

# **GLOBALISATION AND AGRICULTURAL TRANSITION IN KERALA**

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*Under the Faculty of Social Sciences*

By  
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**DEPARTMENT OF APPLIED ECONOMICS  
COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY  
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# **Globalisation and Agricultural Transition in Kerala**

Ph.D. Thesis Under the Faculty of Social Sciences

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## **DECLARATION**

I hereby declare that the thesis entitled **“Globalisation and Agricultural Transition in Kerala”** is a record of bona fide research work done by me under the guidance and supervision of Prof. (Dr.) Meera Bai M., Department of Applied Economics, Cochin University of Science and Technology, and that it has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or any other title of recognition.

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## **Certificate**

This is to certify that the thesis entitled **“Globalisation and Agricultural Transition in Kerala”** is a bona fide record of the research work carried out by **Mr. Subhash K.** under my supervision and guidance at the Department of Applied Economics, in partial fulfillment of the requirements for the Degree of Doctor of Philosophy of Cochin University of Science and Technology. The thesis has not formed the basis for award of any degree, diploma, associateship, fellowship or other similar title of any other University or Board and is worth submitting for the award of Doctor of Philosophy under the Faculty of Social Sciences of Cochin University of Science and Technology. I also certify that all the relevant corrections and modifications as suggested by the audience during the pre-synopsis seminar and recommended by the Doctoral Committee of the candidate have been incorporated in the thesis.

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## **ABSTRACT**

The provisions of the Agreement on Agriculture (AoA) and the subsequent deliberations of the World Trade Organisation (WTO) have major implications to domestic agriculture. One of the main arguments in favour of liberalisation has been the potential for stimulating faster agriculture growth through higher prices realization by the producers. However, it has been pointed out that globalization in the agricultural sector will have adverse effects on income distribution among regions and categories of farmers according to crop combinations and resource base. The agricultural scenario in Kerala indicates a heavy concentration on non-food crops. The two main characteristics of the cropping pattern of agriculture in Kerala are the predominance of crops which are dependent on world market conditions and the dominance of perennial crops as against seasonal or annual crops. The high proportion of commodities dependent on the world market conditions in the farm economy of Kerala makes it highly vulnerable to WTO and AoA related concerns. The farm prices of agricultural products of Kerala under the new scenario are dependent on markets external to Kerala and this dependence renders them highly vulnerable. There has been no systematic study on the impact of liberalisation and globalisation on Kerala agriculture.

In these context, the main objectives of the study are to assess the World Trade Organisation and the Agreement on Agriculture to the Indian, Kerala Agriculture; to understand the global pattern regarding the area, production and yield of coconut, rubber and pepper in order to highlight the change in the major producing countries, during pre-and post-globalisation period; and to analyse the changing pattern of land utilisation, cropping pattern, shifts in productivity and production of major crops, the price parity and export and import of coconut, rubber and pepper in Kerala during pre and post globalisation period. This study is attempted to bridge the gap by addressing the issues of Pre-WTO and Post-WTO agriculture area, production and productivity.

The analysis confined mainly on secondary data. The study is based on exclusively on time series data. During the courses of the study a large amount of data pertaining from 1960 to 2017 had been reviewed. The secondary data was analysed using

percentages, average growth rate, compound growth rate, and acceleration/deceleration growth model. The pre and post globalisation period was used to test the significance of difference between the two sub periods.

The main focus of the study was to review the performance of Kerala agriculture during both pre-and post-globalisation periods and to identify the change over time. In particular, it is analysed the following aspects: (1) Changes in area, production and productivity (2) Contributions of extensive approach through area expansion and intensive approach through productivity changes towards production changes (3) Prices received by the farmers (4) Market price movements (5) Import and exports (6) WTO implications. Comparative analysis of these aspects is carried out for the pre-globalisation and post globalisation periods with a view to identify the nature of changes and to ascertain the impact of globalisation. The main focus of the study was on the three major crops of coconut, rubber and pepper. Coconut is the main stay of Kerala's rural economy and it contributes to income and employment for many rural households with small holdings.

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## LIST OF ABBREVIATIONS

AMS	Aggregate Measure of Support
AoA	Agreement on Agriculture
AOR	Agreement on Rules of Origin
AEZ	Agricultural Export Zones
FAO	Food and Agricultural Organisations
FDI	Foreign Direct Investment
FEMA	Foreign Exchange Management Act
FERA	Foreign Exchange Regulation Act
FTZ	Free Trade Zone
GATT	General Agreement on Tariffs and Trade
GOI	Government of India
Ha	Hectares
IPR	Intellectual property Rights
IMF	International Monetary Fund
Kg	Kilo Gram
Kg/Ha	Kilo Gram per Hectares
LPG	Liberalisation Privatisation and Globalisation
MFN	Most Favoured Nations
OECD	Organisation for Economic Co-operation and Development
SPS	Sanitary and Phytosanitary
SEZ	Special Economic Zones
SAP	Structural Adjustment Policies
SSTH	Super Star Trading Houses
TRIPS	Trade Related Intellectual Property Rights
WTA	World Trade Agreement
WTO	World Trade Organisation



*Dedicated to by  
My Achan & Amma*



# Chapter 1

## Introduction to Globalisation and Agricultural Transition in Kerala

### 1.1 Background

The acceptance of the treaties emerged from the Uruguay Round of Negotiations by the government of India has placed certain obligations towards liberalisation and globalisation of agriculture in India. The provisions of the Agreement on Agriculture (AoA) and the subsequent deliberations of the world trade Organisation (WTO) have major implications to domestic agriculture, especially in three major areas viz., (a) gradual elimination of the restrictions on international and external trade in agriculture, (b) phased withdrawal of input subsidies and (c) IPR regime for seeds and plant varieties along with freedom for transitional corporations to operate in India (1). Trade restrictions on agriculture were mainly confined to quantitative restrictions and tariffs. However, most of the quantitative restrictions on imports have been removed effective from April 1, 2000 and only a few restrictions exist from international trade in agriculture.

One of the main arguments in favor of liberalisation has been the potential for stimulating faster agriculture growth through higher prices realization by the producers. However, it has been pointed out that globalization in the agricultural sector will have adverse effects on income distribution among regions and categories of farmers according to crop combinations and resource base (Gulati and Sharma, 1997; Gulati, et al., 1999; Nayyar and Sen, 1994).

The agricultural scenario in Kerala indicates a heavy concentration on non-food crops. Against the national average of over three-quarters of land under food grains, in Kerala only about one-fifth of the land is under foodgrains. When the state was formed rice was the major crops (767 thousand ha.) followed by coconut (463 thousand ha.) and tapioca (214 thousand ha.). By 2016-17 coconut has emerged as the major crop (906

thousand ha.) followed by rubber (476 thousand ha.) and rice (287 thousand ha.). The share of rice in the total cropped area has declined from 34.7 per cent in 1957-58 to 9.6 per cent in 2016-17. During the same period the share of coconut in the total cropped area has increased from 20.9 per cent to 30.4 per cent and that of rubber increased from 4.5 per cent to 16.0 per cent. Other cash crops such as cashew, pepper, arecanut and coffee and have also improved their share in the total cropped area at the expense of rice and tapioca.

The two main characteristics of the cropping pattern of agriculture in Kerala are the predominance of crops which are dependent on world market conditions and the dominance of perennial crops as against seasonal or annual crops. These two characteristics make the Kerala agriculture distinct from agriculture in the other states of India where subsistence farming system with predominance of food crops exists. The high proportion of commodities dependent on the world market conditions in the farm economy of Kerala makes it highly vulnerable to WTO and AoA related concerns. The dominance of perennial crops implies certain rigidities in the land use pattern which makes it difficult for farmers to respond immediately to changes in market conditions through adjustments in cropping pattern and to make long term investment decisions.

The emerging cropping pattern in Kerala has helped the state to obtain the leading position among all the states in the country in respect of the gross income generated per hectore of cultivated land. In fact, the gap between the gross income generated in Kerala and the national average has widened over time. The major factors responsible for the high gross income in Kerala has been the heavy dependence on cash crops and the isolation of market for the major crops in Kerala from the international market through the protectionist policies.

## **1.2 Current Scenario of the Study**

The farm prices of agricultural products of Kerala under the new scenario are dependent on markets external to Kerala and this dependence renders them highly vulnerable. While some of these commodities such as pepper and cardamom are exported, others

such as coconut and rubber constitute the basic raw materials for industries. Both the export commodities and the industrial raw materials face monopolistic conditions in their markets, and often the commodity prices are highly sensitive to various factors. The liberalisation and globalization policy adopted by the government of India (GOI) is likely to introduce major changes in the Kerala agricultural scenario.

The agricultural sector of Kerala, after prolonged stagnation resulting from increased production cost and declining profitability inter alia on account of rising wages, has adapted its crop structure to focus on less labor-intensive commercial crops. Such a structural change in the region's agricultural sector has coincided by the formation and GOI was sing of the WTO and the new trading environment for agricultural commodities. Against this background, this study seeks answer to the following: has the restructuring effort by Kerala agriculture to salvage itself from the 'high-cost syndrome' been thwarted by the new trading environment resulting from the WTO?

### **1.3 Statement of Problem**

The two main characteristics of the cropping pattern of agriculture in Kerala are the predominance of crops which are dependent on world market conditions and the dominance of perennial crops as against seasonal or annual crops. These two characteristics make the Kerala agriculture distinct from agriculture in the other states of India where subsistence farming system with predominance of food crops exists. The high proportion of commodities dependent on the world market conditions in the farm economy of Kerala makes it highly vulnerable to WTO and AoA related concerns. The dominance of perennial crops implies certain rigidities in the land use pattern which makes it difficult for farmers to respond immediately to changes in market conditions through adjustments in cropping pattern and to make long term investment decisions.

### **1.4 Significance of the Study**

The emerging cropping pattern in Kerala has helped the state to obtain the leading position among all the states in the country in respect of the gross income generated per

hector of cultivated land. In fact, the gap between the gross income generated in Kerala and the national average has widened over time. The major factors responsible for the high gross income in Kerala has been the heavy dependence on cash crops and the isolation of market for the major crops in Kerala from the international market through the protectionist policies.

The farm prices of agricultural products of Kerala under the new scenario are dependent on markets external to Kerala and this dependence renders them highly vulnerable. While some of these commodities such as pepper and cardamom are exported, others such as coconut and rubber constitute the basic raw materials for industries. Both the export commodities and the industrial raw materials face monopolistic conditions in their markets, and often the commodity prices are highly sensitive to various factors. The liberalisation and globalization policy adopted by the GOI is likely to introduce major changes in the Kerala agricultural scenario.

There has been no systematic study on the impact of liberalisation and globalisation on Kerala agriculture. However, there are a few empirical studies in the Indian context which can provide a broad framework for the Kerala study. For example, Subramanian (1993) has analysed the effect of liberalisation of trade on the movement of terms of trade against the agricultural sector and has concluded that trade liberalisation would lead to higher price transmission elasticities for all unprocessed commodities except coarse cereals. The conclusions of the study by Parikh et al. (1995) include following observations: (1) Trade liberalisation in the medium run increase allocative efficiency within agricultural sector and between agriculture and non-agricultural sectors. (2) Agricultural liberalisation increases the output of all agricultural commodities except coarse grains and other foods. (3) Liberalisation leads to higher volume of exports of all agricultural goods, except coarse grains, and (4) Prices of several agricultural commodities which are not protected would rise with trade liberalisation.

Chand (1998) observes that dismantling the trade barriers on imports would increase volatility of Indian prices and farm income. On the positive side, the removal of quantitative restrictions would promote competition in the domestic market leading to



prices advantage for the consumers. Gulathi (1998) observations that agriculture could move on to a higher growth trajectory if supply side bottlenecks are freed, and a protective cover is accorded to the poor.

The past studies were concentrated on the gross income generated per hectare of cultivated land. In fact, the gap between the gross income generated in Kerala and the national average has widened over time. The high gross income in Kerala has been the heavy dependence on cash crops. There is an isolation of market for the major crops in Kerala from the international market through the protectionist policies.

### **1.5 Research Questions**

From the detailed review of literature regarding the WTO and agriculture scenario in international and in Kerala have emerged certain research questions to focus the study. The main research questions arise from the reviews are follows:

1. What are the Changes in area, production and productivity of major crops in major producing countries during pre-and-post globalisation periods?
2. What are the contributions of extensive approach through area expansion and intensive approach through productivity changes towards production changes?
3. Are there any wide fluctuations in the Prices received by the farmers?
4. Whether the Market price of the major crops have volatile movements
5. What is the trend of Import and export of major crops in major producing countries?
6. What are the WTO implications on the Agriculture?

Comparative analysis of these aspects is carried out for the pre-globalisation and post globalisation periods with a view to identify the nature of changes and to ascertain the impact of globalisation.

## **1.6 Objective of the Study**

There are many international literatures highlighting the issues on the impact of globalisation and global agricultural scenario and particularly in Kerala. This study will be looking those aspects in the Kerala context. The objectives of the study are:

1. To assess the World Trade Organisation (WTO) and the Agreement on Agriculture (AoA) to the Indian and Kerala Agriculture.
2. To analyse the global pattern regarding the area, production and yield of coconut, rubber, and pepper in order to highlight the change in the major producing countries, during the pre-and post-globalization period.
3. To analyse the changing pattern of land utilisation, cropping pattern, shifts in productivity and production of major crops, and the price parity of coconut, rubber and pepper in Kerala during pre and post globalisation period.

## **1.7 Research Hypothesis**

The specific hypotheses (in Null Hypothesis form, i.e.  $H_0$ ) to be tested are shown below:

1. Output increases as a consequence of globalisation before and after 1995
2. Area, production and productivity increases the impact of globalisation before and after 1995

All the Null Hypotheses, i.e.  $H_0$  have been tested with level of significance of 0.01 i.e. at the 99% confidence level.

## **1.8 Methodology and Data**

During the course of the substantial amount of data had been reviewed. It was some time difficult to make a choice from different data sets with differing values for the same item. However, as a general guide line data supplied by international organizations were used for making international comparisons. Thus, the global

scenario presented here is based on the data provided by the Food and Agricultural Organisation of the United Nations. Data from national and state levels were used for the analysis at these levels. These included data from various departments of the Government of India, Kerala state government and the commodity boards. To the extent possible official data sources were used, and data from other sources were used only in the absence of relevant data from official sources.

