pepper increased from 15392 tonnes in 2002 to 19365 tonnes in 2015 *i.e.,* a growth rate of 25.81% and an average growth rate of 1.98%. The production of pepper decreased and import quantity of pepper increased. This may be due to the decrease in the production of pepper.

The quantity of import of coconut increased from 56597.13 tonnes in 2002 to 139254.5 tonnes in 2015 *i.e.,* a growth rate of 146.04% and an average growth rate of 11.23%. Though production of coconut increased in India since The India-Sri Lanka agreement, India was not able to decrease the import quantity of coconut. This must be due to the influence of free trade agreement.

The quantity of import of rubber increased from 26217 tonnes in 2002 to 458374 tonnes in 2015 *i.e.,* a growth rate of 1648.38% and an average growth rate of 126.79%. The production of rubber decreased and the import quantity of rubber increased. This may be due to the decrease in the production of rubber.

After the India – Sri Lanka agreement, the quantity of export and import of pepper has showed a slight upward change. In the case of coconut which showed a gradual increase in the quantity of export and import during 2002-2015 period. The quantity of export of rubber showed a negative trend and in the import of quantity of rubber showed an increasing trend. India though one of the leading producers of coconut and pepper in the world, we could not increase the quantity of export on large scale over these years. In the case of rubber we could not increase the export in 2015 from 2002 period. In the case of pepper, coconut and rubber import increased considerably.

5.6.4 INDIA–NEPAL FREE TRADE AGREEMENT

Table 5.7
India–Nepal Free Trade Agreement

YEAR	EXPORT(quantity in tonnes)			IMPORT(quantity in tonnes)		
	pepper	Coconut	Rubber	Pepper	coconut	Rubber
2002	21609	12111	55311	15392	56597.1	26217
2003	16635	6495.19	75905	14334	84347.6	44199
2004	14148	10233.6	46150	17733	65896.2	72835
2005	17363	5649.64	73830	16870	98419.4	45285
2006	28726	3742.03	56545	15701	18352.5	89699
2007	35000	7035.04	60353	13500	38967.8	86394
2008	25250	23509.1	46926	10750	37363.8	77762
2009	19750	28424.1	25090	18100	84399.6	176756
2010	18850	21181	29851	16100	36570.9	188337
2011	26700	45038.9	27145	17565	42680.1	214433
2012	15363	24529.5	30594	15600	38928.4	217364
2013	21250	19061.5	5398	15680	27443.4	388664
2014	21450	15414.4	1002	21300	126752	442130
2015	28100	15299.2	865	19365	139255	458374

Source: Pepper - (DGCI&SKOLKATA/EXPORTERS RETURNS/DLE/DLI FROM CUSTOMS)

Coconut- (1990-2007) Coconut Development Board, Ministry of Agriculture Department of Agricultural And Co-Operation, Govt. of India,, Kerala Bhavan, Kochi.(2008-2015) DGCI&SKOLKATA)

Rubber - (http://www.indiastat.com)2016

Table 5.7 shows that the quantity of export and import of pepper, coconut and rubber from the year 2002-2015, after India signed the free trade agreement with Nepal. The quantity of export of pepper increased from 21609 tonnes in 2002 to 28100 tonnes in 2015 which showed a growth rate of 30.03% and an average growth rate of 2.31%. Though production of pepper decreased in India since The India- Nepal agreement, India was able to increase the export quantity of pepper. This must be due to the influence of free trade agreement.

In the case of coconut, the quantity of export showed a slight increase from 12111 tonnes in 2002 to 15299.2 tonnes in 2015 *i.e.,* a growth rate of 26.32% and an average growth rate of 2.02%. The production of coconut increased and export quantity of coconut also increased. This may be due to the increase in the production of coconut.

The quantity of export of rubber showed a declining trend from 55311 tonnes in 2002 to 865 tonnes in 2015 *i.e.,* a negative growth rate of 98.43% and a negative average growth rate of 7.57%. The production of rubber decreased in India since The India- Nepal agreement, the export quantity of rubber also decreased. This may be due to the decrease in the production of rubber.

In the case of import, the quantity of pepper showed an increasing trend *i.e.,* 15392 tonnes in 2002 to 19365 tonnes in 2015 which showed a growth rate of 25.81% and an average growth rate of 1.98%. The production of pepper decreased and import quantity of pepper increased. This may be due to the decrease in the production of pepper.

The quantity of import of coconut increased from 56597.13 tonnes in 2002 to 139254.5 tonnes in 2015 *i.e.,* a growth rate of 146.04% and an average growth rate of 11.23%. Though production of coconut increased in India since The India-Nepal agreement, India was not able to decrease the import quantity of coconut. This must be due to the influence of free trade agreement.

The quantity of import of rubber increased from 26217 tonnes in 2002 to 458374 tonnes in 2015 *i.e.,* growth rate of 1648.38% and an average growth rate of 126.79%.The production of rubber decreased and the import quantity of rubber increased. This may be due to the decrease in the production of rubber.

After the India - Nepal agreement the quantity of export and import of pepper showed a gradual increase in the trend from the year 2002 to 2015. When we compare the quantity of export and the quantity of import of coconut over these years, though both export and import were increasing the quantity of import of coconut was much higher than the quantity of export except in 2011. In the case of rubber the quantity of export showed a declining trend and the quantity of import showed an increasing trend.

5.6.5 INDIA – THAILAND FREE TRADE AGREEMENT

Table 5.8
India – Thailand Free Trade Agreement

YEAR	EXPORT(quantity in tonnes)			IMPORT(quantity in tonnes)		
	pepper	Coconut	rubber	Pepper	coconut	rubber
2004	14148	10233.6	46150	17733	65896.2	72835
2005	17363	5649.64	73830	16870	98419.4	45285
2006	28726	3742.03	56545	15701	18352.5	89699
2007	35000	7035.04	60353	13500	38967.8	86394
2008	25250	23509.1	46926	10750	37363.8	77762
2009	19750	28424.1	25090	18100	84399.6	176756
2010	18850	21181	29851	16100	36570.9	188337
2011	26700	45038.9	27145	17565	42680.1	214433
2012	15363	24529.5	30594	15600	38928.4	217364
2013	21250	19061.5	5398	15680	27443.4	388664
2014	21450	15414.4	1002	21300	126752	442130
2015	28100	15299.2	865	19365	139255	458374

Source: Pepper - (DGCI&SKOLKATA/EXPORTERS RETURNS/DLE/DLI FROM CUSTOMS)

Coconut- (1990-2007) Coconut Development Board, Ministry of Agriculture Department of Agricultural And Co-Operation, Govt. of India,, Kerala Bhavan, Kochi.(2008-2015) DGCI&SKOLKATA)

Rubber - (http://www.indiastat.com)2016

Table 5.8 shows that the quantity of export and import of pepper, coconut and rubber from the year 2004 to 2015 since India – Thailand free trade agreement. The quantity of export of pepper increased from 14148 tonnes in 2004 to 28100 tonnes in 2015 *i.e.,* a growth rate of 98.61% and an average growth rate of 8.96%. Though production of pepper decreased in India since The India-Thailand agreement, India was able to increase the export quantity of pepper. This must be due to the influence of free trade agreement.

In the case of coconut, the quantity of export showed an increasing trend from 10233.55 tonnes in 2004 to 15299.18 tonnes in 2015 *i.e.,* a growth rate of 49.50% and an average growth rate of 4.50%. The production of coconut increased and export quantity of coconut also increased. This may be due to the increase in the production of coconut.

The quantity of export of rubber decreased from 46150 tonnes in 2004 to 865 tonnes in 2015 *i.e.,* a negative growth rate of 98.12% and an negative average growth rate of 8.92%. The production of rubber decreased in India since The India-Thailand agreement, India was not able to increase the export quantity of rubber. This may be due to the decrease in the production of rubber.

The quantity of import of pepper increased from 17733 tonnes in 2004 to 19365 tonnes in 2015 *i.e.,* a growth rate of 9.20% and an average growth rate of 0.83%. The production of pepper decreased and import quantity of pepper increased. This may be due to the decrease in the production of pepper.

The quantity of import of coconut increased from 65896.17 tonnes in 2004 to 139255 tonnes in 2015 *i.e.,* a growth rate of 111.32% and an average growth rate of 10.12%. Though production of coconut increased in India since The India- Thailand agreement, India was not able to

decrease the import quantity of coconut. This must be due to the influence of free trade agreement.

The quantity of import of rubber increased from 72835 tonnes in 2004 to 458374 tonnes in 2015 *i.e.,* a growth rate of 529.33% and an average growth rate of 48.12%. The production of rubber decreased in India since The India-Thailand agreement, and the import quantity of rubber increased. This may be due to the decrease in the production of rubber.

After the agreement between India and Thailand the quantity of export and import of pepper showed a gradual increase. In the case of coconut which showed an increase in the quantity of export and import. The quantity of export of rubber has decreased and the quantity of import of rubber has increased. It may be because Thailand is the world's largest producer of rubber.

5.6.6 INDIA & SOUTH ASIAN FREE TRADE AGREEMENT (SAFTA)

Table 5.9 shows that the quantity of export and import of pepper, coconut and rubber from 2006 to 2015 after SAFTA. India along with Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka signed the South Asian Free Trade Agreement (SAFTA) in 2006.The quantity of export of pepper showed a decreasing trend from 28726 tonnes in 2006 to 28100 tonnes in 2015 *i.e.,* a negative growth rate of 2.17% and an negative average growth rate of 0.24%. Though production of pepper increased, India was not able to increase the export quantity of pepper. This must be due to the influence of free trade agreement.