This work mainly depends on secondary data to analyse the global and Kerala agricultural scenario. The study is confined to the impact of globalisation of area, production and productivity in the agricultural sector of Kerala and major producing countries of Philippines, Indonesia, India, Sri Lanka, and Thailand and their global scenario. Even through the reasons and effects of globalisation on cash crops like coconut, rubber and pepper. The period of analysis is 42 years starting from 1975-76 to 2016-17. For the purpose of analysis, the period of study has been sub divided into two periods, the first period (1975-76 to 1994-95) and second period (1995-96 to 2016-17) of pre-and-post globalisation period. The study is based on exclusively on time series data. During the courses of the study a large amount of data pertaining from 1960 to 2017 had been reviewed. It was sometimes difficult to make right choice of the appropriate data.

Data on area, production and productivity of coconut, rubber and pepper were mainly collected from Agricultural Department, Kerala and global scenario data were collected globally from Food and Agriculture Organisation of the United Nations ([www.fao.org/faostat](http://www.fao.org/faostat)). In order to examine domestic and international organisation were used. Other sources of data from national and state levels were used for the analysis Economic Survey 2016-17, Economic review 2016-17, and data from various publications of department of economics and statistics of the Kerala and Government of India and the Commodity Boards, publications and journals and other sources were used only in the absences of relevant data from official sources..

The secondary data was analysed using percentages, average growth rate, compound growth rate, and acceleration/deceleration growth model. The pre and post globalisation

period was used to test the significance of difference between the two sub periods. The data used for analysis and formulation of models together with further explanation of the tools and their relevance are given in details in the respective chapters.

### 1.8.1 Annual Growth Rates

The annual growth rate is given as

$$X_i = (X_1 - X_0) / X_0$$

Where,

$X_i$  = Rate of change

$X_1$  = Current year value of variable

$X_0$  = Last year value of the variable

### 1.8.2 Compound Growth Rate

Compound growth rate of the major crops in the major producing countries and in Kerala were analysed with the equation of:

$$r = \exp [(\ln (A_t/A_0))/t] - 1$$

The regression equation,  $y_t = a + b_t$  may also be taken as

The logarithmic transformation of the compound growth equation,

$$y_t = y_0 (1 + r)^t$$

with  $a = \ln y_0$  and  $b = \ln (1 + r)$ .

therefore, the model is  $\ln Y_t = \alpha + \beta_{1t} + ut$

### 1.8.3 Acceleration / Deceleration Growth Model

To show the growth rates are acceleration or deceleration, we can follow the multiple regression as specified under.

$$\ln Y_t = \alpha + \beta_1 t + \beta_2 t^2 + u_t$$

Where,

$\ln Y_t$  = logarithm of the series

$\alpha$  = Intercept (constant)

$\beta_1$  = Actual growth rate

$\beta_2$  = Acceleration or deceleration growth rate

$t$  = Time period (1, 2, ..., 20)

$t^2$  = Squares of the time period (not the square of actual time period)

$u$  = Disturbance term

From the results we can determine the growth rate is whether acceleration or deceleration. If the growth rate shows positive, it is accelerative growth. If the growth rate shows negative, it is deceleration growth. If it is insignificant then there is no acceleration or deceleration growth, the growth rate is stable.

### 1.9 Scope and Coverage of the Study

In view of the conceptual problems involved in studying the impact of globalisation on a state level instead of the national level and on account of the data problems at the state level, the scope of this study had to be limited to certain specific aspects of globalisation. The main focus of the study will be to review the performance of Kerala agriculture during both pre-and post-globalisation periods and to identify the change over time. In particular, it is proposed to analyse the following aspects:

1. Changes in area, production and productivity

2. Contributions of extensive approach through area expansion and intensive approach through productivity changes towards production changes
3. Prices received by the farmers
4. Market price movements
5. Import and exports
6. WTO implications

Comparative analysis of these aspects is carried out for the pre-globalisation and post globalisation periods with a view to identify the nature of changes and to ascertain the impact of globalisation.

The main focus of the study is on the three major crops of coconut, rubber and pepper. Coconut is the main stay of Kerala's rural economy and it contributes to income and employment for many rural households with small holdings. Coconut had been facing very severe crisis in view of the sharp decline in prices during the turn of this century. The average price of coconut has declined from Rs. 4.50 to Rs. 5.00 during 1999 to Rs. 2.80 during 2001. However, prices have recovered subsequently. The minimum support price announced by the government of India had very little impact on the price of coconut. The minimum fall in the price of coconut, combined with the wide spread disease of coconut palms had affected the livelihood security of a vast majority of the small and marginal farmers in Kerala. Pepper is one of the major export-oriented commodities for which the state has certain advantages over other producing regions. Kerala has a near monopoly in area and production of pepper in India.

In the cases of rubber, Kerala accounts for about 84 percent of area and 92 per cent of production of rubber in India. Even though the domestic prices of natural rubber were comparable to international prices the industrial sector still resorts to imports in bulk quantities since the import duty is considered to be lower than the additional procurement and transport cost to be incurred. With the increased integration of international markets, the performance of coconut, rubber, pepper and coffee in Kerala is linked up with the changes in the global scenario. There for any analysis of the global scenario of these three crops is also included within the scope of this study. Further the

changes in the agricultural scenario of Kerala are reviewed with a view to provide relevant background information leading to the emergence of coconut, rubber, pepper and coffee as the major crops in Kerala. A lot of technical details are deliberately left out from the write up in order to avoid difficulties for non-technical readers.

### **1.10 Chapter Outline**

Following this introductory Chapter, a brief review of the provisions of the WTO Agreement on Agriculture is presented in Chapter 2. This chapter also provides a review of the implications of AoA to the Indian agriculture and also to agriculture to Kerala. The third Chapter presents an overview of the global scenario of WTO and the agreement on agriculture to the changing scenarios of Kerala and Indian agriculture. The global scenario in relation to the trends in area, production and yield of coconut, rubber and pepper in major producing countries is presented in Chapter 4. Chapter 5 details the present agricultural scenario in Kerala as a background. Chapter 6 analyses various aspects of Coconut in Kerala. Chapter 7 analyses various aspects of Rubber in Kerala. Chapter 8 analyses the various aspects of Pepper in Kerala. The final Chapter has summarised the major findings and conclusions. It also provides policy implications and suggestions.

### **1.11 Limitations of Study**

It is a macro level work, the time limit and there were also financial and time constraints. It was some time difficult to make a choice from different data sets with differing values for the same items. Since some of the nations do not keep any record on the starting years and non-availability of accurate official data. The study limited only to cash crops like coconuts, rubber, and pepper. There for all those drawbacks and limitations attributed to the secondary data might have crept into our study. Since the analysis was done in a quantitative way, the actual experiences may deviate slightly.





## **Chapter 2**

### **Theoretical Framework and Review of Literature**

#### **2.1 Introduction**

The agricultural scenario of the India especially in Kerala has changing in accordance with the international scenario with the establishment of WTO in 1994. The purpose of this chapter is to review some of the major theoretical and empirical contributions in the field of regional and temporal analysis reflecting the features of agricultural products in the developing and developed countries. There has been no systematic study on the analysis of agriculture and WTO especially on Kerala with international scenario. There are few studies both theoretical and empirical studies are available and they are considered for review. In this chapter, an attempt is made to review those studies in such a way that it serves as a support base for the present study.

#### **2.2 Theoretical Framework**

A popular approach for analysing the effect of globalisation is based on work by Gulati et. al., (1999), Vaidyanathan, (2000), Uruguay Round of Negotiations, treaties emerged by the government of India acceptance liberalisation and globalisation of agriculture in India. WTO AoA provisions have major implications to domestic agriculture especially in three major areas viz., (a) gradual elimination of the restrictions on international and external trade in agriculture, (b) phased withdrawal of input subsidies and (c) IPR regime for seeds and plant varieties alone.

Trade restrictions on agriculture were mainly confined to quantitative restrictions and tariffs. However, most of the quantitative restrictions on imports have been removed effective from April 1, 2000 and only a few restrictions exit from international trade in agriculture.

Gulati and Sharma, (1997); Gulati et al, 1999; Nayyar and Sen, (1994), one of the main arguments in favour of liberalisation has been the potential for stimulating faster agriculture growth through higher prices realization by the producers. However, it has been pointed out that globalization in the agricultural sector will have adverse effects on income distribution among regions and categories of farmers according to crop combinations and resource base.

Subramanian (1993), Parikh et al. (1995), empirical studies analysed the effect of liberalisation of trade on the movement of terms of trade against the agricultural sector and have concluded that trade liberalisation would Leads to higher price.

Parikh et al. (1995) include following observations: (1) Trade liberalisation in the medium run increase allocate efficiency within agricultural sector and between agriculture and non-agricultural sectors. (2) Agricultural liberalisation increases the output of all agricultural commodities except coarse grains and other foods. (3) Liberalisation leads to higher volume of exports of all agricultural goods, except coarse grains, and (4) Prices of several agricultural commodities which are not protected would rise with trade liberalisation.

Chand (1998) observes that dismantling the trade barriers on imports would increases volatility of Indian prices and farm income. On the positive side, the removal of quantitative restorations would promote competition in the domestic market leading to prices advantage for the consumers. Gulathi (1998), observations that agriculture could move on to a higher growth trajectory if supply side bottlenecks are freed and a protective cover is accorded to the poor.

### **2.3 Empirical Review of Literature**

There are many international literatures highlighting the issues on the impact of globalisation and global agricultural scenario and particularly in Kerala. This study will be looking those aspects in the Kerala context.

World Trade Organization (WTO) is a well-known international organization which deals with Trade related issues between nations. It is situated at Geneva and till Feb 2014, there are 160 member countries Yemen is the recently join WTO as 160<sup>th</sup> numbers member country of World Trade Organization. It provides a legal framework for international Trade of Goods and Services. This legal framework helps member countries in case of dispute settlement related with trade and also encourage healthy environment for Trade between nations but still there are various issue for which under developing member countries are not satisfy for the negotiation done by World Trade Organization but They are working together so that can achieve their common goals and also for the overall economic growth and development for their nation. Agriculture is the main factor to influence the negotiations, policies packages and other issue which is revised by World Trade Organization in their Ministerial Conferences.

India remains the founder member of GATT and WTO both and it has an important role in all the negotiations done by World Trade Organization and specially for the multilateral trading system, Agriculture Negotiation, Policies for under developing countries because although India is an under developed country but still its role in International Organization is much better than any other under developed country. Even today agriculture and rural sectors are the backbone of India because almost 60 per cent population still lived in rural areas and they are depending on agriculture for their livelihood.

On the International Level establishment of GATT and WTO in respectively 1947 and 1995 provides a lot of opportunities to least develop, under develop and developed country to make their presence on international level. To grasp this opportunities, various country have changed their foreign trade policies to get maximum benefit from foreign trade like promotion of export sector, financial facility to domestic market, trade facility to exporter etc. so that they can maximum utilize their resources and get maximum benefit from the globalization which is arises by due their presence on International level and also due to International Organizations such as WTO, IMF, World Bank etc.

Like in India due to Economic Reform in 1992 and establishment of WTO in 1995 have changed the India's Foreign Trade and people started import of such product which was not available earlier and domestic market get a chance to export their product in International market e.g., Agriculture product like Dasehari Aam (an species of Indian mango) is well known in India Specially in Uttar Pradesh state but now local former get a chance to export in various other countries which was not possible earlier. Based on the available literature on the following subject, this study tried to point out various factors which are directly or indirectly related with the Indian Agriculture Sector like supporting policies of Indian Government and WTO and also its impact on Indian Agriculture sector especially in special reference with agriculture trade.

Lewis (1955) gives a broad view about the economies of the colonial world and he describes the economic condition of the country when there was colonial system at international level.

Herberler (1959) focuses on the export sector and conclude in his study that the export of any country is directly or indirectly related with the economic growth of that country. According to him, Trade is the centre point to give a boost to any economies.

Patel (1959) examined that, after the formation of Five years plan for the better economic growth in India various changes arises such as commodity composition, share in world exports, India's Foreign Trade directions etc. Patel in his study briefly describe why demand for Indian traditional product at international level goes down. He studied the trends, direction, and composition of Export product during First five-year plan.

Rostow (1960) has focuses on the importance of the establishment of the International Organizations such as World Bank, International Monetary Fund (IMF) and World Trade Organization (WTO) etc. after the World War II for the better economic growth on International level. His theory briefly describes the importance of International Trade for the better economic growth of the country.

Maizells (1961) and Nurkse (1961) have argued that the stagnation of export sector in LDCs is the main factor for the slow demand of the traditional product at world level. They try to find out that some other factor which are responsible that why country like India is not able to increase its product demand at international level.

The analysis of Cohen (1964) was focused on the Indian export pattern during 1951-60. He try to find out that why there is an stagnation in the Indian export during this time period and he find out some reasons like firstly Production cost of Indian domestic product were more so ultimately they were costlier on International market in comparison with other same nature of goods, Secondly rise in domestic demand which also increases the price of domestic product in international market. These are the main factors (price) which reduced the competitiveness of Indian exports and therefore the share of the India's Traditional product in export on international level goes down.

Hultman (1967) gave various model in special reference with foreign trade such as growth models, multiplier model and also various approaches like export base approach, development stages approach and all of this models and approaches shows the importance of trade and also describe the relationship between trade (export) and economic growth.

Samuel (1970) and Mote (1970) have focuses on the competitiveness of the Indian export. He studied the entire price and non-price (i.e. services facility and quantity) factors which are directly or indirectly responsible for the competitiveness of the export product and finally conclude that although both price and non-price factors are responsible but price factor is the main for determining the competitiveness of export.

Bhagwati (1975) and Srinivasan (1975) also tried to understand the Indi's foreign trade regime with special focuses on government policy for domestic support and objectives, so that they can assess the efficiency and growth of India's foreign trade during 1951-70. They give following conclusion in his study (i) Government is focusing more on import substitution policy (ii) Government is not focusing on export promotion (iii) Due to more emphasis on import substitution policy, export performance is going down.

Thus, according to his study, apart from import substitution government should focus on export sector through various export promotion policy so that the amount of fiscal deficit can be decrease and export can get its maximum level.

Nayyar (1976) analysed the performance of India's export and government policies during 1951-60 and stated that various internal and external factors are responsible for the growth of export sector of India. Nayyar also tried to study all the domestic factors such as policies and external factors like completeness of export.

Panchmukhi (1978) was focuses on the government policy for the promotion and support to foreign trade and also studied the overall trade of India during the period of 1960 but Sainy (1979) not only studied the government policy rather then he tried to find the loop wholes for the policy formation and also related the foreign trade with the Economics development of India. He considered foreign trade as an important key factor for the overall economic growth.

The study of Nambiar (1979) was different because he related foreign trade or export sector with the employment generation of India during the time period of 1963-64 and 1973-74. According to his study, export sector only contributed 2 per cent in the overall employment in the same time period which was very less amount of contribution for employment generation.

Dhindsa (1981) analysed the trend of some major commodities which are traditional in nature and exported from a long time from India such as Jute, Cotton, tea etc. He examined that why there is a slowdown in these commodity export specially in those country which are importing it from a long time period and he gave some conclusion for this slow down like (i) Increasing in the profitability ratio of domestic sales, (ii) Government tax policy so that heavy tax on these major export commodity, (iii) Low level of production & productivity of such commodities (iv) Higher level of cost of production etc. So that all were these major factors which ultimately gives stiff competition to these commodities in international market from there substitute products.

Wolf (1982) analysed the pattern of India's export of major commodities in the period of 1970. He also works to find various factors through which India's foreign trade is going down.

Nayyar (1988) examined various factors which are directly or indirectly related with India's foreign trade for the time period of 1977-85 whether they are from domestic or international market such as price and non-price factor for the competitiveness of domestic export sector, transportation and infrastructural facility which are the major element for the growth of export sector of India on the other hand various external factors like price and non-price factor from the international market, protectionism for domestic industry by foreign country are found the main factor to influence export growth of India adversely.

Kaur (1993) also tries to understand the pattern of Indian export in the decade of 80s and 90s. During this study period he analyses the foreign trade of India and performance of exported commodities from India.

The study time period of Sathe (1995) was very long. He analyses the Indian export since 1951-84. He critically examined effects of diversification of the Indian export on the Indian economy. Sathe analysed the impact of Indian export sector on the overall economic growth and development. He tries to find a relationship between foreign trade and economic growth.

Kantawala (1996) tried to make a relationship between price and income elasticity of the export and import commodity during the period of 1969-1990. Through his study he gave a conclusion that most of the commodity which are imported and exported from India having price and income elasticity during the study time period. Finally, he concludes that in future manufacturing sector will grow and demand of Indian manufacturer goods will increase.

Kathuria (1996) shows that the government policy for import substitution was the main factor the decrease in export and thus various schemes for the export promotion has

been adopted by the government to increase the share of India's export at world level and thus through this step domestic market also protected and the export of traditional goods increased.

The study of Joshi and Little (1996) was based on the changes occurs in Indian economy after economic reform. They analysed with some factors like price control, Industrial regulation, Exchange rate, Monetary Policy etc. They concluded in their study that for the positive result of economic reform Government have to support Free Trade Policy, FDI support, attract foreign investment etc. Thus, through government step various changes occurs in the economy like; (i) Export promotion policy rather than import substitution policy, (ii) Decontrol on Price Policy, (iii) Delicensing of Industries etc.

Indian government in the decade of 90's was very sincere for adopting any new policy for Foreign trade and they have their full control on foreign trade through proper rule and regulation but after adopting LPG policy in 1991-92, government have to accept various policy for global point of view like Tax Policy, Export promotion policy, rule and regulation which control foreign trade. Joshi and little analysed the government step for the promotion of and he find that government have to be liberal toward foreign trade. Government taken some steps such as - (i) Decrease in tariff rate especially on capital goods industrial raw materials. (ii) Relaxation on the quantitative restriction for imported goods, (iii) Promotion policy for export adaptation, (iv) Easiness in domestic licensing, (v) Promotion to privatization so that private firm can grow better, (vi) Introduction of new technology, (vii) Various scheme to attract Foreign Direct Investment (FDI), (viii) Acceptance free trade zone (FTZ) concept in 1999-2000, (ix) Formation of Foreign Exchange Management act, 2000 (FEMA) who replace Foreign Exchange Regulation Act (FERA). (x) Formation of the special economic zones (SEZ), (xi) Other steps like establishment of export promotion councils, various scheme for export promotions, duty free import exemption scheme, etc have be taken by the government.

Kathuria (1996) worked on India's export performance and tried to find out the impact of policies change on the export growth. In 1991 to 1996 there were various



dramatically changes were found in India's foreign trade policy which affected export sector. In his study he used econometric tools and model to analyse the impact of policies changes on export sector.

Srinivasan (2002) analysed the trends of India's export in his study. Exchange rate was the main factor for export of India in his study and thus he relates exchange rate with the export performance. He concludes in his study that devaluation process does not change as much changes in export as official data shows because country like India having much more rule and regulation process for foreign exchange.

Sharan and Mukherji (2001) works on the impact of Foreign Trade Reform on Trade sector and find out that yet there is gain from this reforms to India such as terms of trade policy was in the favour of India, Structure of Trade also diversified and it include some other commodities and countries but at the same time growth rate of import goes down and the amount of fiscal deficit increased and for this situation various external factor were also responsible.

Kathuria et al. (2003) studied the impact of multi-fibre arrangement on export of textile industry of India. He concluded that this arrangement shows the biasness toward developing country like India. That's why growth of India's textile sector is low.

Chand (2004) analysed in his study about the competitiveness and export performance of the Indian agriculture and the policy change due to Trade reform like reducing control on the exchange rate and export process leads to increase in export performance. Various odds like Technical Barriers to Trade and sanitary/Phyto-sanitary and infrastructural bottlenecks etc. are the main determinants for the better export growth of livestock, horticultures. He concludes that for various products like Sugar, Rice, Cotton, India has advantages to export these products because of high level of production and favourable environment condition but for the Wheat, they do not have any advantages to compete in foreign market.

Sury (2004) mentioned in his book “Indian Economy in the 21<sup>st</sup> Century: Prospects and Challenges” about the economic reform on the analytical and description approach and discuss about the future prospect of the economic reform. Furthermore, this book also gives brief study about the policy framework, future prospect, and current scenario of Indian Economy. Various other government economic activities show that in future government will start various economic reform programme for the economic growth and development.

The study of Kaundal (2005) was based on the impact of trade reform on the export sector and he analysed the causes, pattern of India’s export during the period of 1970 to 2002. He concluded that the share of some traditional goods like Jute, Cotton, and Tea has been fallen in overall export and on the other hand non-traditional goods like manufactured goods, machineries etc. share has been increased in overall export.

Raju (2005) worked on the role of agriculture sector for the employment generation and its role in GDP and economic growth. He studied the agreement on agriculture (AoA) which was formed by World Trade Organization and also studied various other issues regarding with agriculture growth in developing countries.

Bakshi (2005) focused on the agreements of WTO basically sanitary Phyto-sanitary agreements and He concluded in his study that these agreements are the main cause to reduce the Trade of Agriculture of developing country especially for those who are largest producer at International level like India. The conditions in agreements like testing standards, production standards were in such a frame which works as a non-tariffs barrier for developing country.

Mittal and Raju (2005) have studied the formation process of WTO from the GATT time period. They analysed all the eight round of WTO conferences and studied its negotiations and agreements.

Chakraborty et al. (2005) studied about the relationship between WTO and India and also analysed the export performance of India. In his study he compared India and china

export performance and studied about India's competitiveness and export directions trends of India. Diversification was the major determinant for the growth of India's export.

Kaundal (2006) find out in his study that government have been taken various serious step to make environment friendly for the better foreign trade such as: (i) Formation of new category of export houses like Super Star Trading Houses (SSTH), (ii) Implication of import licensing policy, (iii) Removal on the restriction of Agriculture export, (iv) Promotion to private warehouses, (v) Export Credit Policy, (vi) Easy custom clearance policy for some major exported goods, (vii) Decrease in custom duty from 20 per cent to 15 per cent for non-agricultural product, (ix) State government also initiated in the trade promotion activities thorough formation of Inter-State Trade Councils and State Policies.

Ramphul (2006) analysed the performance of agricultural trade of various developed and developing country. He also analysed the impact of WTO agreements and negotiation on the agricultural trade at world level. He concluded that WTO has adverse effect on agricultural trade at world level.

Chakraborty and Singh (2006) took agricultural subsidy as a main factor for the increase and decrease of agriculture trade. They concluded that subsidy on agriculture is favourable for developed country but for developing country it works as a hurdle for free trade of agricultural product so they are not favourable negotiation. According to him negotiations should be in such a way which can be beneficial for developing country also.

Banerjee (2006) was focused on the agricultural trade of India. He also analysed the TBT-SPS impact on agriculture. He concluded that developing country is not implementing the TBT-SPS in a proper manner that's why country like India such agreements are not favourable.

Veeramani (2007) studied the exchange rate of rupees through exchange rate government want to increase its export and thus with the objective of export profitability, various changes occurs in trade policy like government introduced various export promotion scheme such as Export credit Policy, Import licensing Policy, Relaxation on trade restriction for the export of agricultural product so that export might be increased at international level.

Sharma and Dietrich (2007) have studied basically on India's manufacturing sector in the time period of 1980-2000. They individually analysed all the three categories of technological industry like high technological industry, medium technological industry and low technological industries. He also analysed the structure of India's manufacture sector.

Ramesh, Chandrayya and Sankara (2009) have opined that, WTO has a direct and indirect relationship with various sectors of Indian economics. Indian agriculture sector affected so much from the WTO. WTO also have its impact on Indian former because they are directly associated with agriculture and their livelihood depends on agriculture sector so they affected so much by government policy to subsidies agriculture and also from the policy of WTO. There is also a very big challenge for the Indian government to protect these former on agriculture sector from the side effects of WTO and also a big task to improve its competitiveness for the international market because after economic reform and adoption of LPG India is getting a tough competition from foreign companies therefore government is trying to make more favourable policy such as market policy, agriculture policy to make former more capable for the production. There are various institutions which provide financial help, training to the former for better agriculture growth.

Arunachalam (2009) studied the reasons that why agriculture is one of the main sectors for the study by various magazines, newspapers, books and academicians, politicians etc. in special reference with WTO because there is various difference for the developed and developing agriculture sector is in developed countries in WTO. Developed countries already have economic development and there is already agriculture sector is

in developed state but in developing countries agriculture is not in developed stage therefore government has to subsidies and also has to make favourable policies for agriculture sector. Developed economic already have a policy and mechanism to protect their domestic market from the competition of developing countries through import quota etc. but developing countries are not able to adopt such types of measures. He also mentioned India's policy to protect their agriculture sector in his study.

Balasubramanian (2010) studied various positive and negative impact of WTO on Indian economy in his research paper, “WTO and Indian agriculture insights, Implication and Imperatives”. He tried to find out impact of WTO on Indian industry. His study based on the agriculture sector. Farmers were the main effected element in this study.

## **2.4 Conclusion**

The objective of this chapter was to review major research works earlier done on WTO especially on Indian Agriculture Products and the other international countries. The studies reviewed in this chapter indicate that various provisions of Agreement on Agriculture have been directed in the manner so as to favour more the developed world than the developing world. It is an agreed fact that all provisions may not be beneficial at a time for each country, therefore, it is advocated that each country should work so as to transform the challenges posed by these provisions into the opportunities. Among the Indian states, Kerala's agriculture has the maximum impact of WTO provisions on account of the predominantly cash crop oriented cropping pattern by a large number of small and marginal farmers, and a high proportion of trade dependence on the agricultural products. It is in this context that the present study is designed. In this study, an attempt shall be made to identify the possibilities and explore them so as to strengthen the agriculture sector to cope with the WTO challenges.



## **Chapter 3**

### **World Trade Organisation and the Agreement on Agriculture to the Kerala, Indian Agriculture**

#### **3.1 Background**

India along with 122 other countries has signed the world trade agreement (WTA) evolved at the Uruguay Round of negotiations concluded in Murrakesh on April 15, 1994 after prolonged negotiations of GATT spread over eight years. The WTA contains 29 individual legal texts and a number of additional Ministerial declarations and undertakings specifying the obligations and commitments of member countries. This was the first time that agriculture was brought under the preview of the global trade regulating agreements. The World Trade Organisation (WTO), which replaced GATT originating from the 1947 Geneva trade conference, came into existence on January 1, 1995 with stated objective of creating a fair and equitable system of global trade among the member countries. The apex decision making body of the two is the Ministerial Conference and there is a General Council below the Ministerial Conference. By the end of 2017 the membership of WTO has gone up to 164.

The WTO Agreement on Agriculture (AoA) brought under agricultural products under the multinational rules and paved the way for liberalization of agricultural trade. The Doha Ministerial declaration of 2001-initiated negotiations on wide ranging areas. The AoA has three basic components relating to market access (tariffication), domestic support and export competition. During the Uruguay round discussions, it was expected that distortions in agricultural trade would be reduced on account of AoA and as a direct consequence the developing countries would enhance their market access to developing countries.

### **3.2 Market Access**

The market access commitment of the AoA aims to free imports from quantitative restrictions and to introduce upper bounds of tariffs. AoA had contemplated conversion of all non-tariff barriers such as import quotas, minimum import price, total ban on imports and discriminatory licensing into equivalent tariff barriers which was referred as tariffication. It was envisaged that a reduction in the basic tariff would take place on the time bound basis, to the extent of 24 per cent over 10 years in the case of developing countries and 36 per cent over six years for developed countries. However, the leased developed countries were exempt from the provision. Further it was visualized to maintain current access opportunities and to establish minimum access tariff quota where there was no binding of tariffs. Tariff-quotas at reasonable levels were expected to facilitate access, and these tariff-quotas would be established on a line- by-line basis. When the provisions are fully implemented imports of all agricultural commodities cannot be banned except on grounds of sanitary and phytosanitary conditions. It was also stipulated that all sorts of quota restrictions and prohibitions (other than tariff) maintained through quotas or import-export licenses should be removed. However, there is a provision that member whose economics can only support lower standard of living and are in the early stages of development may apply quantitative restorations for balance of payments positions and such countries were free to deviate temporarily from some of these provisions. It was specified that members had to announce time schedules for removal of all quantitative restorations.

### **3.3 Domestic support**

The AoA provisions on domestic support to agricultural production and trade were meant to isolate non-trade distorting supports from trade distorting supporters and to quantify the trade distorting supports in order to discipline and eliminate measures of domestic agricultural support were classified as Green Box, Blue Box and Amber Box supports on the basis of the lack or extent of trade distortion effected by each measures of domestic support. Green box items included general services to agriculture such as research and extension, pest and disease control, storage costs for food security, crop



insurance, environmental programmers, and direct payments not limited to agricultural production purposes. Most of the green box items were considered to be production neutral having either no or least distortion effects or so they were excluded from the preview of domestic support. Some of the blue box items required disciplining. The Amber box support items were considered to be trade distorting and these were to be disciplined and finally eliminated within ten years. The Amber box items were further classified as product specific and non-product specific supporters.