The quantity of export of coconut increased from 3742.03 tonnes in 2006 to 15299.2 tonnes in 2015 showed a growth rate of 308.84% and an average growth rate of 34.31%. The production of coconut decreased

and the export quantity of coconut increased. This must be due to the influence of free trade agreement.

Table 5.9

India & South Asian Free Trade Agreement (SAFTA)

YEAR	EXPORT(quantity in tonnes)			IMPORT(quantity in tonnes)		
	pepper	Coconut	rubber	Pepper	coconut	Rubber
2006	28726	3742.03	56545	15701	18352.5	89699
2007	35000	7035.04	60353	13500	38967.8	86394
2008	25250	23509.1	46926	10750	37363.8	77762
2009	19750	28424.1	25090	18100	84399.6	176756
2010	18850	21181	29851	16100	36570.9	188337
2011	26700	45038.9	27145	17565	42680.1	214433
2012	15363	24529.5	30594	15600	38928.4	217364
2013	21250	19061.5	5398	15680	27443.4	388664
2014	21450	15414.4	1002	21300	126752	442130
2015	28100	15299.2	865	19365	139255	458374

Source: Pepper - (DGCI&SKOLKATA/EXPORTERS RETURNS/DLE/DLI FROM CUSTOMS)

Coconut- (1990-2007) Coconut Development Board, Ministry of Agriculture Department of Agricultural And Co-Operation, Govt. of India,, Kerala Bhavan, Kochi.(2008-2015) DGCI&SKOLKATA)

Rubber - (http://www.indiastat.com)2016

In the case of rubber, the quantity of export was 56545 tonnes in 2006 and decreased to 865 tonnes in 2015 *i.e.,* a negative growth rate of 98.47% and a negative average growth rate of 10.94%. The production of rubber decreased and export quantity of rubber also decreased. This may be due to the decrease in the production of rubber.

The quantity of import of pepper showed an increasing trend from 15701 tonnes in 2006 to 19365 tonnes in 2015 which showed a growth rate of 23.33% and an average growth rate of 2.59%. Though production of pepper increased, India was not able to decrease the import quantity of pepper. This must be due to the influence of free trade agreement.

In the case of coconut the quantity of import from 2006 to 2015 showed an increasing trend *i.e.,* 18352.5 tonnes to 139255 tonnes with a growth rate of 658.77% and an average growth rate of 73.19%. The production of coconut decreased in India since The India - SAFTA agreement and the import quantity of coconut also decreased. This may be due to the decrease in the production of coconut.

The quantity of import of rubber showed an increasing trend from 89699 tonnes in 2006 to 458374 tonnes in 2015 which showed a growth rate of 411.01% and an average growth rate of 45.66%. The production of rubber decreased and import quantity of rubber increased. This may be due to the decrease in the production of rubber.

India's agreement with SAFTA showed a decrease in the quantity of export and increase in the quantity of import of pepper. It showed an increasing trend in the quantity of export and import of coconut. The quantity of export of rubber showed a declining trend and the import of rubber showed an increasing trend.

5.6.7 INDIA - SOUTH KOREA FREE TRADE AGREEMENT

Table 5.10 shows that the quantity of export and import of pepper, coconut and rubber from the year 2010 to 2015 after the free trade agreement between India and South Korea. The quantity of export of pepper increased from 18850 tonnes in 2010 to 28100 tonnes in 2015 which showed a growth rate of 49.07% and an average growth rate of 9.81%.The production of pepper increased in India since The India- South

Korea agreement, India was able to increase the export quantity of pepper. This may be due to an increase in the production of pepper.

Table 5.10

India - South Korea Free Trade Agreement

YEAR	EXPORT(quantity in tonnes)			IMPORT(quantity in tonnes)		
	pepper	Coconut	rubber	Pepper	coconut	Rubber
2010	18850	21181	29851	16100	36570.9	188337
2011	26700	45038.9	27145	17565	42680.1	214433
2012	15363	24529.5	30594	15600	38928.4	217364
2013	21250	19061.5	5398	15680	27443.4	388664
2014	21450	15414.4	1002	21300	126752	442130
2015	28100	15299.2	865	19365	139255	458374

Source: Pepper - (DGCI&SKOLKATA/EXPORTERS RETURNS/DLE/DLI FROM CUSTOMS)

Coconut- (1990-2007) Coconut Development Board, Ministry of Agriculture Department of Agricultural And Co-Operation, Govt. of India,, Kerala Bhavan, Kochi.(2008-2015) DGCI&SKOLKATA)

Rubber - (http://www.indiastat.com)2016

The quantity of export of coconut decreased from 21181 tonnes in 2010 to 15299.2 tonnes in 2015 *i.e.,* a negative growth rate of 27.76% and a negative average growth rate of 5.55%. Though production of coconut increased in India since The India - South Korea agreement, India was not able to increase the export quantity of coconut. This must be due to the influence of free trade agreement.

In the case of rubber, the quantity of export showed a declining trend from 29851 tonnes in 2010 to 865 tonnes in 2015 *i.e.,* a negative growth rate of 97.10% and a negative average growth rate of 19.42%. The production of rubber decreased and export quantity of rubber also decreased. This may be due to the decrease in the production of rubber.

The import of quantity of pepper increased from 16100 tonnes to 19365 tonnes in 2015 which showed a growth rate of 20.27% and an average growth rate of 4.05%. Though production of pepper increased, India was not able to decrease the import quantity of pepper. This must be due to the influence of free trade agreement.

The quantity of import of coconut increased from 36570.9 tonnes in 2010 to 139255 tonnes in 2015 *i.e.,* a growth rate of 280.77% and an average growth rate of 56.15%. Though production of coconut increased in India since The India - South Korea agreement, India was not able to decrease the import quantity of coconut. This must be due to the influence of free trade agreement.

In the case of rubber the quantity of import showed an increasing trend from 188337 tonnes in 2010 to 458374 tonnes in 2015 *i.e.,* a growth rate of 143.37 % and an average growth rate of 28.67%. The production of rubber decreased and import quantity of rubber increased. This may be due to the decrease in the production of rubber.

The India – South Korea agreement made some influence in the quantity of export and import of crops like pepper, coconut and rubber. In the case of pepper, the quantity of export and import showed an increasing trend. The quantity of export declined but quantity of import of coconut increased these years. After this agreement, the quantity of export of rubber showed a decreasing trend, at the same time the quantity of import of rubber increased rapidly.

5.6.8 INDIA and ASEAN

The quantity of export and import of crops like pepper, coconut, and rubber, after the free trade agreement between ASEAN and India in 2010 is shown in table 5.11. The quantity of export of pepper increased from 18850 tonnes in 2010 to 28100 tonnes in 2015 *i.e.,* a growth rate of

49.07% and an average growth rate of 9.81%. The production of pepper increased in India since The India-ASEAN agreement, India was able to increase the export quantity of pepper. This may be due to an increase in the production of pepper.

Table 5.11

India and ASEAN Free Trade Agreement

YEAR	EXPORT(quantity in tonnes)			IMPORT(quantity in tonnes)		
	pepper	Coconut	rubber	Pepper	coconut	Rubber
2010	18850	21181	29851	16100	36570.9	188337
2011	26700	45038.9	27145	17565	42680.1	214433
2012	15363	24529.5	30594	15600	38928.4	217364
2013	21250	19061.5	5398	15680	27443.4	388664
2014	21450	15414.4	1002	21300	126752	442130
2015	28100	15299.2	865	19365	139255	458374

Source: Pepper - (DGCI&SKOLKATA/EXPORTERS RETURNS/DLE/DLI FROM CUSTOMS)

Coconut- (1990-2007) Coconut Development Board, Ministry of Agriculture Department of Agricultural And Co-Operation, Govt. of India,, Kerala Bhavan, Kochi.(2008-2015) DGCI&SKOLKATA)

Rubber - (http://www.indiastat.com)2016

In the case of coconut, the quantity of export decreased from 21181 tonnes in 2010 to 15299.2 tonnes in 2015 which showed a negative growth rate of 27.76% and a negative average growth rate of 5.55%. Though production of coconut increased in India since The India - ASEAN agreement, India was not able to increase the export quantity of coconut. This must be due to the influence of free trade agreement.

The quantity of export of rubber showed a declining trend from 29851 tonnes in 2010 to 865 tonnes in 2015 *i.e.,* a negative growth rate of 97.10% and a negative average growth rate of 19.42%. The production of

rubber decreased and export quantity of rubber also decreased. This may be due to the decrease in the production of rubber.

The quantity of import of pepper increased from 16100 tonnes in 2010 to 19365 tonnes in 2015 *i.e.,* a growth rate of 20.27% and an average growth rate of 4.05%. Though production of pepper increased, India was not able to decrease the import quantity of pepper. This must be due to the influence of free trade agreement.

The quantity of import of coconut increased from 36570.9 tonnes in 2010 to 139255 tonnes in 2015 *i.e.,* a growth rate of 280.77% and an average growth rate of 56.15%. Though production of coconut increased in India since The India - ASEAN agreement, India was not able to decrease the import quantity of coconut. This must be due to the influence of free trade agreement.

In the case of rubber the quantity of import showed an increasing trend from 188337 tonnes in 2010 to 458374 tonnes in 2015 *i.e.,* a growth rate of 143.37% and an average growth rate of 28.67%. The production of rubber decreased and import quantity of rubber increased. This may be due to the decrease in the production of rubber.

The quantity of export and import of pepper showed an increasing trend over these years. The quantity of export of coconut declined during this period. The quantity of import of rubber showed a huge increase in these years but in the case of export it declined.

5.6.9 INDIA- JAPAN FREE TRADE AGREEMENT

Table 5.12 shows quantity of export and import of crops like pepper, coconut, and rubber after the trade agreement between India and Japan in 2011. The quantity of export of pepper increased from 26700 tonnes in 2011 to 28100 tonnes in 2015 *i.e.,* a growth rate of 5.24% and an average growth rate of 1.31%. The production of pepper increased

and export quantity of pepper also increased. This may be due to the increase in the production of pepper.

Table 5.12

India- Japan Free Trade Agreement

YEAR	EXPORT(quantity in tonnes)			IMPORT(quantity in tonnes)		
	pepper	Coconut	rubber	Pepper	coconut	rubber
2011	26700	45038.9	27145	17565	42680.1	214433
2012	15363	24529.5	30594	15600	38928.4	217364
2013	21250	19061.5	5398	15680	27443.4	388664
2014	21450	15414.4	1002	21300	126752	442130
2015	28100	15299.2	865	19365	139255	458374

Source: Pepper - (DGCI&SKOLKATA/EXPORTERS RETURNS/DLE/DLI FROM CUSTOMS)

Coconut- (1990-2007) Coconut Development Board, Ministry of Agriculture Department of Agricultural And Co-Operation, Govt. of India,, Kerala Bhavan, Kochi.(2008-2015) DGCI&SKOLKATA)

Rubber - (http://www.indiastat.com)2016

In the case of coconut, the quantity of export showed a decreasing trend from 2011 to 2015 *i.e.,* from 45038.88 tonnes to 15299.18 tonnes and which showed a negative growth rate of 66.03% and a negative average growth rate of 16.50%. The production of coconut decreased in India since The India – Japan agreement and the export quantity of coconut also decreased. This may be due to the decrease in the production of coconut.

The quantity of export of rubber decreased from 27145 tonnes in 2011 to 865 tonnes in 2015 which showed a negative growth rate of 96.81% and a negative average growth rate of 24.20%. The production of rubber decreased and export quantity of rubber also decreased. This may be due to the decrease in the production of rubber.

In the case of import, the quantity of pepper increased from 17565 tonnes in 2011 to 19365 tonnes in 2015 which showed a growth rate of 10.24% and an average growth rate of 2.56%. Though production of pepper increased in India since The India – Japan agreement, India was not able to decrease the import quantity of pepper. This must be due to the influence of free trade agreement.

The quantity of import of coconut showed an increasing trend from 2011 to 2015 *i.e.,* 42680.1 tonnes to 139255 tonnes which showed a growth rate of 226.27% and an average growth rate of 56.56%. The production of coconut decreased in India since The India - Japan agreement, the import quantity of coconut also decreased. This must be due to the influence of free trade agreement.

From 2011 to 2015, the quantity of import of rubber showed an upward trend *i.e.,* 214433 tonnes to 458374 tonnes which showed a growth rate of 113.76 % and an average growth rate of 28.44%. The production of rubber decreased and import quantity of rubber increased. This may be due to the decrease in the production of rubber.

By the influence of India-Japan agreement, quantity of export of pepper increased and export of other two crops showed a downturn trend. In the case of quantity of import of these crops it showed a huge rise in these years.

5.6.10 INDIA – MALAYSIA FREE TRADE AGREEMENT

Table 5.13 shows that the quantity of export and import of crops like pepper, coconut, and rubber, after the free trade agreement between India and Malaysia in 2011. The quantity of export of pepper showed an increasing trend from 26700 tonnes in 2011 to 28100 tonnes in 2015 which showed a growth rate of 5.24% and an average growth rate of 1.31%. The production of pepper increased and the export quantity of

pepper also increased. This may be due to an increase in the production of pepper.

Table 5.13

India – Malaysia Free Trade Agreement

YEAR	EXPORT(quantity in tonnes)			IMPORT(quantity in tonnes)		
	pepper	coconut	rubber	Pepper	coconut	rubber
2011	26700	45038.9	27145	17565	42680.1	214433
2012	15363	24529.5	30594	15600	38928.4	217364
2013	21250	19061.5	5398	15680	27443.4	388664
2014	21450	15414.4	1002	21300	126752	442130
2015	28100	15299.2	865	19365	139255	458374

Source: Pepper - (DGCI&SKOLKATA/EXPORTERS RETURNS/DLE/DLI FROM CUSTOMS)

Coconut- (1990-2007) Coconut Development Board, Ministry of Agriculture Department of Agricultural And Co-Operation, Govt. of India,, Kerala Bhavan, Kochi.(2008-2015) DGCI&SKOLKATA)

Rubber - (http://www.indiastat.com)2016

In the case of coconut, the quantity of export showed a decreasing trend from 2011 to 2015 *i.e.,* from 45038.88 tonnes to 15299.18 tonnes and showed a negative growth rate of 66.03% and a negative average growth rate of 16.50%. The production of coconut decreased in India since The India – Malaysia agreement and the export quantity of coconut also decreased. This may be due to the decrease in the production of coconut.

The quantity of export of rubber decreased from 27145 tonnes in 2011 to 865 tonnes in 2015 which showed a negative growth rate of 96.81% and a negative average growth rate of 24.20%. The production of rubber decreased and export quantity of rubber also decreased. This may be due to the decrease in the production of rubber.

In the case of import, the quantity of pepper increased from 17565 tonnes in 2011 to 19365 tonnes in 2015 which showed a growth rate of 10.24% and an average growth rate of 2.56%. Though production of pepper increased in India since The India – Malaysia agreement, India was not able to decrease the import quantity of pepper. This must be due to the influence of free trade agreement.

The quantity of import of coconut showed an increasing trend from 2011 to 2015 *i.e.,* 42680.1 tonnes to 139255 tonnes which showed a growth rate of 226.27% and an average growth rate of 56.56%. The production of coconut decreased in India since The India - Malaysia agreement, the import quantity of coconut also decreased. This must be due to the influence of free trade agreement.

From 2011 to 2015, the quantity of import of rubber showed a rising trend *i.e.,* 214433 tonnes to 458374 tonnes which showed a growth rate of 113.76% and an average growth rate of 28.44%. The production of rubber decreased and import quantity of rubber increased. This may be due to the decrease in the production of rubber.

After the India –Malaysia agreement, the quantity of export of pepper increased but in the case of coconut and rubber the quantity of export declined. In the case of import, the pepper, coconut, and rubber showed an increasing trend.

5.6.11 AVERAGE ANNUAL GROWTH RATES OF EXPORT AND IMPORT OF 3 CROPS AFTER DIFFERENT FREE TRADE AGREEMENTS

Table 5.14 shows average annual growth rates of export and import of pepper, coconut & rubber after ten free trade agreements. We have considered the period from 1990 onwards, as this was the period from when new economic policies began to be followed more intensively.

For each trade agreement, the average annual growth was calculated from the year of Agreement to 2015, the period of our study. This method has a limitation that for each Agreement that we study, the growth rates will depict the combined influence of the same as well as the earlier signed Agreements. Another point to be kept in mind is that here we are looking at the export-import value of only India with the rest of the world. This time series might not reflect the changes that might have occurred due to the trade diversion impact of the various FTAs that other nations have with each other.

Table 5. 14
Average annual growth rates of Export and Import of Pepper, Coconut & Rubber after different free trade agreements between 1990 & 2015

Trade Agreements	Pepper		Coconut		Rubber	
	Average annual export growth rate	Average annual import growth rate	Average annual export growth rate	Average annual import growth rate	Average annual export growth rate	Average annual import growth rate
India - Bhutan	0.25%	48.05%	15687.47%	176.26%	-3.54%	33.41%
India - Singapore	0.78%	45.59%	587.66%	976.93%	-3.71%	107.08%
India – Sri Lanka	2.31%	1.98%	2.02%	11.23%	-7.57%	126.79%
India - Nepal	2.31%	1.98%	2.02%	11.23%	-7.57%	126.79%
India - Thailand	8.16%	0.83%	4.50%	10.12%	8.92%	48.12%
India – SAFTA	-0.24%	2.59%	34.31%	73.19%	-98.47%	45.66%
India - South Korea	9.81%	4.05%	-5.55%	56.15%	-19.42%	28.67%
India – ASEAN	9.81%	4.05%	-5.55%	56.15%	-19.42%	28.67%
India – Japan	1.31%	2.56%	-16.50%	56.56%	-24.20%	28.44%
India – Malaysia	1.31%	2.56%	-16.50%	56.56%	-24.20%	28.44%

Source: Pepper Production - Spices Board, India; Export and Import (DGCI&SKOLKATA)

Coconut Export and Import (1990-2007) - Coconut Development Board & 2008-2015- DGCI&SKOLKATA

Rubber Export and Import -www.indiastat.com

Generally, one would expect a nation's exports to increase in the years when the production has increased and imports to increase during the years when the production has been low. However, sometimes, the trends observed under the influence of Free Trade Agreements have been quite the reverse with years of high production witnessing fall in exports and increase in imports. There are multiple factors influencing these trends simultaneously which make it difficult to isolate the more important factors from the less influential ones. This has been a limitation of our exercise as well.