Domestic support was measured through Aggregate Measure of Support (AMS) based on product and input subsidies provided by the government to the agricultural sector as a proportion of the total value of agricultural output. The AMS was supposed to be arrived on a product-specific basis for each agricultural product receiving market support, and it was expected to be limited to certain levels of the value of total agricultural productions. It was anticipated that the domestic support provisions would correct market distortions by minimizing the domestic production subsidies and shift production to regions with comparative advantage.

### **3.4 Export Competition**

The provision relating to export competition mainly refers to export subsidy and it covers two aspects namely, reduction in the total budgetary outlays on export subsidies and reduction in the total quantity of exports covered by the subsidy. Ceilings were specified on budgetary outlay and the quantities benefiting from the subsidies.

### **3.5 Implementation Aspects**

It was envisaged that the modalities for effective implementations of the provisions should be evolved through negotiations (Josling, 2003). WTO ministerial meetings in Seattle, Doha, Cancun and Singapore have evolved certain guidelines to implement various provisions. In spite of the apparent efforts to evolve a legally binding set of rules to regulate the international trade in agriculture satisfying the interests of both

developed and developing countries, there is a general feeling that many provisions are biased against developing countries.

There are many bottlenecks and hardships facing developing countries to obtain a favourable position in the international markets in competition with the developed countries. The structure of border protection in developed countries remains high and often it is non-transparent and anti-development. For example, more than a quarter of domestic production of OECD countries is protected by Tariff Rate Quotas. In some cases, tariffs peak as high as 500 percent for imports from developing countries. Further tariffs increase by the degree of processing thereby limit access for processed foods. In many industrial countries the average income of farmers is higher than the national average and this level is maintained by an extensive network of subsidies outside the purview of WTO norms. These problems create many obstacles for developing countries to enhance their market access to developed countries by effectively competing in the global markets on an even keel. Many structural problems in developing countries make it difficult to cope up with the competition in international markets in the context of organised efforts of developed countries to retain their current position.

Realising this, the Doha Ministerial conference had decided that special and differential treatment for developing countries should be an integral part of the negotiations. They should be embodied in the schedules of concessions and commitments as appropriate in the rules and disciplines to be negotiated so as to be operationally effective and to enable developing countries to effectively take account of their development needs including food security and rural development. The Doha Ministerial declaration of 2001 had initiated negotiations on a wide-ranging issue related to the interests of developing countries.

The agricultural and trade policies followed by many developed countries including USA and the OECD countries in the past involving heavy subsidisation of domestic agricultural production and the export of these products has resulted in certain polarisation of trade in their favour and has depressed international prices. Therefore,

it is important to obtain a consensus on phasing out the distortions of trade through direct and indirect subsidisation of domestic agricultural production and trade. In addition to the government policies in the developed countries the agricultural production pattern with commercial orientation using mass production technologies supported by huge subsidy, capital and technology has also contributed to this polarisation. Against this background agriculture in developing countries is small scale farming, using low inputs of capital and poor forward and backward linkages.

In the context of the absence of a level playing field between the developed and developing countries on account of the existing diversities in farming conditions and market characteristics special efforts are necessary to safeguard the interest of agriculture in the developing countries. Since tariff and non-tariff barriers limit the access to the developed country markets adjustments in tariff measures alone will not safeguard the interests of developing countries. Non-tariff measures such as standards of food safety involves modifications in post-harvest technology and adaptation of sanitary and Phyto sanitary measures. Historically most developing countries were handicapped by poor financial resources to provide support to agriculture on a comparable nature and scale with the developed countries. The financial constraint of the developing countries has resulted in the domestic support and export subsidies in general to remain below the levels prevalent in the developed countries. Therefore, most of the developing countries might not require to make major concessions or reductions in the existing levels of domestic support and export subsidies at the same time there is enough scope for developed countries to effect substantial reduction on these two items of subsidies on a phased manner, so that the distortions in trade on account of the direct and indirect subsidisation of domestic production and exports in these countries could be minimised.

The subsistence level of the large proportion of small-scale farmers in developing countries – a large proportion of them below or close to the poverty line – is a serious social concern in these countries. Agricultural sector of these countries is expected to play a crucial role in poverty alleviation and rural development. While this issue may not be important in the context of trade policies of developed countries, no responsible

developing country government can evolve an agricultural trade policy without giving due considerations to provide opportunities for livelihood in agriculture and availability of food items at an affordable price level. Thus, for developing countries issues of agricultural trade are linked with their economic and social conditions, development needs including rural development, food and livelihood security (Bhalla 1994). Among the three major concerns of market access, domestic support and export competition developing countries are mostly affected by market access since they have not been depending heavily on the other two concerns. While the developing countries expect increased market access to developed countries through the mechanism of tariffs, they also want to safeguard against a surge in imports leading to decline in domestic prices of local agricultural products on which their economies are heavily dependent.

Most of the developing countries experience difficulties in relation to provisions on Sanitary and Phytosanitary (SPS) measures, Agreement on Rules of Origin (AOR) and Trade Related Intellectual Property Rights (TRIPS). The SPS requirements involve problems of originating from specification of standards and the implementation of the standards. In some cases, access to technical know-how to meet the specified standards is restricted. The additional production cost involved in meeting the standards specified and the other costs on items such as certification and control make it difficult for many developing countries to achieve market competition. AOA provisions relate to raw materials produced in one country exported to another country for processing and then exported to a third country as an export product of the second country. Often low-quality items from the originating country is mixed or processed in the imported country and further exported. In this process often producers in the intermediary country get reduced prices for their products. It also affects the market share of products of the processing country. The case of imported low quality tea and pepper from Sri Lanka to India is an example for this problem. The TRIPS agreement covers various aspects such as patents, copyrights, trademarks, geographical indications and industrial designs. Patents covering seeds evolved by plant breeders may affect bio-diversity concerns and the choice of planting materials by the farmers.

To sum up, the experience of the past ten years raises serious doubts about achieving substantial economic gains to many developing countries from increased world trade. In fact, there are isolated indications that the WTO regime has widened the gap between the developed and developing countries. Evidence from some poor countries indicates that increases in food imports have substantially exceeded the increases in overall agricultural exports from these countries. This has raised doubts about the realisation of the promise of substantial economic gains for developing countries from increased access to developed country markets. Policy changes to accommodate the provisions of AoA in some developing countries have adversely affected the low-income households. Within the developing countries the bulk of the adjustments are affecting the income opportunities, livelihood pattern and welfare of the vulnerable groups such as small and marginal farmers. The poor bargaining power of many developing countries and the rigid attitude of some developed countries make it even more difficult for arriving at a favourable outcome.

### **3.6 Indian Scenario**

In order to analyse the implications of WTO in the Indian context it is necessary to make a brief review of the agricultural situation prior to 1995. Historically in the Indian context the underlying concern of agricultural policy has been a desire for achieving self-sufficiency in food production and there was very little emphasis of international trade based on comparative advantages. Agricultural commodities were allowed to be exported when there existed surplus after meeting the domestic consumption requirements. Imports were allowed mainly to meet the excess demand. This inward orientation focusing on import-substitution has virtually ignored the potential of agricultural exports except for a few export oriented agricultural commodities produced in certain pockets. It has been often pointed out that the strategy of import substitution and industrialisation along with over-valuation of exchange rates adopted in India has an alleged inherent discrimination against agriculture (Bhalla, 1995).

Further, low administered prices of agricultural output provided inadequate incentives to the farmers. As Ahluwalia (1996) has pointed out a policy of heavy protection to

industry leads to exchange rate being maintained at an appreciated level compared to the level that would prevail if industrial protection was lower. The over-valuation of exchange rate discouraged exports in general, but the discouragement was more pronounced in the case of agricultural exports. This was mainly because the industrial exports were covered by a variety of schemes such as duty-free imports of industrial components, duty drawbacks and various market support measures which provided export incentives. Agricultural exports were denied such export incentives on the ground that they did not use imported inputs, and therefore they did not suffer on account of any obvious disincentive. However, it cannot be ignored that the policy of protection has increased the cost of capital good needed in agricultural production and processing, and at the same time over-valuation of exchange rate induced by the protectionist policies provided a disincentive. One of the major consequences of the trade and price policy followed in India was that the domestic prices were mainly determined by the supply and demand conditions in the domestic market, and they were insulated from the world market prices.

The policy changes initiated in the beginning of 1990's as part of macroeconomic stabilisation and structural adjustment policies (SAP) focused on correcting disequilibrium in foreign exchange market in the short run and it focused on reforms in fiscal, exchange rate, trade and industrial policy, financial and capital markets in the medium term. These measures were expected to improve the terms of trade of tradable agriculture and to make it internationally competitive resulting in substantial income from agricultural output and exports. However, these measures had not made a significant impact on the India's international trade in agriculture until mid-1990's.

Another significant development occurred when India signed the Dunkel Text in April 1994 which committed the country to multilateralism under GATT Accord. Though there was no immediate insistence on competitive free trade in agricultural commodities, it was required to allow a limited access to Indian domestic market in a phased manner. The subsequent WTA agreement on agriculture and the establishment of WTO has brought new dimensions to Indian agricultural production and trade.

The Dunkel GATT agreement and the AoA had attracted mixed response in India. On the one hand it was pointed out that economic liberalisation has shifted the terms of trade in favour of tradable agriculture and opened new opportunities to achieve substantial increase in exports. Gulati and Sharma (1994) had indicated that India was likely to gain substantially from free trade in wheat, rice, cotton and soybeans. Also, it was indicated that there was comparative advantage for fish products, cashew kernel, oil cake, fruits and processed food. The alignment of internal domestic prices in India with the border prices was likely to rationalise the cropping pattern by expanding area under crops with comparative advantage and reduction in the area under high cost crops like oilseeds and to a certain extent sugarcane (Nayyar and Sen, 1994).

The opposite arguments cautioned against excessive export optimism on the ground that price increase and inflationary tendencies in the domestic economy would reduce the comparative advantage enjoyed by many crops. Further, it was feared that excessive free trade of rice and wheat was likely to affect food security and buffer stock policy followed in India.

Trade liberalisation was also likely to result in large variability in Indian domestic market price on account of the large fluctuations in international market prices, since historically world market price was less stable than the domestic market price (Tyagi, 1990). It was further pointed out that the arguments favouring gains from free trade based on small country assumptions may not be valid for a large country of India's size. International prices are likely to go up whenever there is anticipation of sizeable imports from large countries. The price increase of wheat in the international market as a result of the Russian entry in the world wheat market during a lean production period illustrates this concern. It was also feared that the large import requirements during the lean production years in India might initiate problems on account of foreign exchange requirements to meet the import bill.

As Bhalla (1995) has concluded, globalisation of Indian agriculture offered opportunities for deriving large benefits from increased agricultural exports, especially exports of high value labour intensive allied agricultural products. However,

diversification of Indian agriculture for both domestic consumption and exports should take place only after achieving self-sufficiency in food grain production and providing substantial investment for infrastructure development. It was emphasised that while considerations of India's comparative advantage should be made an integral part of domestic agricultural policies, excessive free trade of rice and wheat should not be allowed for food security reasons.

### **3.6.1 Tariffication or Market Access**

During the Uruguay Round India had agreed to make adjustments in tariff rates for 3373 commodity/commodity groups at 6-digit HS level or commodity sub-groups of 6-digit HS level. The committed commodities accounted for about 65 per cent of India's tariff lines defined at 6-digit HS level. The agricultural lines involved 673 lines under AoA at 6 digit or sub-group of 6-digit level. As Gulati, Mehta and Narayanan (1999) have pointed out among the 673 products belonging to the agricultural sector, the level of MFN tariff rate was significantly less than the corresponding Uruguay Round final bound rates. The difference was more than 50 per cent and above for 556 commodities. There were only 8 tariff line, most of them belonging to the beverages group, where the MFN tariff rates exceeded the Uruguay Round bound rates.

Quantitative restrictions that had prevailed on the import of agricultural products on April 1, 1997 have been totally eliminated on a phased manner by April 1, 2001. India was compelled to take this action on the basis of the favourable balance of payment position and in accordance with the WTO dispute settlement decision against a complaint from USA.

### **3.6.2 Domestic Support**

India had not provided any product specific support other than market price support for certain commodities. Since the present level of support provided by Government of India and the state governments to agriculture is below the levels admissible under AoA, there is no need to dismantle any of the support measures currently followed in



India. In fact, the total AMB was -22 per cent during 1988-89, -21 per cent during 1992–93 and -17.6 per cent during 1994–95 (Gulati, 1998).

### **3.6.3 Export Competition**

Export subsidies listed in the AoA which attract reduction commitments do not exist in India. Though profits from export earnings are exempt from income tax, this does not constitute an export subsidy under the purview of AoA.

### **3.7 Kerala Scenario**

Among the Indian states Kerala's agriculture has the maximum impact of WTO on account of the predominantly cash-crop oriented cropping pattern followed in the state and the existence of a large proportion of small and marginal farmers. Kerala's export sector was a major contributor of foreign exchange earnings of India from agriculture and agro-based products even before the introduction of structural adjustment policies and globalization. Major export items from Kerala included coffee, tea, cashew kernels, coir products, spices and marine products. The value of exports from Kerala during 2016-17 was Rs. 76,790 million. Export from the Kochi port in the state alone accounted for Rs. 15,855 million from cashew kernels, Rs. 6337 million from pepper, Rs. 6238 million from sea foods, Rs. 4289 million from coir products, Rs. 3874 million from coffee and Rs. 3252 million from tea.

Kerala's agriculture is acknowledged as most vulnerable to WTO and AoA related concerns on account of the high proportion of trade dependence on the commodities produced in the state. While most of the other states in India are engaged in capitalising on the opportunities provided by WTA through promotion of new export products, Kerala has to take adequate measures to ward off the erosion of the existing export items and to protect the farmers from sharp fall in farm prices on account of cheap imports from abroad. The seriousness of the problem can be visualised from the fact that coconut and rubber accounting for about two-thirds of the GDP arising from the

agricultural sector in Kerala are most vulnerable on account of the uncontrolled imports to the state.

The first half of the nineties had witnessed a buoyancy in the farm economy of Kerala on account of both productivity changes and favourable price situation. However, there was a crash in the prices of most commodities during the last quarter of the 1990's which had left the commodity market dependent on agriculture in a depressed situation. While this depressed condition coincides with India's membership in WTO it is not clear if this was entirely due to the implementation of WTO mandated measures.