When we go through the average annual growth rates of export and import of pepper, we can see that India was able to achieve highest average annual growth rate of export of pepper after India- South Korea and India – ASEAN free trade agreement *i.e.,* 9.81% which was signed in 2010. This may be due to the fact that India in those years had experienced increase in production levels of pepper. The lowest annual average growth rate was noticed after India – SAFTA agreement *i.e.,* -0.24%; signed in 2006. Though the production levels were in an increasing trend, India was unable to improve her export performance, probably due to the influence of the FTA.

In the case of imports, highest average annual growth rate was achieved after India – Bhutan agreement *i.e.,* 48.05%. Although production of pepper had increased in India, she failed to decrease the import quantity. The lowest average annual growth rate of imports was achieved after India – Thailand agreement signed in 2004 *i.e.,* 0.83%.

While analysing average annual growth rates of export and import of coconut, we can see a tremendous increase in exports after India-Bhutan agreement. The large annual growth recorded is partly explained by the statistical fact that the base year export value was very small. Besides the base effect, the increase in production levels of coconut also

led to promotion of exports. On the other hand, slowest average annual growth rate in export is witnessed after India – Japan and India – Malaysia agreements. During this period, the production levels decreased leading to fall in exports.

In the case of imports, highest annual average growth rate was noticed after India – Singapore agreement signed in 1992. The lowest annual average growth rate was noticed after India – Thailand agreement of 2004. This increase in imports was once again in spite of an increase in domestic production levels.

In the case of rubber, the exports have been negative after all the ten agreements. The lowest decrease in exports was after India-Thailand agreement *i.e.,* -8.92%. The largest fall in export rate was after India–SAFTA agreement *i.e.,* -98.47%. The fall in exports has been observed after decrease in production of rubber. The main factor behind this trend could be competition from cheaper and more efficient producers who were members of the various free trade agreements.

Highest average annual growth rate of import of rubber *i.e.,* 126.79% was observed after India – Sri Lanka and India – Nepal agreement and lowest average annual growth rate was noticed after India – Japan and India – Malaysia agreement. During these years, production has decreased, leading to increase in imports.

When we analyse ten trade agreements as a whole, growth in exports lagged behind growth in imports in all three crops. In the case of pepper, coconut and rubber the average annual growth rate of exports was negative after one, four and ten agreements respectively.

On analysing the performance of India in terms of growth of exports and imports of three crops- pepper, coconut and rubber, we can arrive at certain conclusions. Firstly, overall trade has increased, as has

been the objective of the WTO as well as the other free trade agreements. Secondly, while both imports and exports have increased in the case of pepper and coconut, the growth rate of imports has been higher than that of exports. In the case of rubber, neither WTO nor other FTAs could help India as her rubber exports have shown a consistent decline while imports have risen at a fast pace.

Chapter VI

FINDINGS, SUMMARY AND POLICY IMPLICATIONS OF THE STUDY

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FINDINGS, SUMMARY AND POLICY IMPLICATIONS OF THE STUDY

6.1 Introduction

India was a member of the General Agreement on Tariff and Trade (GATT) since its inception in 1945. In 1995, when GATT was replaced by the World Trade Organisation (WTO), India was among the 123 countries who signed it. Under the aegis of the WTO and its terms and conditions, significant changes have come out. The agricultural sector has also seen many changes that can be directly linked to the new policies of liberalisation introduced as a consequence of WTO.

The impact of opening up the domestic economy to the international markets has seen in the change in the cropping pattern. In India, cropping patterns has been affected in two ways. One is the shift from one crop to another, such as –food grains to cash crops; the other is shift of land from agricultural to non-agricultural activities. In this study, we look at the cropping pattern and its changes in the state of Kerala, with the following objectives.

1. To examine the trends in area, production and yield of major crops in Kerala since 1980.

2. To identify the determinants of shifts in cropping pattern.

3. To analyse the implication of WTO policies on major crops in Kerala.

4. To identify constrains experienced by farmers as a consequence of liberalisation and trade reforms.

We examined the trends in the shift of cropping pattern in Kerala for the period of the study 1980-2015 and the factors that have caused the shift. We also attempted to identify the determinants of the shift as well as whether and how these were affected by the WTO agreement. By means of a primary survey, we also enquired into the experience of the farmers as well the constraints faced by them. While studying the trends we concentrated on five major crops, - rice, tapioca, rubber, pepper and coconut.

Besides the use of secondary data from various sources such as Ministry of Statistics and Programme Implementation (MoSPI), Planning Commission, International Monetary Fund, World Trade Organisation, Directorate of Economics and Statistics (DoES), Ministry of Agriculture and others, a primary survey was also conducted.

The districts were chosen so as to represent low-land, mid-land and high-land areas. From each district, one block was chosen at random to represent each type of eco-zone. Thus Vypin block from Ernakulam district was chosen as the lowland area, Puzhakkal block from Thrissur district represents the mid-land and Lalam block from Kottayam which lies in the high land area. From each block farmers with more than 40 cents of land were identified and 100 such farmers were selected from each block on a random basis.

Data were collected from the sample with the aid of a pre-tested schedule via the interview method. The data were collected regarding the cultivation of selected five major crops. The data collected were used to identify the important determinants of the cropping trends and estimate

the extent of influence of each determinant on different crops by means of a multiple regression model.

On the basis of the primary survey, it was observed that while the farmer respondents did face fluctuating prices, receive subsidies *etc.*, they were unaware about how these could be the consequences related to the WTO agreement or other Free Trade Agreements (FTA) or other government policies. Hence, to study the implication of the WTO, the export and import trends of three crops *i.e.* coconut, rubber and pepper were also studied. Here rice and tapioca were ignored as they did not show up as important items in international trade. We also took a look at ten important FTAs to which India became party to and attempt to analyse their impact on the India's trends of production, productivity and trade.

The following are the important findings of the present study.

6.1 National and State level trends

- In terms of land resource India owns 2.3% of the total area of the world, whereas India's share of arable land in the World stands at 11.3%. Thus India ranks seventh in terms of geographical land area (after Brazil) but second in terms of arable land (after USA).
- India produces 10.6% of total world cereal production and stands at the third position (after China and USA) in the world economy.
- India accounts for 11.5% of the total wheat production in the world and ranks second (after China) in the World.
- In the case of rice production, India produces 21.6% of the total production of rice and ranks second (after China) in the World.
- India stands first in the case of pulses production accounting for 24.6% of the total world pulses production.

- The share of agriculture in India's GDP has been falling- from 43.60% in 1960-61 to 17% in 2013-14.
- It provided employment to 48.9% of the population in 2011.
- Total cropped area has increased between 1990-91 and 2010-11 by 6.36%.
- Since 1991, the area under food crops has remained stagnant with marginal variations due to two reasons. First is the conversion of agricultural land to non agricultural activities due to the increase in the commercial value of land. Second is shift in the favour of non-food crops due to greater profitability.
- Area, under major food crops –rice and wheat have increased over the years but area under inferior cereals like *jowar*, *bajra* and *ragi* has fallen.
- Production of rice and wheat has increased especially after the impact of the green revolution. While *jowar* experienced a fall in production levels, maize and *ragi* showed a small increase.
- Since 1991, the production levels increased sharply due two reasons. First is the increase in productivity and the other being the shift in favour of relatively more profitable food crops, namely, rice and wheat.
- Productivity of all crops- superior and inferior cereals have increased over time. One of the reasons is the use of HYV seeds and Research and Development activities in the field of food crop cultivation.
- Share of agriculture in Kerala's GSDP fell from 55% in 1960-61 to 11.36% in 2014-15.
- Net area sown has increased from 1923731 hectares in 1960-61 to 2023073 hectares in 2015-16
- In Kerala, area under cultivation of total food crops has reduced rice- from 1565.154 ('000 hectares) to 982.301('000 hectares) in 2015-16.

- In the case of rice, both area under cultivation and level of production has shown a fall while productivity has increased over the period of the study 1980-2015.
- All districts show a fall in area under rice cultivation as well as production since 1980.
- In the case of pepper, area under cultivation has shown a fall whereas both production levels and productivity has increased.
- All districts except Idukki and Palakkad show a fall in area under pepper cultivation and all except Idukki show a fall in production levels of pepper.
- Area under cultivation has reduced but production and productivity levels have increased in the case of coconut.
- Four districts- Palakkad, Kozhikode, Wayanad and Kasargode are the only districts were area of cultivation under coconut has risen. Rest have seen a fall.
- Three districts- Alapuzha, Kottayam and Ernakulum show a fall in production of coconut while rest have experienced an increase.
- In the case of rubber, area under cultivation and production levels has exhibited an increase. Productivity levels depict an increasing trend till 2007 after which it has shown a fall, this could be due to fall in prices after the global recession leading to farmers not harvesting the latex.
- Only one district- Kollam experienced a fall in area under rubber cultivation while all districts experienced increase in production.
- In the case of tapioca- area under cultivation has fallen by one-third, production levels have fallen by more than 50% and productivity too has fallen.
- All districts have seen a fall in area under tapioca cultivation. But only Wayanad saw a fall in production.

6.2 Changes in area, production and yield of selected crops- A micro level analysis

- 53% of the total respondents surveyed belonged to 2-3 member families.
- Majority of the respondents were Christians (67.7%) followed by Hindus (32.3%). There were no Muslims who owned greater than 40 cents and practiced agriculture in any of the blocks that were surveyed.
- Majority of the farmers (72.3%) belonged to the general category whereas the rest belonged to the OBC category.
- Majority of the farmers (40%) surveyed reported secondary level of education as the highest education level attained. Only 0.7% of the respondents were illiterate.
- Majority of the respondents (66.7%) across the blocks practiced farming as their sole occupation. The rest (33.3%) reported holding additional occupational positions.
- Of the total, 65% of the farmers reported cultivation of coconut. Pepper was grown by 17.7% of the respondents. Rice was cultivated by 49% of the farmers. Rubber was cultivated by 32% of the sample. In many instances, farmers engaged in multiple cropping.
- In Lalam block, all 100 farmers surveyed were engaged in agriculture from 1990 itself.
- The largest number of new entrants into agriculture *i.e.,* since 1995, was reported in Vypin block. Across all blocks, 20.6% of the total reported themselves as new to agriculture.
- The examination of the data from the primary survey shows that only a couple of farmers in the case of coconut and one farmer in the case of rice, who were cultivating since before 1990 adopted more intensive cultivation after 1995.

- Among the farmers who had been cultivating from since 1990, who reported adopting more intensive cultivation since 1995, majority (30.33%) were rubber cultivators.
- Of the various reasons given profitability was reported as the most important factor that determined the decisions regarding area under cultivation and production.
- The main reason behind increasing productivity was reported as advancement of technology of machines.
- Productivity increase was reported by mainly rice farmers among the large farmers and coconut farmers among small farmers.

Farmers who reported beginning intensive cultivation since 1995 were posed questions regarding cultivation pattern and influencing factors in more detail.

- Farmers had the highest demand for fertilizer subsidies (36.3% of total farmers) followed seed subsidy (24.7% of total respondents).
- 35.66% of the farmer respondents prefer cash only subsidy to while none spoke in favour of subsidy paid in kind only.
- Although not preferred, 41% of the farmers reported receiving fertilizer subsidy and 19.6% received seed subsidy in kind.
- 64.33% of the farmers received and preferred subsidies paid partly in cash and partly in kind.
- 43.7% of the famers preferred product specific subsidy as it brought in additional income that could be spent as they liked.
- 45.3% of the farmers were rice cultivators who reported increase in production due to receipt of product specific subsidy.
- 36% of the farmers reported increase in production due to receipt in non-product specific subsidy.

- 22.3% of the farmers were rubber cultivators who said that production has increased due to receipt of investment subsidy.
- 53% of the respondents admitted that production can increase due to non-product specific subsidy as it helps the farmers to utilise the right inputs at the right time for the right purpose.
- In the case of rice, 40% of the cultivators reported increase in production due to receipt of direct payment.
- 44.7% cultivators were rice farmers who reported increase in production levels due to receipt of various input services.
- 45% cultivators were rice farmers who reported increase in productivity due to receipt of various input services.
- 23.2 acres of land under cultivation was increased after 1995 due to better infrastructure facilities.
- Very few farmers reported any new problems that they have been facing since 2001.

6.3 Cropping pattern in Kerala – determinants

- 49% of the total farmers were rice cultivators who felt that irrigation had the greatest influence on cultivation decisions.
- 65% of the total farmers were coconut cultivators who felt that the influence of fertilizers was the most prominent on cultivation decisions,
- 32% of the total farmers were rubber cultivators who reported price of the crop as the most important influencing factor.
- Coconut cultivators reported an importance of influence of other crops on cultivation decisions.
- Rice cultivators (43%) felt that availability of credit was an important influence on cultivation related decisions.

- Rice cultivators also reported that cost of cultivation and income levels of the household were important determinants.
- Another important influencing factor reported by the respondents was size of land holding, profitability and subsidy.
- The significant determinants of coconut cultivation are irrigation, price, availability of credit and size of land holding.
- The only significant determinant in the case of pepper is price. This price is affected mostly by international fluctuations in price of pepper rather than the actual cost of cultivation.
- In the case of rubber, all determinants except competing crops were found to be significant.
- Price, credit, cost of cultivation and size of holding were the important determinants of rice cultivation.
- The important constraints identified and reported by the respondents were:

    1) Unpredictability of weather

    2) Import of rubber and palm oil

    3) New varieties of seeds are susceptible to diseases

    4) Problems related to public stock holdings

    5) Salinity of water

    6) Labour shortage

    7) Delay in getting subsidy

    8) Increase in the price of land

    9) Higher wages and labour problems

    10) Poor social status of farmers

6.4 Implications of WTO

The main objective with which the WTO was set up in 1995 was to increase the volume of international trade. Thus they asked for a shift from non-tariff barriers to tariff barriers as these were considered less distortionary. Free trade would lead to the most efficient utilisation of the world resources as it would ensure production as per the cost comparative advantage of the member nations.

The main features of WTO related to the agricultural sector are- reduction of tariff barriers, providing most favoured nation treatment, providing national treatment of goods, providing common institutional framework, improving standard of living, ensuring full employment, increasing effective demand, enlarging production and trade of goods, increasing trade in services, ensuring optimum use of world resources, protecting environment, accepting the concept of sustainable development, conducting trade without discrimination, increasing predictability in growing market access, promoting fair competition, encouraging development, administering trade agreements, forming of forum of trade negotiations, settling trade disputes, reviewing national trade policies, providing technical assistance and training programme, increasing cooperation with international organisations; modernising domestic support, aggregate measurement support, blue box support, green box support, di minimum support, special and differential treatment, export subsidy; increasing transparency in quality improvement, improving the advantages of comparative cost, achieving food security, increasing diversification, reducing price distorting subsidies, harmonising sanitary and phytosanitary measures and imposing anti dumping duties.

As the WTO Agreement of 1995 was not fully successful in achieving its objectives, the fourth Ministerial Conference was held at

Doha in 2001. The objectives of the Doha Declaration was "Clarifying and Improving Disciplines" under the WTO Agreements on Anti-Dumping and on Subsidies and Countervailing Measures.

The main principles of the Doha Declaration were- single undertaking, which asked every member to fully agree and not partially agree to the negotiated points. Second principle of transparency emphasized on fair and clear negotiations. The third principle dealt with Special and Differential treatment which should be provided to developing and least developed countries. Finally, the principle of sustainable development stated that protection of the environment should be kept in mind during the signing of all free trade agreements.

The implications of WTO on export and import of pepper, coconut and rubber are the following:

- In the case of pepper, exports have been fluctuating widely showing an overall fall during the period 1991-2015. However, imports have shown a continuous increase in quantity since 2000-2001.
- The exports of pepper as a percentage of total production ranged from 17 % to 95% over various years.
- In the case of coconut both exports and imports have been increasing since 1999-2000. The pace of growth of imports has been greater than that of exports.
- The exports of coconut as a percentage of total domestic production were next to negligible in 1990-91 but fluctuated up to 2% in 2011-12 and then fell again.
- In the case of rubber imports have increased rapidly especially since 2002-03. Exports, on the other hand, have shown an overall fall.
- The fall in exports of rubber has been especially steep since 2008-09 which could be seen as the impact of the global economic recession,

which led to fall in demand in the global markets and therefore fall in prices.

- On examining exports of rubber as a percentage of total production, the highest level achieved was 10% in 2002-03 and the lowest was 0.04% in 1993-94.
- On analysing ten trade agreements on the whole, we see that on the whole growth in exports of all three crops- rubber, pepper and coconut have lagged behind growth in imports.
- In the case of pepper, coconut and rubber, the average annual growth rate of exports was negative after one, four and ten agreements respectively.

6.5 POLICY IMPLICATIONS

- The study revealed two important issues, firstly there is a clear shift in favour of cash crops and secondly the farmers prefer crops without considering local agro climatic conditions. Thus efforts should be made by the government to identify the appropriate crops for the locality and encourage farmers to cultivate the same. The precision farming concept can do a lot in this context.
- During the course of the study it was felt that expenditure on agriculture research and development is not sufficient. Whatever meager is spent is not reaching the farmers and the technology is not farmer friendly. Hence it is high time to develop farmer friendly and cost efficient technology to make Indian agriculture globally competitive.
- The review of literature disclosed that production subsidy is meager and consumption subsidy is moderate in India. But it is found that in developed countries production subsidy is more. Hence, while formulating national agricultural policy production subsidy may be given emphasis.

- Since Green revolution number of agricultural research institutions spread across the state, these institutions supply competent scientists and agriculture graduates. While reviewing the role of these officers and scientists it is sorry to notice that, they try to maintain a corporate culture in recent years instead of bias towards agriculture and rural economy. Hence it is high time to strengthen the "lap to land" concept.
- The above suggestion can be better practised if the local bodies play a creative role in promoting agriculture. As per the new local governance, agriculture comes under panchayats. The only requirement is grama sabhas should be made aware to make useful and feasible agricultural proposals.
- For agriculture to be effective and competitive, input supply is also to be made very scientific. Agriculture inputs like seeds, fertilizers, irrigation and credit are to be supplied and used at optimum level. This will enhance yield. Thus efforts should be made in this direction. Agriculture offices can do much in achieving this purpose.
- In the days of globalised agriculture, value addition and agro processing play a very important role. But the current rate of value addition and agro processing is minimal in the state. Thus agro processing and value addition should be promoted by various policy measures and also linking agriculture activities with agriculture financing institutions. In this context the role of agri clinics is worth mentioning.
- The road map towards competitive and globalised agriculture depends on framing appropriate policies to incorporate the provisions of WTO and Doha agreement. It is unfortunate that even after a quarter century after reforms; the state agriculture policy is not yet completely

equipped to accommodate the reforms. Policy measures to be strengthened in this direction immediately

- During the survey process, one interesting observation was majority of the farmers in the state are totally unaware about the WTO and Doha provisions and how they influence state agriculture or state agriculture trade. Irrespective of difference of opinions, WTO is a reality. Thus it is appropriate to have farmer level awareness about reforms in the state agriculture.
- Ultimately what is required is a highly professional agriculture, professionalization from all perspectives.