Based on the special conditions of Kerala agriculture it may be possible to make a few observations relevant to globalization.

1. An analysis of the comparative advantage of Indian agricultural commodities for international trade carried out by the Government of India has indicated that most of the traditional agricultural export items from Kerala cannot effectively compete in the international market on account of the high cost of production.
2. With the removal of quantitative restrictions and elimination of import duties, the obligatory imports could result in a greater flow of agricultural commodities to the state and this would have a major impact on the domestic price situation. The competition was expected to be serious for rubber, coconut, pepper and cardamom.
3. The non-product subsidy prevailing in Kerala was below the national average.
4. The product specific support to agriculture in Kerala was limited only to copra and even in this case the magnitude of subsidy was relatively small. None of the export oriented agricultural commodities in Kerala enjoyed the benefit of product specific subsidies except limited income tax exemption on export profit.
5. The classification of commodities as industrial products and agricultural products for determining tariff peaks also affected the rubber cultivators of Kerala. Rubber is classified as an industrial commodity from the early days of GATT and continuation of this classification causes serious economic disadvantage to the rubber producers of Kerala. While latex or rubber sheets

could have obtained 100 per cent bound duty as a primary agricultural product, when it is classified as an industrial product the maximum import duty is only 50 per cent.

6. A major threat to Kerala's export of agricultural commodities originates from the increasing quality standards specified in the international markets, especially the Phyto sanitary measures such as pesticide residue, mycotoxins, bacterial contamination and presence of foreign bodies.
7. With increased market access under AoA new opportunities are available for flowers and tropical vegetables from Kerala.
8. The predominantly perennial tree crops in the cropping pattern introduces major limitations for adjustments in the crops grown by the farmers in the short and medium terms. The domination of perennial crops in the cropping pattern also makes it difficult to adjust supply according to market conditions.
9. Though the most important crops of coconut, rubber, pepper and cardamom are vital to the state economy, they are not significant in the national economy. In view of the limited importance of Kerala agriculture in the national economy, often Kerala's interests are either inadequately perceived in the WTO negotiations or sacrificed to protect the interests of potentially more important states. The small size of the state also introduces limitations of bargaining power in the political decision-making process at the national level.

### **3.8 Conclusion**

The objective of this chapter was to assess the World Trade Organisation (WTO) and the Agreement on Agriculture (AoA) to the Indian and Kerala Agriculture. The developing countries are mostly affected by the provisions on market access since they have not been heavily dependent on the other two concerns. Modalities for effective implementation of these provisions were evolved through negotiations by the WTO ministerial meetings. There are many bottlenecks and hardships facing the developing countries to obtain a favourable position in the international markets in competition with the developed countries. Some of the provisions create obstacles for developing countries to effectively compete in the global markets on an even keel. Further many

structural problems in developing countries make it difficult to cope up with the competition in the international markets. It was expected that globalization in Indian agriculture offered opportunities for driving large benefits from increased agricultural exports of high value of agricultural products. At the Uruguay round India had agreed to make adjustments in tariff rates of 3373 commodity/commodity groups. Quantitative restrictions on import of agricultural products have been totally eliminated on a phased manner by April 1, 2001.

Among the Indian states, Kerala's agriculture has the maximum impact of WTO provisions on account of the predominantly cash crop oriented cropping pattern by a large number of small and marginal farmers, and a high proportion of trade dependence on the agricultural products. The first half of the 1990's had witnessed buoyancy on account of both productivity improvements and favourable price situation. However, the crash of commodity prices during the last quarter of 1990's had left the commodity market dependent on agriculture in a depressed situation. Based on the experience of the limited post globalisation period some tentative conclusions on the coconut, rubber and pepper economy of the state are indicated in the respective chapters.

## **Chapter 4**

### **Trends in Area, Production and Yield of Coconut, Rubber and Pepper: An Analysis of Major Producing Countries**

#### **4.1 Introduction**

This chapter deals with the global pattern regarding the area, production and yield of coconut, rubber and pepper in order to highlight the changes in the major producing countries like Philippines, Indonesia, India, Sri Lanka, Thailand, Vietnam, Brazil, Malaysia and China during the pre-and post-globalization period. The growth trends of the area, production and yield of the coconut, pepper and rubber are estimated for the pre-globalisation and post-globalisation. To make a comparison with the Indian scenario, the major producing countries of each crop are selected for the analysis. It will be helpful to understand the growth position of India with regard to the selected crops and can suggest policy recommendations based on the conclusion. The entire period of analysis is total covering 42 years from 1975 to 2017. This period is subdivided as 1975-1994 as the pre-globalisation period covering 19 years prior and 1995-2017 around 23 years as the post-globalisation period. The subdivision of the period is based on the implementation of the WTO's Agreement on Agriculture and the WTO came into force during 1995. Therefore, before the period of WTO is taken as pre-globalisation and after the period of WTO is taken as post-globalisation periods. This chapter analyses the growth trends of area, production and yield of coconut, pepper and rubber. The compound annual growth is used to analyse the growth for the sub-periods. The acceleration deceleration growth model is also used to analyse the stability of the growth.

#### **4.2 Trends in Area, Production and Productivity of Coconut**

This section analyses the growth trends of area, production and yield of coconut for the major producing countries of Philippines, Indonesia, India, Sri Lanka and Thailand for the period of 1975-2017. Further the changes in the production levels are decomposed

in terms of contributions from the changes in area and yield during both the pre-globalisation and post-globalisation periods. The data for the analysis was extracted from Food and Agricultural Organisations (FAO) statistics. The analysis is carried out for pre-globalisation and post globalization periods.

#### 4.2.1 Area under Coconut Cultivation

According to the FAO data, the global area under coconut in 2017 was 27, 840, 63 thousand hectares. The three major producing countries of Philippines, Indonesia and India with 3612 thousand ha, 3260 thousand ha and 2081 thousand ha respectively accounted for more than 88.6 per cent of the global area. Among the remaining countries Sri Lanka (409 thousand ha) and Thailand (192 thousand ha) occupied the fourth and fifth position in terms of area.

**Table 4.1**  
**Area under Coconut ('000 ha)**

Year	Philippines	Indonesia	India	Sri Lanka	Thailand
1975	2283	1534	1070	451	202
1980	3236	1803	1083	451	232
1985	3270	1975	1226	416	306
1990	3112	2262	1475	416	346
1995	3095	2585	1833	442	335
2000	3144	2592	1770	444	315
2005	3243	2710	1935	395	265
2010	3576	2980	1896	395	231
2017	3612	3260	2081	409	192

Source: FAO Statistics

From the Table 4.1, it is clear that the highest area increase was experienced in Indonesia where the area of coconut cultivation in 1975 was 1534 thousand ha had increased by 122.5 per cent in 2017. In India the area of coconut cultivation in 1975 was 1069 thousand ha had increased by 94.6 per cent in 2017. During the same period Philippines had only 58 per cent increase in the coconut area. The data shows that the

area of coconut cultivation was increased highly from 1975 to 2017 in Philippines, Indonesia and India, but the area of coconut cultivation was declined for Sri Lanka and Thailand in 2017.

The compound growth rate of the area of coconut cultivation for the major producing countries given in Table 4.2 shows that during the pre-globalisation period, Philippines, Indonesia, India and Thailand have high growth of area of coconut cultivation. While considering the changes in coconut area separately for the period pre-globalization and post-globalization period, it is evident that during the pre-globalization period India had the maximum growth of 2.6 per cent followed by Indonesia (2.43 per cent), Thailand (2.36 per cent) and Philippines (1.11 per cent). However, during the post-globalization period Indonesia had the highest growth of 1.11 per cent and it was only 0.84 per cent in Philippines. Thailand shows the highest decline in the post-globalization period with -2.86 per cent while, India experienced 0.78 per cent increase in the post-globalization period. Sri Lanka had a declining tendency in area during both the periods, with rapid decline during the post-globalization period. Thus, during the post globalization period while Indonesia, Philippines and India had expanded the area under coconut, Thailand and Sri Lanka had declined the area under coconut cultivation. The Figure 4.1 also shows the trend of area under coconut cultivation.

**Table 4.2**  
**Compound Growth rate of Area under Coconut**

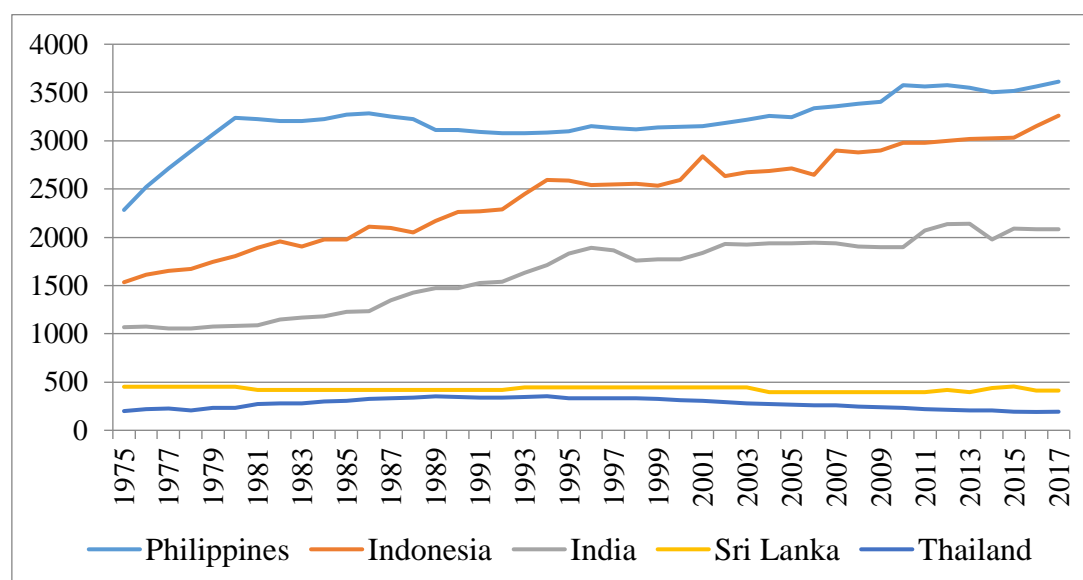
Period	Philippines	Indonesia	India	Sri Lanka	Thailand
1975-2017	0.56	1.61	1.92	-0.29	-0.57
1975-1994	1.11	2.43	2.63	-0.46	2.36
1995-2017	0.84	1.11	0.78	-0.64	-2.86

Source: Calculated from FAO Statistics

The table 4.3 shows the acceleration deceleration growth model of the area under coconut cultivation. During the pre-globalisation period the growth rate of area under coconut cultivation for Philippines, and Thailand shows a deceleration of growth while India and Sri Lanka show an acceleration of growth rate. In the post-globalisation

period Indonesia and Sri Lanka shows acceleration of growth rate in the area of coconut cultivation.

**Figure 4.1**  
**Area under Coconut ('000 ha)**



Source: FAO Statistics

**Table 4.3**  
**Acceleration Deceleration Growth of Area under Coconut**

Period	Philippines	Indonesia	India	Sri Lanka	Thailand
1975-2017	-2.5	-3.2***	-4.42***	0.8	-3.48***
1975-1994	-6.54***	4.94	18.47***	3.65***	-3.48***
1995-2017	1.66	7.46*	3.42	2.69**	4.3

Note: \*\*\* 1%, \*\* 5%, \* 10% level of significance.

Source: Calculated from FAO Statistics

The global share of area under coconut cultivation for the major producing countries is given in Table 4.4. The uneven increase in the area under coconut in the major producing countries has also influenced the relative shares of different countries in the global area. While Philippines had accounted for 30.79 per cent of the global area in 1975, it had declined to 28.89 per cent in 1995 and remained at the slight increases 29.28 in 2017. Indonesia had a steady increase in its share during both the periods.



India's share had increased during the pre-globalization period, but it has declined during the post-globalization period. Sri Lanka's share declined during both the periods. Thailand had improved its share during the pre-globalization period, and declined its position during the post-globalization period.

**Table 4.4**  
**Share of the Major Coconut Producing Countries in the Global Area**

Country	1975	1995	2017
Philippines	30.79	28.89	29.28
Indonesia	20.69	24.12	26.42
India	14.42	17.11	16.87
Sri Lanka	6.08	4.12	3.31
Thailand	2.71	3.13	1.56

Source: Calculated from FAO Statistics

#### **4.2.2 Production of Coconut**

The global production of coconut in 2017 is 61,098 thousand tonnes. While Indonesia was the leading producer of coconut with 18,983 thousand tonnes, followed by Philippines (14,049 thousand tonnes). India remained as the third largest producer with 11,469 thousand tonnes. The three major producing countries accounted for 72.8 per cent of the global production, which corresponds to their area share also (Table 4.5). The growing trend of coconut production in Philippines, Indonesia and India is also visible from the Figure 4.2.

The compound growth rate of coconut production (Table 4.6) shows that, during the entire period of analysis, India had the highest growth rate of coconut production with 1.92 per cent per annum, followed by 1.61 per cent per annum in Indonesia, and Philippines (0.62 per cent). Sri Lanka and Thailand had registered negative growth in the production of coconut for the period of 1975-2017. During the pre-globalization period all the five countries had increased production of coconuts, with the highest level of 4.29 per cent in India, followed by Indonesia (3.25 per cent), Thailand (2.77 per cent), Philippines (1.59 per cent) and Sri Lanka (0.36 per cent). The situation had

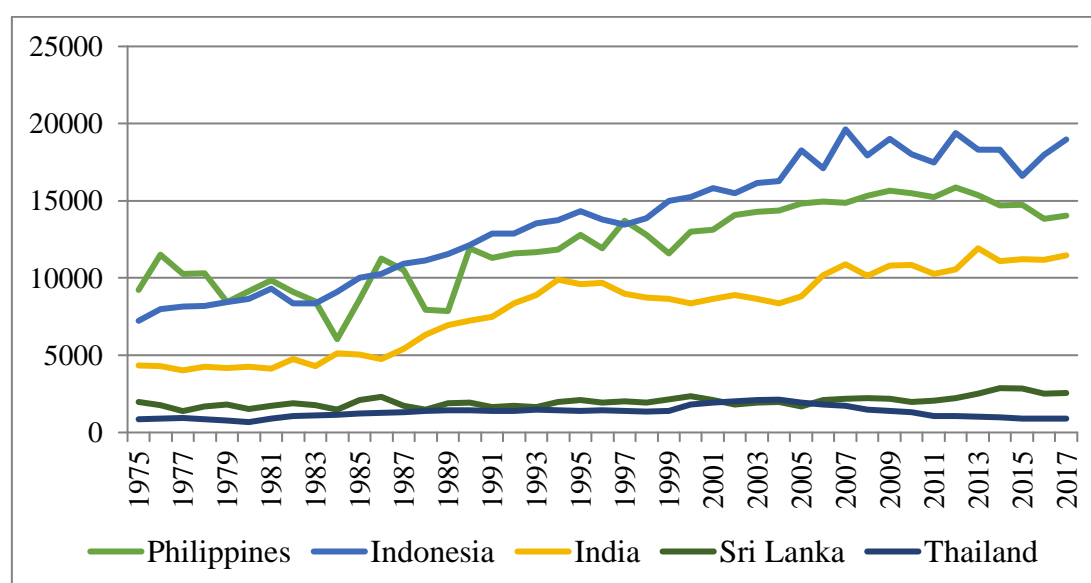
changed during the post-globalization period in Philippines, Indonesia, Sri Lanka and India having a sizeable decrease in the major production of coconut. The growth of coconut production in Thailand during the post-globalization period shows a negative growth of -1.76 per cent.

**Table 4.5**  
**Production of Coconut (000' Tonnes)**

Year	Philippines	Indonesia	India	Sri Lanka	Thailand
1975	9219	7230	4331	1965	842
1980	9141	8660	4250	1540	671
1985	8600	10000	5030	2096	1226
1990	11942	12120	7230	1924	1426
1995	12791	14318	9623	2094	1413
2000	12995	15240	8350	2353	1795
2005	14825	18250	8829	1683	1940
2010	15510	18000	10840	1990	1298
2017	14049	18983	11470	2575	895

Source: FAO Statistics

**Figure 4.2**  
**Production of Coconut (000' Tonnes)**



Source: FAO Statistics

**Table 4.6**  
**Compound Growth rate of Coconut Production**

Period	Philippines	Indonesia	India	Sri Lanka	Thailand
1975-2017	0.62	1.61	1.92	-0.28	-0.56
1975-1994	1.59	3.25	4.29	0.36	2.77
1995-2017	0.93	1.61	1.25	1.31	-1.76

Source: Calculated from FAO Statistics

**Table 4.7**  
**Acceleration Deceleration Growth of Coconut Production**

Period	Philippines	Indonesia	India	Sri Lanka	Thailand
1975-2017	1.37	-28.38***	-21.7**	6.57**	-20.23***
1975-1994	29.55**	12.98***	24.13***	-25.23	-10.4
1995-2017	-14.74***	-15.91***	72.52**	32.42***	-63.65***

Source: Calculated from FAO Statistics

The acceleration deceleration growth model of coconut production (Table 4.7) shows that Indonesia, India and Thailand show a deceleration of growth rate, while Sri Lanka shows an acceleration of coconut production for the entire period of analysis. During the pre-globalisation period, Philippines, Indonesia and India show accelerate in of growth rate, while Philippines, Indonesia and Thailand show the deceleration of growth rate. India and Sri Lanka have accelerated growth rate during the post-globalisation period. During both pre-globalisation and pre globalisation India only witnessed the acceleration of growth rate.

In the Table 4.8, the relative shares of production in the major producing countries indicate that the share of Philippines in the global production of coconuts had slight decline during the pre-globalization period from 29.91 per cent in 1975 to 25.32 per cent in 1995. However, during the post-globalization period the share of Philippines in the global production had a sharp decline to 22.99 per cent in 2017. Both Indonesia and India had improved their share in coconut production from 1975 to 1995, but the shares of Indonesia have increased their coconut production but India has dropped during the

post-globalization period. Sri Lanka had experienced declining share during both the pre-globalization and post-globalization periods. The share of Thailand also witnessed half of their share of coconut production was declined from 1995 to 2017.

**Table 4.8**  
**Shares of Major Coconut Producing Countries in Global Production**

Country	1975	1995	2017
Philippines	29.91	25.32	22.99
Indonesia	23.45	28.32	31.07
India	14.05	19.03	18.77
Sri Lanka	6.37	4.14	4.21
Thailand	2.73	2.79	1.46

Source: Calculated from FAO Statistics

#### 4.2.3 Yield of Coconut

The global average yield of coconut has increased from 3858 Kg/Ha in 1975 to 4715 kg/ha in 2017. In 1975, Indonesia had the highest yield of 4713 Kg/Ha and it was followed by Sri Lanka with 4352 Kg/Ha. While the yield of Thailand in was third in the global average during 1975. India and Philippines remained below in the yield level of coconut compared to other countries. The global average yield of 4259 Kg/Ha in 1995 indicated an increase of 51.8 per cent from 1975 to 1995. Indonesia had the highest yield of 5339 Kg/Ha, in 1995. However, Indonesia's 13.2 per cent growth in yield from 1975 to 1995 was below India's yield increase of 29.6 per cent during the same period. The yield of coconut had declined in Philippines to -5.9 per cent in 2017 from 2.3 per cent in 1975. The global average yield of coconut was doubled during 2017 as compared to 1975 From the Table 4.9, it is clear that in 2017 the highest yield of coconut was shown by Sri Lanka (6293 Kg/Ha.) followed by Indonesia (5823 Kg/Ha.) and India (5511 Kg/Ha.). The yield of coconut was declined for Philippines during 2017. The growing trend of the coconut yield for the major producing countries during 1975 to 2017 is represented in the Figure 4.3.

**Table 4.9**  
**Productivity of Coconut (Kg/Ha)**

Year	Philippines	Indonesia	India	Sri Lanka	Thailand
1975	4037	4713	4048	4352	4171
1980	2824	4803	3923	3411	2886
1985	2630	5063	4104	5033	4001
1990	3837	5359	4901	4620	4120
1995	4133	5539	5249	4739	4212
2000	4133	5880	4717	5300	5696
2005	4570	6734	4562	4263	7310
2010	4337	6040	5717	5041	5620
2017	3889	5823	5511	6293	4661

Source: FAO Statistics

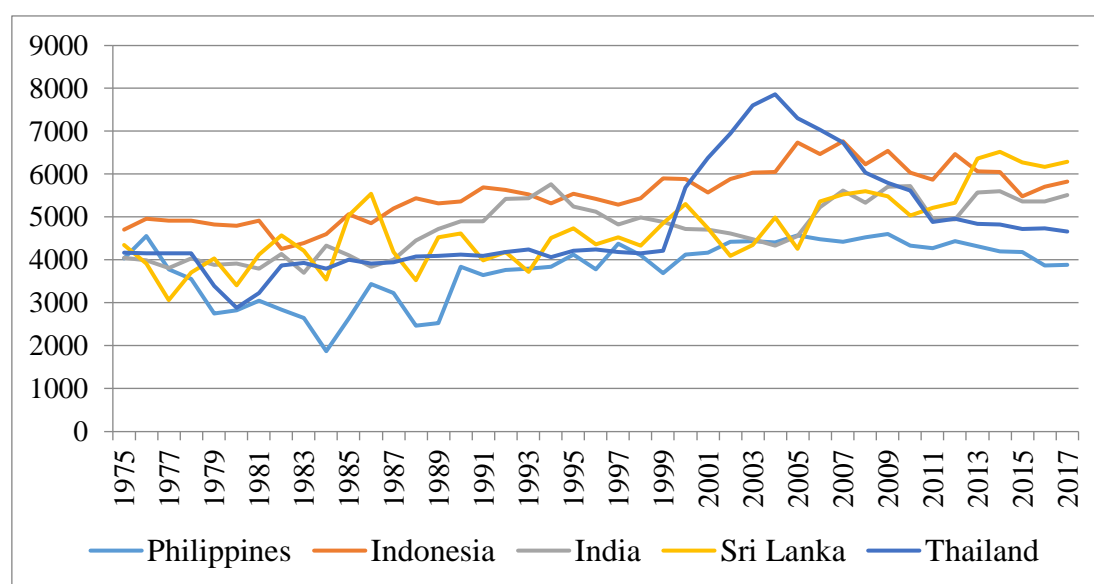
The compound annual growth rate of the coconut yield (Table 4.10) shows that India had the highest coconut yield level during the entire period of analysis (1.92 per cent) and in the pre-globalization period (1.69 per cent) followed by Indonesia (1.61 per cent). Whereas, India and Indonesia are the two major producing countries which have declined the growth of coconut yield during the post-globalization period. All other countries like, Philippines, Sri Lanka and Thailand had increased the growth rate of coconut yield during the post globalization period. Among them Sri Lanka shows the highest growth rate of coconut yield during the post-globalization period with 1.72 per cent growth per annum.

**Table 4.10**  
**Compound Growth rate of Coconut Yield**

Period	Philippines	Indonesia	India	Sri Lanka	Thailand
1975-2017	0.56	1.61	1.92	-0.29	-0.59
1975-1994	-0.61	0.83	1.69	0.78	0.39
1995-2017	0.17	0.36	0.65	1.72	0.45

Source: Calculated from FAO Statistics

**Figure 4.3**  
**Productivity of Coconut (Kg/Ha)**



Source: FAO Statistics

**Table 4.11**  
**Acceleration Deceleration Growth of Coconut Yield**

Period	Philippines	Indonesia	India	Sri Lanka	Thailand
1975-2017	8.12	-8.11**	-6.88	15.31***	-18.36
1975-1994	17.46***	44.15**	99.06***	-41.35	48.12*
1995-2017	-45.55***	-73.93***	26.63	44.86*	-23.59***

Source: Calculated from FAO Statistics

The acceleration deceleration growth model of coconut yield of the major producing countries (Table 4.11) show that Philippines, Indonesia, India and Thailand are positively significant and it indicate that the growth rate of these countries in the pre-globalisation period was an accelerated rate of growth. While in the post-globalisation period, the growth rate of Philippines, Indonesia and Thailand was negatively significant and it indicates that the growth rate of coconut yield during the post-globalization period was a decelerated rate of growth.

Productivity variations across the countries are often considered as a major factor influencing international competitiveness among the countries. While productivity in

different countries depend on a number of factors, it may be possible to compare the relative productivity by considering the yield level obtained in a given country in relation to the global average yield.

**Table 4.12**  
**Relative Productivity Index of Coconut (Global average=100)**

Country	1975	1995	2017
Philippines	161	108.5	81.3
Indonesia	187	140.2	121.8
India	161.4	137.8	115.3
Sri Lanka	173.5	124.4	131.7
Thailand	166.3	110.6	97.5

Source: Calculated from FAO Statistics

The relative productivity measures indicate (Table 4.12) that during 1975 the index of productivity ranged between 161 in Philippines and 187 in Indonesia. By 1995 the range had slightly widened with 108 in Philippines to 140 in Indonesia. However, by 2017 the range has narrowed down with 97.5 in Thailand to 115 in India. From the point of view of individual country scenario, in Philippines productivity index declined from 161 to 108 during the pre-globalisation period and it increased from 108 to 81 during the post globalisation period.

Indonesia and India have decreased their productivity index during the pre-globalisation period, but they have deteriorated in the post globalisation period, but the share of production in Indonesia second and India had third relative production of index in 2017. Sri Lanka's productivity index has deteriorated during pre-globalisation periods, post globalisation period the heist growth obtained. Thailand whose productivity was the same as the average global productivity during 1975 has worsened its position by 1995 and it remained at the same reduced level in 2017 also.

#### 4.2.4 Decomposition of Production Changes in Coconut

The changes in the coconut output over the years can be decomposed in terms of the contributions of area effect, yield effect and interaction effect. About 75 per cent of the global production changes between 1975 and 1994 were influenced by the changes in area and 18.5 per cent was the contribution of yield changes. Philippines had a major influence of area effect (106.4 per cent) which was partially offset by the negative contribution of yield (– 4.7 per cent). Area effect dominated in Thailand (92.3 per cent), Indonesia (69.9 per cent) and India (58.4 per cent). Sri Lanka’s production increase was the net result of a large positive yield effect (136.3 per cent) and a negative area effect of 31.4 per cent (See Table 4.13).

**Table 4.13**

#### **Contribution of Area Effect and Yield Effect in Production Changes (per cent)**

Country	1975 – 1994		1995– 2017	
	Area Effect	Yield Effect	Area Effect	Yield Effect
Philippines	106.4	– 4.7	19.9	78.2
Indonesia	69.9	17.8	132.5	– 207.5
India	58.4	24.3	– 59.4	– 44.5
Sri Lanka	–31.4	136.3	– 62.1	– 40.9
Thailand	92.3	1.6	–	100.0

Source: Calculated from FAO Statistics

During the post globalisation period also the global production increase was mainly due to the area effect. Yield effect accounted for the entire production increase in Thailand. In Philippines also the yield effect was the dominant factor (about 78 per cent) responsible for the production increase. Both in India and Sri Lanka area effect and yield effect had significant contributions towards the decline in production. A sizeable positive area effect in Indonesia was more than offset by a large negative yield effect.

#### 4.3 Trends in Area, Production and Productivity of Pepper

This section analyses the growth trends of area, production and yield of pepper for the major producing countries of India, Indonesia, Vietnam, Sri Lanka, Brazil and Malaysia



for the period of 1975-2017. Further the changes in the production levels are decomposed in terms of contributions from the changes in area and yield during both the pre-globalisation and post-globalisation periods. The data for the analysis was extracted from Food and Agricultural Organisations (FAO) statistics. The analysis is carried out for pre-globalisation and post globalization periods.

### **4.3.1 Area under Pepper Cultivation**

In terms of area, India is the major pepper producing country with 1, 81,978 ha, followed by Indonesia (1, 32,000 ha.), Vietnam (93,507 ha.), Sri Lanka (41,965 ha), Brazil (28,631 ha.) and Malaysia (17,087 ha.) in 2017 (See Table 4.14). The growth trends in the major producing countries indicated substantial variations. Both in India and Indonesia, major increase in area of pepper cultivation took place during 1985 to 1990 – in India the increase was from 109,400 ha in 1985 to 171,490 ha in 1990 and in Indonesia it was from 53,500 ha in 1985 to 74,776 ha in 1990. Vietnam had a substantial expansion of area; starting from 320 ha in 1975 it increased to 93507 ha in 2017, with the bulk of increase after 1995. Sri Lanka's major expansion of area occurred during 1990 to 1995. Brazil had major expansion of area in two periods from 1975 to 1980 and from 1985 to 1990, mainly on account of the encouragement from the Brazilian government through financial support. However, there was a major setback in Brazil during 1990 to 1995 with the area declining from 34,093 hectares to 18,743 ha due to the farmers' response to declining prices during early 1990's. This decline continued till 2000 and subsequently there was a revival from 16,217 ha to 23, 101 ha in 2017. Malaysia had also experienced major fluctuations in area with rapid decline during 1980 to 1985 and revival during the remaining periods. The growing trend of the area under pepper cultivation for the period from 1975 to 2017 for the major producing countries is represented graphically in Figure 4.4.