6.6 Areas for future research

- The present study covered mainly five crops. There is scope for more intensive study taking crop wise. A separate study on rubber or coconut is most welcome
- The present study is limited to implications of WTO. A detailed attempt is not made since micro details are not easily available now. But over the years, these details will become access which will provide opportunity for research.
- Attempts can be made to study specific agreements (FTA/RTA) like ASEAN in detail.
- Specific research can be made on exports and imports of agricultural commodities or specific commodity
- There is scope for examining the input supply management system in agriculture, because input supply and efficiency influence cropping pattern, production and yield, indirectly road towards competitive and global agriculture.

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APPENDIX

K.C. FRANCIS, RESEARCH SCHOLAR

JOHN MATTHAI CENTRE, THRISSUR.

Survey Schedule

Dynamics of Cropping Pattern in Kerala: After WTO Agreement

I. HOUSEHOLD DETAILS								
Item no.	Item		Serial No:					
1	Name and address of the head of the household:							
1.1	Size of family of the household (1-Joint family 2- nuclear family)							
2	Name of informant							
3	Sex:							
4	Religion and caste:							
5	Ward		7	House number				
6	Adhar No		8	Ration card no				
9	Phone number							
10	Social group		GENERAL	OBC	SC	ST	Others (specify)	
11	Name of the locality:							
12	District:							
13	Block and village:							
14	which categories do you belong		L.L.	M.L.	H.L.			
15	Educational status							
16	Occupational status							

Ownership pattern of land holdings		
17	Owned area	
18	Leased – in	
19	Total cultivated area	
Remarks by the investigator:		

Objective.2

To identify the determinants of shifts in cropping pattern in Kerala.

1. What all crops you cultivate now?

Pepper ☐

☐

Rice

☐

Tapioca

☐

Coconut

Rubber ☐

Others ☐

If others, specify ☐

a) How much area of different crops you cultivate?

Crop	Area (in acre)

2. How long you have been cultivating coconut/pepper/rice/rubber/tapioca?

☐ A) Since 1990

☐ B) Since 1995

A) Since 1990

I. Which crop did you cultivate before 1990?

Coconut ☐ pepper ☐ rice ☐ rubber ☐ tapioca ☐ others ☐
no crop ☐

II. Among above five crops which all crops did you cultivate intensively from 1995?

Coconut ☐ pepper ☐ rice ☐ rubber ☐ tapioca ☐

a) What all are the reasons?

Reasons	Coconut	Pepper	Rice	Rubber	Tapioca
Increased profitability					
Increased government support – (Warehousing, Floor price, etc.)					
Increase in infrastructure					
Increase in the productivity					
Availability of subsidies- (product specific subsidy, non-product specific subsidy, investment subsidy)					

b) Did you increase the cultivated area of given crops intensively since 1995?

Crops	Yes	No
Coconut		
Pepper		
Rice		
Rubber		
Tapioca		

c) If yes, what all are the reasons?

Reasons	Coconut	Pepper	Rice	Rubber	Tapioca
Increased profitability					
Increased government support – (Warehousing, Floor price,etc.)					
Increase in infrastructure					
Increase in the productivity					
Availability of subsidies- (product specific subsidy, non-product specific subsidy, investment subsidy)					

d) If no, what all are the reasons?

Reasons	Coconut	Pepper	Rice	Rubber	Tapioca
Lack of profitability					
Lack of government support					
Inadequate infrastructural facilities - (roads, canals, electricity, market information, pest control measures, irrigation facilities, technology, etc)					
Less productivity					
Labour shortage					

e) Did you increase or decrease the production of given crops since 1995?

Crops	Increase	Decrease
Coconut		
Pepper		
Rice		
Rubber		
Tapioca		

f) If increased, what all are the reasons?

Reasons	Coconut	Pepper	Rice	Rubber	Tapioca
Increased profitability					
Increased government support – (Warehousing, Floor price,etc.)					
Increase in infrastructure					
Increase in the productivity					
Availability of subsidies- (product specific subsidy, non-product specific subsidy, investment subsidy)					

g) If decreased, what all are the reasons?

Reasons	Coconut	Pepper	Rice	Rubber	Tapioca
Lack of profitability					
Lack of government support					
Inadequate infrastructural facilities - (roads, canals, electricity, market information, pest control measures, irrigation facilities, technology, etc)					
Less productivity					
Labour shortage					

h) What did you notice in the productivity of given crops since 1995?

Crops	Increase	Decrease
Coconut		
Pepper		
Rice		
Rubber		
Tapioca		

i) If increase, what all are the reasons?

Reasons	Coconut	Pepper	Rice	Rubber	Tapioca
Advancement in technology of machineries					
Better infrastructure- (climatic information, pest control measures, training, extension and advisory services)					
Increased availability of HYV seeds					
Improvement in the quality of fertiliser					
Better availability of resources at the right time					

j) If decrease, what all are the reasons?

Reasons	Coconut	Pepper	Rice	Rubber	Tapioca
Poor infrastructural facilities (lack of roads, canals, electricity, pest control measures, irrigation etc.)					
Various diseases					
Climatic unpredictability					
Inadequate labour supply at the right time					
Loss of original fertility of soil					

B) Since 1995

I. Were you a cultivator before 1995?

Yes ☐ No ☐

a) If yes, which crop did you cultivate before 1995?

Pepper ☐ Coconut ☐

Tapioca ☐ Others ☐

Rubber ☐ No Crop ☐

b) Why did you select present crops for cultivation since 1995?

Reasons	Coconut	Pepper	Rice	Rubber	Tapioca
Increased profitability					
Increased government support – (Warehousing, Floor price)					
Increase in infrastructure- (irrigation,road,electricity,mechanisation,market information, pest control, training, extension and advisory services, insurance, HYV seeds, capital, Decrease in the cost of capital, availability of resources, reclaimed land)					
Increase in the productivity					
Availability of subsidies- (product specific subsidy, non-product specific subsidy, investment subsidy)					
Increase in the availability of cultivable land					

Remarks by the investigator

3. Did you shift to present crops in 1995 from previous crops?

☐ Y☐ No

a) If yes, why did you stop the cultivation of previous crops?

Reasons	Coconut	Pepper	Rice	Rubber	Tapioca
Lack of profitability					
Lack of government support					
Poor infrastructure-(market information, pest control measures, roads, canals, electricity ,irrigation, echnology)					
Less productivity					
Various diseases					
Labour shortage					

b) Why did you shift to present crops?

Increased profitability	Coconut	Pepper	Rice	Rubber	Tapioca
Increased government support – warehousing, Floor price					
Increase in infrastructure- (irrigation, road , electricity, mechanisation, market information, pest control measures, training, extension and advisory services, insurance , HYV seeds, capital , reclaimed land)					
Increase in the productivity					
Availability of subsidies- (product specific subsidy, non-product specific subsidy, investment subsidy)					
Increased export possibility					
Increase in the cultivable land					

Remarks by the investigator

(Blue box: production

Limiting programme)

4. Did you get direct payment from the government for non-cultivation of land? ☐ ☐ Yes No

a) If yes, did you reduce the area because of government's production limiting incentive? ☐ Yes ☐ No

b) Did you reduce the production because of government's production limiting incentive? ☐ Yes ☐ No

c) Did you make any ☐rtial shift in the cultivation of rice because of direct payment received under production limiting programme?

Yes ☐ No ☐

Remarks by the investigator

Objective.3

To analyse the impact and implications of trade policies on major crops in Kerala.

(Aggregate Measurement Support: subsidy)

5. Did you get any kind of subsidy since 1995?

Yes ☐ No ☐

a) If yes, what all types?

Fertiliser ☐ Electricity ☐ Irrigation ☐ Seed ☐ Others ☐

b) If you got it, was it at the right time?

Yes ☐ No ☐

Remarks by the investigator

6. Did you get subsidies in the form of cash or kind?

Cash ☐ Kind ☐ Both ☐

a) If kind, which are they?

Fertiliser ☐ Electricity ☐ Irrigation ☐ Seeds ☐ Others ☐

7. Which type of subsidy do you prefer:

Fertiliser ☐ Electricity ☐ Irrigation ☐ Seed ☐ Cash ☐ Others ☐

Remarks by the investigator

(Blue box: production

Limiting programme*)*

8. Did you get direct payment from the government for non-cultivation of land?

Yes ☐ No ☐

a) If yes, did you reduce the area because of government's production limiting incentive?

Yes ☐ No ☐

b) Did you reduce the production because of government's production limiting incentive?

Yes ☐ No ☐

c) Did you make any shift in the cultivation of rice because of direct payment received under production limiting programme?

Yes ☐ No ☐

Remarks by the investigator

(Green box:

Infrastructure facilities)

9. Did you get any infrastructural facilities?

Yes ☐ No ☐

a) If yes, what all are they?