The compound growth rate of the area under pepper cultivation of the major producing countries is given in Table 4.15. While analysing the changes in area under pepper among the major producing countries, it is obvious that India is the only country where the post-globalisation period has recorded a negative growth in area. Vietnam had an

impressive gain in the area of pepper cultivation both in pre-globalisation (21.77 per cent) and post-globalisation (10.96 per cent) with highest growth rate among other countries. While the percentage increase during the pre-globalisation period in Vietnam might appear to be large, it should be kept in mind that in the initial year (1975) area was very small. Even though, the growth rate in the post-globalisation period was less compared to the pre-globalisation period, Vietnam shows the highest growth rate. During the pre-globalisation period Malaysia only shows the negative growth rate (-0.95). Malaysia had also increased the area at a rapid rate during the post globalisation period (1.41 per cent). Though, the growth in area under pepper in Sri Lanka during the post-globalisation period was not substantial it could hold on to the substantial increase during the first half of 90's and maintain a slow rate of growth in the subsequent years. Except for Indonesia and Malaysia, all the countries show a decline in the growth rate during the post-globalisation period.

**Table 4.14**  
**Area under Pepper (Hectares)**

Year	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
1975	111930	40300	320	6445	9909	9225
1980	109290	50038	426	9080	23069	12720
1985	109400	53500	2176	11510	19219	5413
1990	171490	74776	9196	15601	34093	11512
1995	193300	71500	7000	26990	18743	9837
2000	196000	100000	14900	28440	16217	13415
2005	228330	115000	39400	31150	31832	12722
2010	195920	186296	44300	37340	23263	11012
2017	132000	181978	93507	41969	28631	17087

Source: FAO Statistics

The acceleration deceleration growth of area under pepper for the major producing countries is given in Table 4.16. During the pre-globalisation period India and Sri Lanka had shown acceleration growth rate in the area under pepper with positive and significant coefficients. While, India, Indonesia and Brazil show decelerative growth rate during the post-globalisation period. Vietnam and Sri Lanka witnessed significant

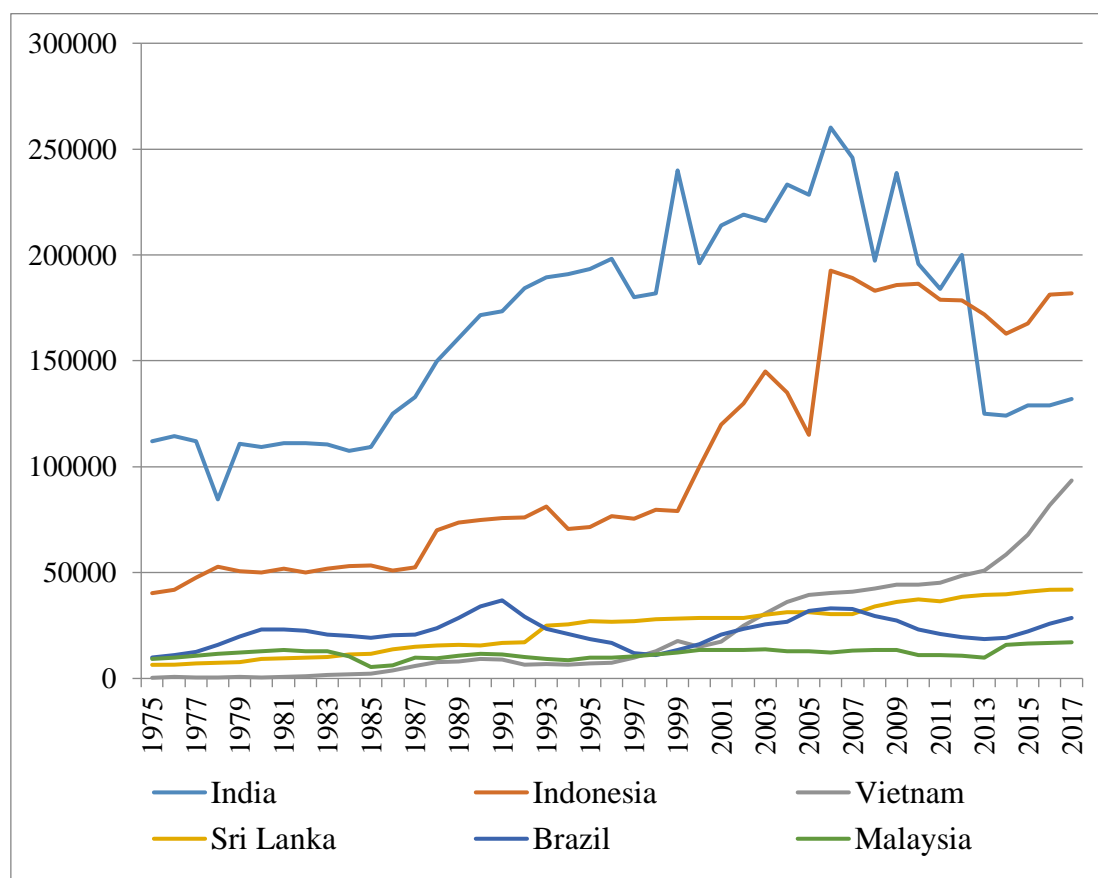
and positive growth rate and shows acceleration of growth rate. Only Sri Lanka shows an acceleration of growth rate during both in pre-globalisation and post-globalisation period.

**Table 4.15**  
**Compound Growth rate of Area under Pepper**

Period	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
1975-2017	1.41	4.08	13.66	4.71	0.98	0.92
1975-1994	3.36	3.25	21.77	7.04	4.92	-0.95
1995-2017	-1.98	4.61	10.96	2.33	2.22	1.41

Source: Calculated from FAO Statistics

**Figure 4.4**  
**Area under Pepper (Hectares)**



Source: Calculated from FAO Statistics

**Table 4.16**  
**Acceleration Deceleration Growth of Area under Pepper**

Period	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
1975-2017	-21.23***	64.04***	65.21***	-14.99	-10.49	5.76**
1975-1994	41.98***	63.21	6.14	42.73***	-57.66	-7.68
1995-2017	-69.42***	-38.24***	77.26**	23.37***	-75.64**	5.58

Source: Calculated from FAO Statistics

**Table 4.17**  
**Share of Major countries in Global Area under Pepper**

Country	1975	1995	2017
India	53.68	51.12	22.51
Indonesia	19.33	18.86	31.02
Vietnam	0.15	1.85	15.94
Sri Lanka	3.09	7.12	7.15
Brazil	4.75	4.95	4.88
Malaysia	4.42	2.62	2.91

Source: Calculated from FAO Statistics

The shares of area under pepper cultivation in the major producing countries are given in Table 4.17. While India has retained the leading position in terms of area under pepper cultivation, the relative positions of the major producing countries have undergone some changes. Though India remained at the first position there has been a decline in its share of global area of pepper from 53.68 per cent in 1975 to 22.51 per cent in 2017 with the bulk of the reduction occurring during the post-globalisation period. Indonesia had more or less retained its relative share in 1975 and 1995, then it increased to 31.02 per cent in 2017. Vietnam had only a negligible share of 0.15 per cent of the global area in 1975, and by 1995 it had slowly increased to 1.85 per cent and during the post-globalisation period it has rapidly gone up to 15.94 per cent in 2017. Though Sri Lanka had increased the area during the post-globalisation period, its share in the global area has declined. Brazil has more or less maintained its share of the global

area. Malaysia had experienced a sharp decline in its share during the pre-globalisation period, but there was a recovery during the post-globalisation period.

### **4.3.2 Production of Pepper**

The production of pepper in the major producing countries is given in Table 4.18. It shows that, Vietnam had the highest production level of 2, 52,576 tonnes followed by Indonesia (87,029 tonnes) and Brazil (79,371 tonnes) in 2017. India was the fourth largest producer with 72,000 tonnes in 2017. Between 1975 and 2017 world production of pepper has nearly tripled. Consistent with the maximum increase in area the maximum increase in production also occurred in Vietnam. Sri Lanka had recorded the next highest growth of pepper production in 2017, being four times higher the 1975 production level. Indonesia has nearly tripled the production. In India the production of pepper is increased to 72,000 tonnes in 2017 from 25,570 tonnes in 1975. Brazil also had more than doubled the production during this period. Here it is also worth pointing out that the world production level as well as the production level in individual countries had experienced substantial fluctuations over the years. Therefore, it is difficult to identify a consistent trend in production levels except in Vietnam and Sri Lanka. The graphical representation of the production of pepper for the major producing countries is represented in Figure 4.5.

The compound growth rate of the pepper production for major producing countries is given in Table 4.19. In spite of the absence of any consistent trend in production level it is possible to make some observations regarding the production growth during the pre-globalisation and post-globalisation periods. The production growth in India during the post-globalisation period was negative (-0.79 per cent), which is consistent with the area growth. As expected, Vietnam's phenomenal increase in area has also resulted in a phenomenal increase in production during both the pre-and post-globalisation periods. However, the growth in the post globalisation period is more impressive than the pre-globalisation period with 24.61 per cent growth per annum. Malaysia had a negative growth (-3.44 per cent) during the pre-globalisation period, but during the subsequent period it has made substantial improvements in the production level (2.22

per cent). Brazil also has a better production performance during the post-globalisation period (2.94 per cent) as compared to the previous period (2.12 per cent). Sri Lanka's production increase during the post globalisation period was less (3.94 per cent), though it had an impressive growth during the pre-globalisation period (7.57 per cent).

**Table 4.18**  
**Production of Pepper (Tonnes)**

Year	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
1975	25570	22934	350	3250	28720	32885
1980	29490	36626	556	4601	62563	31570
1985	18220	40516	1317	5808	37941	19070
1990	55190	69899	11210	8732	78155	31191
1995	60700	58955	12100	16000	33852	15796
2000	59000	69087	51000	16860	38685	24114
2005	73020	78328	104390	18290	79102	19099
2010	51020	83700	105400	26620	52137	24227
2017	72000	87029	252576	29289	79371	30433

Source: FAO Statistics

**Table 4.19**  
**Compound Growth of Pepper Production**

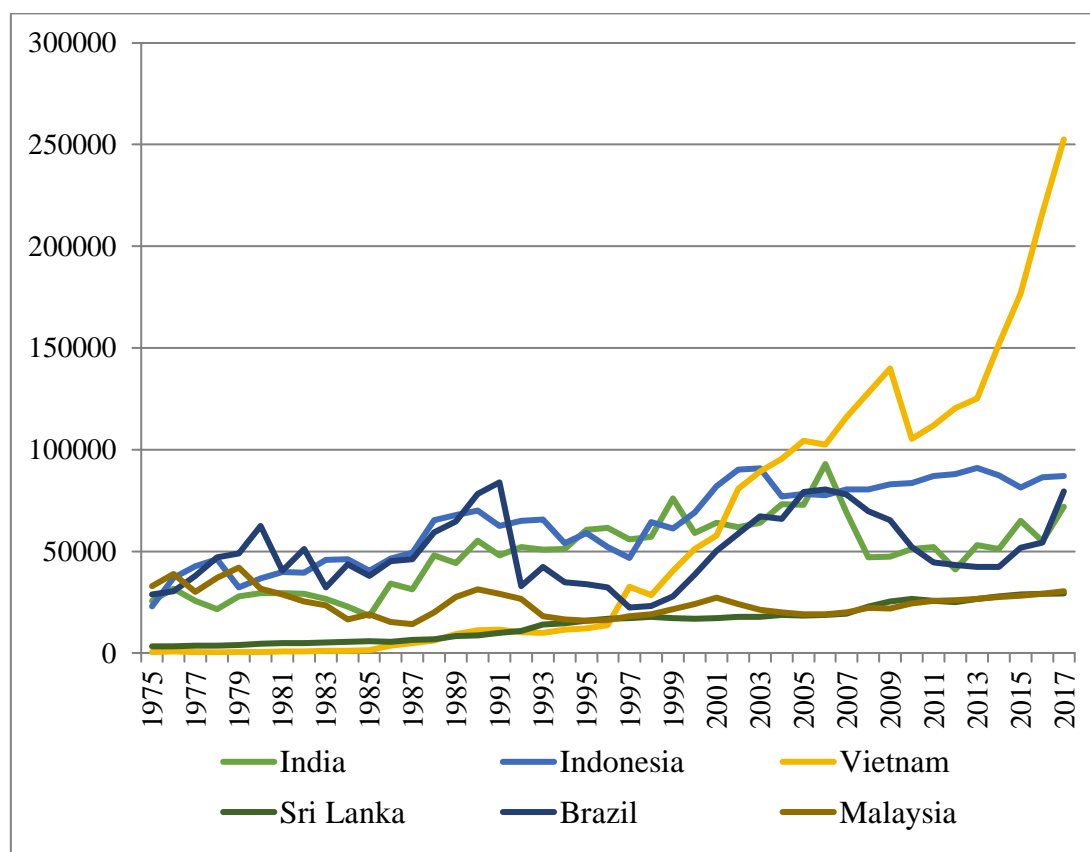
Period	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
1975-2017	2.44	2.43	18.18	5.76	0.90	-0.35
1975-1994	4.08	4.29	24.61	7.57	2.12	-3.44
1995-2017	-0.79	2.12	11.40	3.94	2.94	2.22

Source: Calculated from FAO Statistics

The acceleration deceleration growth model of pepper production for the major producing countries is given in Table 4.20. India, Indonesia and Brazil show deceleration of growth while Vietnam and Sri Lanka show an acceleration of growth for the entire period of analysis. Whereas, India only shown a deceleration of growth rate during the pre-globalisation period, but during the post- globalisation period the

growth of pepper production is accelerative. Vietnam, Sri Lanka and Malaysia also witnessed an acceleration of growth of pepper production during the pre-globalisation period.