Road, Bridge, Canal	
Machinery	
Pest control facilities	
Support for research, Training, extension and advisory services, Market information	
Others	

Remarks by the investigator

10. Did you get any benefits from the development of infrastructural facilities?

☐ Yes ☐ No

a) If yes, what all are they?

Reduction in the transportation cost	
Improved knowledge about agriculture	
Increased profitability	
Increase production and productivity	
Others	

11. Did your income improve because of improvement in the infrastructural facilities? Yes ☐ No ☐

12. Did you increase area of cultivation after improvement in the infrastructural facilities? Yes ☐ No ☐

13. Did production increase after improvement in the infrastructural facilities?

Yes ☐ No ☐

14. Did productivity increase after improvement of infrastructural facilities?

Yes ☐ No ☐

15. Did cultivation cost have been reduced after the improvement of infrastructure? Yes ☐ No ☐

Remarks by the investigator

(Green box:

Market information*)*

16. Did market information help you to increase in the area of cultivation?

Yes ☐ No ☐

17. Did market information help you to increase production?

Yes ☐ No ☐

18. Did market information help you to increase productivity?

Yes ☐ No ☐

Remarks by the investigator

(Green box

Support for research*)*

19. Did the support for research help to increase in the area of cultivation?

Yes ☐ No ☐

20. Did the support for research help to increase in the production?

Yes ☐ No ☐

21. Did the support for research help to increase in the productivity?

Yes ☐ No ☐

Remarks by the investigator

(Green box: Control of

Pest & diseases*)*

22. Did control of pests and diseases led to increase in the area?

☐ Yes ☐ No

23. Did control of pests and diseases led to increase in the production?

☐ Yes ☐ No

24. Did control of pests and diseases led to increase in the productivity?

☐ Yes ☐ No

Remarks by the investigator

(Green box: Training, Extension and advisory services*)*

25. Did training, extension and advisory services directly or indirectly help you to increase in the area of cultivation?

Yes ☐ No: ☐

a) If yes, which crop's area?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

26. Did training, extension and advisory services directly or indirectly help you to increase production?

Yes ☐ No ☐

27. Did training, extension and advisory services directly or indirectly help you to increase productivity?

Yes ☐ No ☐

Remarks by the investigator

(Green box: direct payment to

Producers to increase production)

28. Did direct payments led to increase in the area of crops?

Yes ☐ No ☐

a) If yes, what all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

29. Did direct payments led to increase the production of any crop?

Yes ☐ No ☐

a) If yes, what all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

Remarks by the investigator

(Green box : Farm income insurance*)*

30. Did you have insurance for your crops before 1995?

Yes ☐ No ☐

31. Did you have insurance for your crops after 1995?

Yes ☐ No ☐

Remarks by the investigator

(Green box:Disaster management*)*

32. Did disaster management assistance helped to avoid and manage disaster in a better way which led to increase in the area of any crop?

Yes ☐ No ☐

a) If yes, what all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

33. Did disaster management assistance helped to avoid and manage disaster in a better way which led to increase in the production of any crop?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

Remarks by the investigator

(De-minimum support: product

Specific & Non product specific subsidy**)**

34. Which subsidy do you prefer?

Product specific ☐
Non-product specific ☐
Both ☐

a) If product specific subsidy, why?

(It increases income and farmers can spend as they like)

b) If non-product specific, why?

(It helps the farmer to utilize the inputs in the right time and for right purpose)

c) If both product specific& non-product specific, why?

(Both subsidies encourage production)

Remarks by the investigator

35. Did area cultivated increase because of product specific subsidy?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

b) What all are the reasons?

(The additional subsidy income helped to expand the area)

36. Did production increase because of product specific subsidy?

☐ Yes ☐ No:

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

b) What all are the reasons?

(The additional subsidy income helped to expand the area thus increase in the production)

37. Did area cultivated increase because of non-product specific subsidy?

Yes ☐ No: ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

b) What all are the reasons?

38. Did production increase because of non product specific subsidy?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

b) What all are the reasons?

Remarks by the investigator

(Special and differential treatment: Investment subsidies to agriculture & agricultural input services to resource poor producers in developing countries)

39. Did you have any awareness about investment subsidies?

Yes ☐ No ☐

40. Did you receive any investment subsidies before 1995?

Yes ☐ No ☐

41. Did you get any investment subsidy after 1995?

Yes ☐ No ☐

42. Did area of cultivation increase because of investment subsidy?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

43. Did production increase because of investment subsidy?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

44. Did area of cultivation increase because of agricultural input services?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

45. Did production increase because of agricultural input services?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

46. Did productivity increase because of agricultural input services?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

Remarks by the investigator

(Market access)

47. Did shift from quota system to tariff system led to increase in export thus increase in cultivated area of present crop since 1995?

Yes ☐ No ☐

48. Did shift from quota system to tariff system led to increase in export thus increase in production of present crop since 1995?

Yes ☐ No ☐

Remarks by the investigator

Objective.4

To identify constraints experienced by farmers as a consequence of liberalization and trade reforms

49. Did you shift to present crops in 1995 from previous crops?

Yes ☐ No ☐

c) If yes, why did you stop the cultivation of previous crops?

Reasons	Coconut	Pepper	Rice	Rubber	Tapioca
Lack of profitability					
Lack of government support					
Poor infrastructure-(market information, pest control measures, roads, canals, electricity ,irrigation, echnology)					
Less productivity					
Various diseases					
Labour shortage					

Remarks by the investigator

(Blue box: production : Limiting programme)

50. Did you face any problems because of not getting ancillary agriculture products due to production limiting programme?

Yes ☐ No ☐

a) If yes, what all are they?

Hay ☐ Rice bran ☐ rice bran oil ☐ others ☐

Remarks by the investigator

(Green box: Disaster management)

51. Did you face any disaster before 1995?

Yes ☐ No ☐

a) If yes, did you get any financial support to overcome disaster you faced?

Yes ☐ No ☐

52. Did you face any disaster since 1995?

Yes ☐ No ☐

a) If yes, did you get any financial support to overcome disaster you faced?

Yes ☐ No ☐

Remarks by the investigator

(Green box: public stock)

53. Did increase in the public stock for food security led to decrease in the price thus decrease in the area of cultivation?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

54. Did increase in the public stock for food security caused decrease in the price which led to decrease in the production?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

Remarks by the investigator

(Doha Declaration)

55. Did you face any difficulties related to production of any crop since 2001; which you have not faced before 2001?

Yes ☐ No ☐

a) If yes, which all are they?

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

b) Specify the difficulties

Remarks by the investigator

56. What is the market price

crop	price
Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

A) Whether there is any influence for price?

57. What is the land price per cent

crop	Price
Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

58. Whether there is any influence of the price of land on cultivation of major 5 crops?

YES ☐
NO ☐

i) If yes, please specify the reason?

59. Did you shift to present crop from any other crop?

YES ☐
NO ☐

i) If yes, which are they?

ii) Why did you shift from previous crop?

reasons	coconut	Pepper	rice	rubber	tapioca
Labour charge					
Change in climate					
Reliability					
Alternative employment					
Decrease in price					

60. Do you cultivate any other crops? If yes, please specify?

61. Whether profitability of this crop influences cultivation of five major crops?

a) Yes
b) No

A) Whether there is any influence for other crops?

62. Do you cultivate crops commercially or non-commercially? Why?

63. How much does it cost for planting?

Crop	Cost(per pit)
Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

64. Which fertiliser do you prefer? Why? How does it cost?

65. What is the labour charge for a day?

66. How often do you water and how much does it cost for one acre?

67. In which all month does watering is required for the crop?

68. From which year onwards do you get yield? How much will you get and please specify the upcoming years yield?

69. In which year do you get maximum and minimum yield?

crop	Maximum yield	Minimum yield
Coconut		
Pepper		
Rice		
Rubber		
Tapioca		

70. Do you use chemicals for cultivation?

a) Yes

b) No

i) if yes, Which all are they?

71. Which process do you opt for drying and how much does it cost?

crop	process	cost
Coconut		
Pepper		
Rice		
Rubber		
Tapioca		

72. Where did you dry the crop

crop	Place
Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

73. Do you experience the disturbance from rat, cat and squirrel? Did their excreta, hair found while drying?

74. Where did you store the yield? How much does it cost per acre?

Crop	store	Rent(per month)
Coconut		
Pepper		
Rice		
Rubber		
Tapioca		

75. How much did you spent for transportation?

crop	cost
Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

76. What is the life span of

Coconut	
Pepper	
Rice	
Rubber	
Tapioca	

77. How much does it cost for disposing? Will you get any govt. Subsidy for disposing and replacement? How much will you get?

crop	Disposing cost	Subsidy for disposing	Subsidy for replacement
Coconut			
Pepper			
Rice			
Rubber			
Tapioca			

78. Do you get agriculture credit?

a) Yes

b) No

I) If yes how much did you get per acre and from where?

crop	Credit	Place
Coconut		
Pepper		
Rice		
Rubber		
Tapioca		

79. Whether there is any influence of agriculture credit on cultivation and does the agricultural credit helps you to increase yield?

a) Yes

b) No

80. What all types of loans did you get for agricultural purpose?

Loans	
Short term	
Medium term	
Long term	
Gold loan	

A) If there is any influence for credit?

81. Where do you pledge gold for getting credit for agricultural purpose?

82. Whether there is any effect of cultivation on income?

a) Yes

b) No

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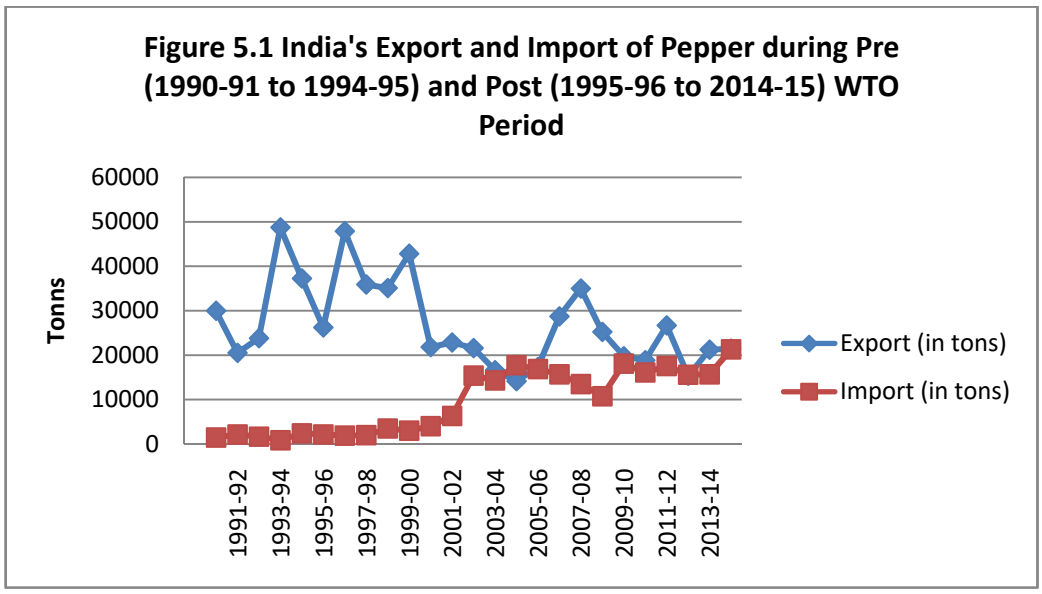
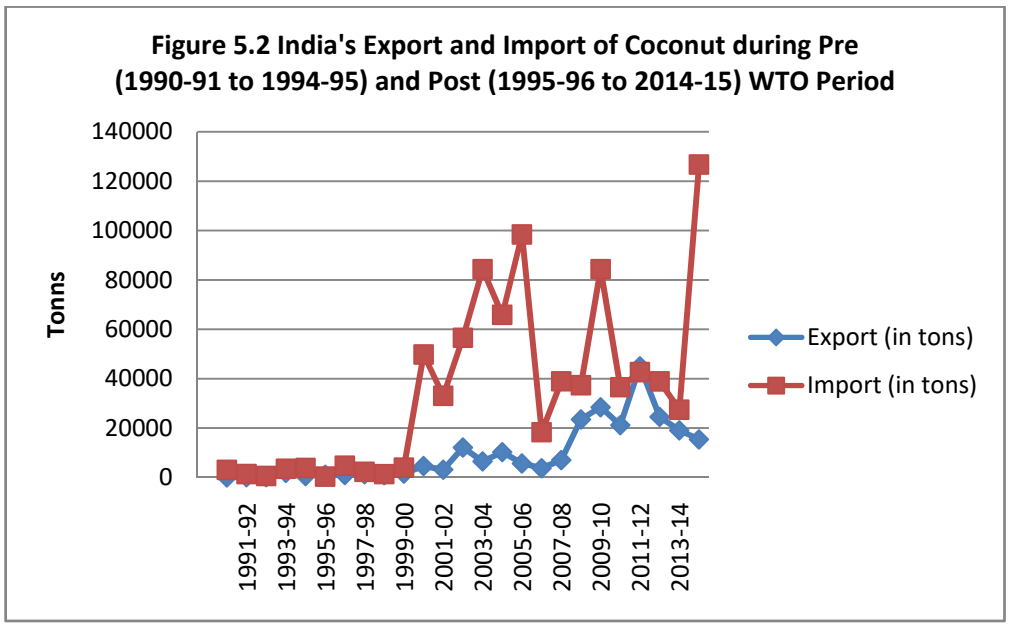


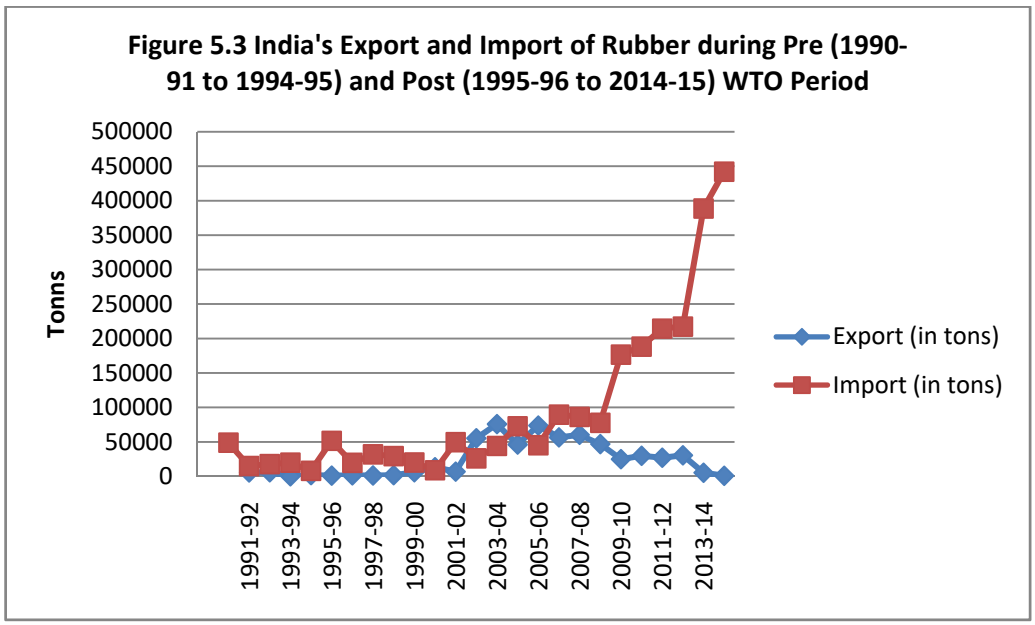
Source: Compiled from Table 5.1

After the free trade agreements with Bhutan, since 1990 and Singapore (1992) which are not the major pepper producing nations, India witnessed an increase in import quantity of pepper between1990-91 to 1994-95. The increase in the export quantity of pepper may be due to increase in the productivity. Increase in the imports may be because of increase in the internal demand or for re-exporting of pepper after converting it into value added products. In post-WTO period (1995-96 to 2014-15) the production increased from 61.6 tons in 1995-96 to 65 tons in 2014-15 *i.e.,* a growth rate of 5.52% and an average growth rate of 0.28% per annum. The quantity of export of pepper showed a decreasing trend from 26244 tons in 1995-96 to 21450 tons in 2014-15 *i.e.,* a negative growth rate of 18.27% and an average negative growth rate of 0.91% per annum. In this period, the production and the productivity of pepper increased in India. During 1995 – 2015 India signed free trade agreements with some of the major pepper producing countries and regional associations like Sri Lanka (2001), Thailand (2004), SAFTA (2006), ASEAN (2010) and Malaysia (2011); but India was not able to increase the export quantity of pepper. In post-WTO period (1995-96 to 2014-15)



Source: Compiled from Table 5.2

Since Bhutan and Singapore are not the major coconut producing nations, this could have helped India to increase the export quantity of coconut. The quantity of import also increased from 3090 tons in 1990-91 to 3859 tons in 1994-95 *i.e.,* a growth rate of 24.89% and an average growth rate of 4.98% per annum. In this period the production and productivity of coconut increased in India. Although Bhutan and Singapore are not the major coconut producing nations, India witnessed an increase in import quantity of coconut between1990-91 to 1994-95. The increase in the exports of coconut may be because of increase in the productivity of coconut, increased demand for coconut in the international market and reduction in the tariff rates which were mentioned in the first round of GATT held at Geneva in 1947. The increase in the imports of coconut may be because of increase in the internal demand, increased supply of coconut into international market by cost effective nations, import of coconut for converting it into value added products and the influence of different free trade agreements.



Source: Compiled from Table 5.3

Rubber plays an important role in India's foreign trade. During pre- WTO period the production of rubber increased from 329.6 tons in 1990-91 to 472 tons in 1994-95 *i.e.,* a growth rate of 43.20% and an average growth rate of 8.64% per annum, but the quantity of export of rubber showed a decreasing trend from 5834 tons in 1991-'92 to 1961 tons in 1994-95 *i.e.,* a negative growth rate of 66.39% and an average negative growth rate of 16.60% per annum. In spite of the fact that India signed two FTAs with Bhutan and Singapore, which are not major rubber producing nations, India was not able to increase her rubber exports. During this period, the production and productivity of rubber has increased in India. The quantity of import of rubber showed a decreasing trend from 49013 tons in 1990-91 to 8093 tons in 1994-95 *i.e.,* a negative growth rate of 83.48% and an average negative growth rate of 16.70%.

The decrease in the export quantity of rubber may be because of increased competition from nations where rubber production is more cost effective. Another important factor is that production of synthetic rubber became cheaper with the fall in international prices of petroleum. The