**Figure 4.5**  
**Production of Pepper (Tonnes)**



Source: FAO Statistics

**Table 4.20**  
**Acceleration Deceleration Growth of Pepper Production**

Period	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
1975-2017	-69.43***	-38.27***	77.23**	23.36***	-75.64**	5.51
1975-1994	-45.52***	-13.92	17.63***	4.42**	-1.37	31.36***
1995-2017	13.19**	-7.91	42.75***	39.68***	-14.66	83.02*

Source: Calculated from FAO Statistics

**Table 4.21**  
**Shares of Major Producing Countries in Pepper Production**

Country	1975	1995	2017
India	19.85	19.32	9.92
Indonesia	17.80	18.76	11.99
Vietnam	0.27	3.85	34.80
Sri Lanka	2.52	5.09	4.04
Brazil	22.29	10.77	10.93
Malaysia	25.52	5.03	4.19

Source: Calculated from FAO Statistics

The global share of pepper production in the major producing countries is given in Table 4.21. The shares of major producing countries in the global pepper production indicate different patterns during the pre-and post-globalisation periods. Vietnam was the only country where the share in the global production of pepper has increased during both the periods. While Vietnam's share increased from 0.27 per cent in 1975 to 3.85 per cent in 1995 it has further increased to 34.80 per cent in 2017. India and Sri Lanka had decreased their shares during the pre-globalisation period, and both countries have experienced a fall in their shares during the post-globalisation period. India had dropped down its share from 19.85 per cent in 1975 to 9.92 per cent in 2017. Indonesia's share increased from 17.80 per cent in 1975 to 18.76 per cent in 1995 and it has dropped down to 11.99 per cent in 2017. Sri Lanka's share has increased from 2.52 percent in 1975 to 4.04 per cent in 2017, but it was drop down from 5.09 per cent in 1995 to 2017. Brazil's share of 22.29 per cent in 1975 had declined to 10.77 per cent in 1995 and it has slightly increased to 10.93 percent in 2017. Malaysia had a substantial decline in its share from 25.52 per cent in 1975 to 5.03 per cent in 1995 and further declined to 4.19 per cent in 2017.

### **4.3.3 Yield of Pepper**

The yield levels indicate substantial variations across the major producing countries mainly on account of the nature of cropping and the commercial attitude of the farmers.



Table 4.22 shows the yield of pepper for the major producing countries. India has the lowest yield level due to the mixed cropping and the use of live trees as the support. The yield of pepper in India was 228 kg/ha in 1975 and it increased to 314 kg/ha in 1995 and then declined to 545 kg/ha in 2017. Indonesia's yield of 569 kg/ha in 1975 had increased to 824 kg/ha in 1995 and then declined to 478 kg/ha in 2017.

**Table 4.22**  
**Yield of Pepper (kg/ha)**

Year	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
1975	228	569	1093	504	2898	3564
1980	269	732	1305	506	2712	2481
1985	166	757	605	504	1974	3523
1990	321	934	1219	559	2292	2709
1995	314	824	1728	592	1806	1605
2000	301	690	3422	592	2385	1797
2005	319	681	2649	587	2485	1501
2010	260	449	2379	712	2241	2200
2017	545	478	2701	697	2772	1781

Source: FAO Statistics

**Table: 4.23**  
**Compound Growth rate of Pepper Yield**

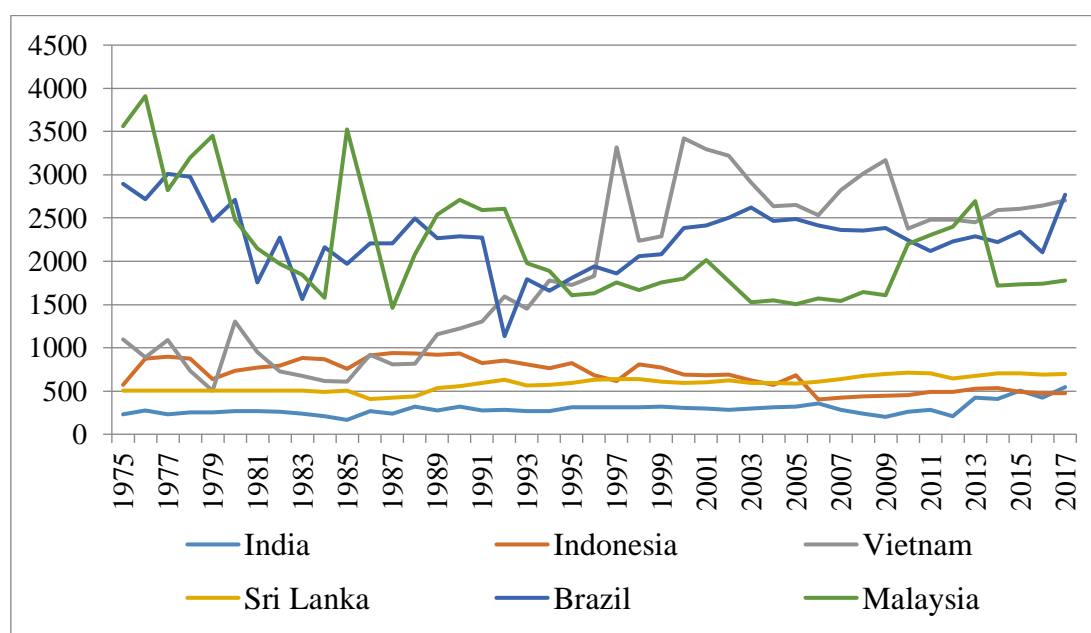
Period	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
1975-2017	1.51	-1.59	3.98	1.04	0.21	-1.19
1975-1994	1.37	-1.62	0.42	0.85	-0.79	-0.90
1995-2017	1.41	-2.68	0.41	0.88	0.78	0.85

Source: Calculated from FAO Statistics

Vietnam had only a small area in 1975 with a yield of 1093 kg/ha, which had increased by 58 percent between 1975 and 1995, and further by 56.2 per cent between 1995 and 2017. Sri Lanka had a relatively low level of yield (504 kg/ha) in 1975 which had increased by 17.5 percent between 1975 and 1995 and then slight increases by 17.7 per

cent between 1995 and 2017. Brazil and Malaysia had high yield levels in 1975, but both had experienced a drastic decline by 1995 and a good recovery between 1995 and 2017. It may be noted that increased pepper prices during mid 1980's had induced new planting around the world. With the harvest from these new vines prices began falling in 1991. The pepper production in Brazil and Malaysia declined quickly as the highly commercially oriented farmers had adjusted inputs, especially fertilizers according world pepper prices. Further, in Brazil interest rates were very high in 1990's and farmers could not get credit for input purchase. Unfavourable weather had reduced fertiliser application depressed the yield levels in Brazil during mid 1990's. The graphical representation of the growth trend of the yield of pepper for the major countries is given in Figure 4.6.

**Figure 4.6**  
**Yield of Pepper (kg/ha)**



Source: FAO Statistics

The compound growth rate of the yield of pepper for the major producing countries is given in Table 4.23. The results show that, for the total period of analysis, Vietnam witnessed the higher growth of yield of pepper with 3.98 per cent per annum followed by India (1.51 per cent) and Sri Lanka (1.04 per cent). India shows slightly higher

growth rate in the post-globalisation period (1.41 per cent) as compared to the pre-globalisation period (1.37 per cent). Vietnam and Sri Lanka had almost stable growth rate both in the pre-and post-globalisation periods. Brazil and Malaysia show an improvement of growth rate in the post-globalization period compared to the negative growth rates in the pre-globalisation periods. Indonesia shows negative growth rate of pepper yield during the pre-and post-globalisation periods.

**Table 4.24**  
**Acceleration Deceleration Growth of Pepper Yield**

Period	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
1975-2017	14**	-39.9***	-10.6*	4.7	13.9***	19.8***
1975-1994	18.1	-11.5	74.1***	94.5***	20.4	84.2*
1995-2017	12.8***	91.7**	-47.3**	24.6	-27.8**	11.9

Source: Calculated from FAO Statistics

The acceleration and deceleration growth model of pepper yield for the major producing countries is given in Table 4.24. It shows that Vietnam, Sri Lanka and Malaysia had positive and significant result and these countries had an acceleration of growth rate in the pre-globalisation period. While, during the post-globalisation period India and Indonesia had acceleration of growth rate, and the countries of Vietnam and Brazil were negatively significant and show deceleration of growth rate.

**Table 4.25**  
**Relative Productivity Index of Pepper (Global average = 100)**

Country	1975	1995	2017
India	2	0.6	0.6
Indonesia	5	1.7	0.5
Vietnam	9.7	3.6	3.1
Sri Lanka	4.4	1.2	0.8
Brazil	25.7	3.8	3.2
Malaysia	31.7	3.4	2

Source: Calculated from FAO Statistics

The relative productivity index indicates substantial variations among the major producing countries (See Table 4.25). During 1975 the productivity level in India was only 2 per cent of the average global productivity while it was 31.7 per cent in Malaysia. By 1995 the range has slightly narrowed down with 0.6 per cent in India and 3.8 per cent in Brazil. By 2017 the range has again widened with the lowest level of 0.6 per cent in India and the highest level of 3.2 per cent in Brazil. Both India and Sri Lanka had productivity levels below the global averages for all the years. Indonesia improved its position from 5 per cent in 1975 to 1.7 per cent in 1995, but it has dropped down to 0.5 per cent in 2017. Brazil had a high index in 1975, but here was decline in 1995 and had a moderate recovery by 2017. Vietnam had the world average productivity level in 1975, and it was doubled by 1995 and continued to retain the same level in 2017. Malaysia had the highest productivity level of more than four times the global average in 1975. However, there has been a declining tendency in the Malaysian productivity index even when they retained more than double the global average levels. Thus, there is a large comparative advantage in productivity levels of Vietnam, Brazil and Malaysia. Indonesia and Sri Lanka are at a disadvantageous position with respect to productivity levels. India has the least productivity index and therefore the Indian pepper cannot claim any comparative advantage in the International markets from productivity considerations.

#### **4.3.4 Decomposition of Production Changes in Pepper**

The change in global production of pepper during the post globalisation period was mainly influenced by the changes in area under pepper. From the Table 4.26, it is clear that, Brazil's substantial area effect was somewhat offset by a large negative yield effect during the pre-globalisation period. More than 80 per cent of the production increases in Vietnam and Sri Lanka were accounted by the area effect. Even in Malaysia where production has declined on account of a large negative yield effect, the area effect was positive.

**Table 4.26**  
**Contribution of Area and Yield Effects (per cent)**

Country	1975–1994		1995–2017	
	Area effect	Yield effect	Area effect	Yield effect
India	53.6	27.8	13.9	83.5
Indonesia	49.3	28.7	126.6	–23.5
Vietnam	81.6	0.8	68.8	4.5
Sri Lanka	81.2	5.0	179.2	–75.6
Brazil	498.9	–210.9	27.0	59.2
Malaysia	23.1	–109.8	54.4	28.9

Source: Calculated from FAO Statistics

During the post globalisation period yield increase accounted for 56 per cent of the global production increase and the area effect accounted for about 33 per cent. India's decline of production was mainly on account of the yield effect. Indonesia and Sri Lanka had substantial area effect to offset the negative yield effect. Brazil had the highest contribution of yield effect which accounted for 59 per cent of the production increase. Both Vietnam and Malaysia had area effect dominating over the yield effect.

#### **4.4 Trends in Area, Production and Productivity of Rubber**

This section analyses the growth trends of area, production and yield of rubber for the major producing countries of India, Indonesia, China, Malaysia and Thailand for the period of 1975-2017. Further the changes in the production levels are decomposed in terms of contributions from the changes in area and yield during both the pre-globalisation and post-globalisation periods. The data for the analysis was extracted from Food and Agricultural Organisations (FAO) statistics. The analysis is carried out for pre-globalisation and post globalisation periods.

##### **4.4.1 Area under Rubber Cultivation**

The area under rubber cultivation for the major producing countries is presented in Table 4.27. Malaysia had the largest area of rubber cultivation (1700 thousand ha)

followed by Indonesia (1561 thousand ha), Thailand (993 thousand ha), China (275 thousand ha) and India (171 thousand ha) in 1975. There was gradual expansion in the area under rubber cultivation in all these countries except Malaysia. Malaysia had a gradual decline in area though out this period. The 1975 area of 1700 thousand ha, touched the low level of 1081 thousand ha in 2017 indicating a decline of -36 per cent. While India and China have only relatively larger area under rubber, both these countries have expanded the area at a much higher rate of growth in comparison with the other three countries, however, the total area in these two countries is not very significant. The graphical representation of the growth trends of the area under rubber cultivation of the major producing countries is depicted in Figure 4.7.

**Table 4.27**  
**Area under Rubber (000' ha)**

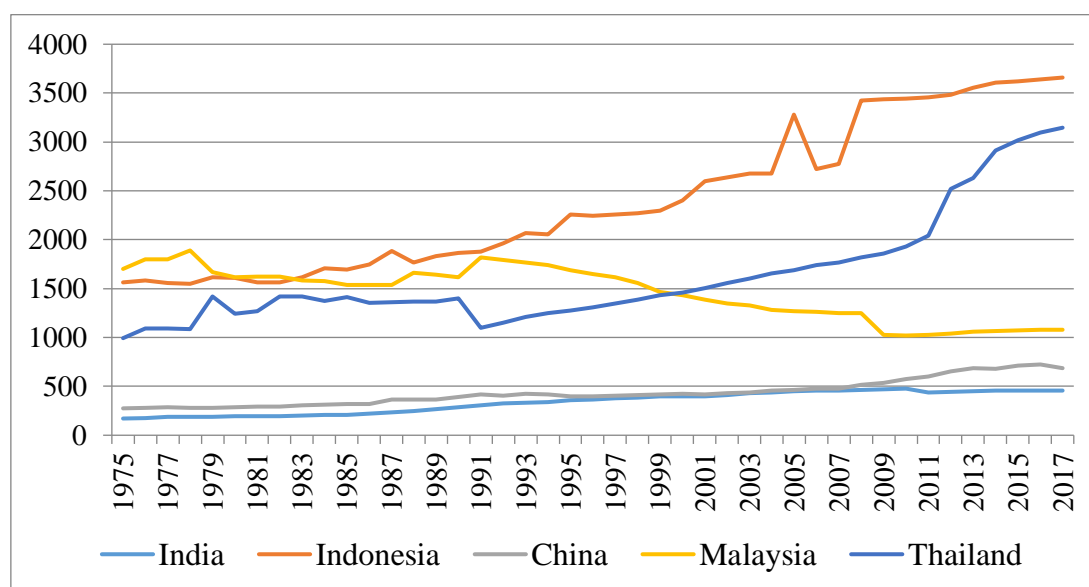
Year	India	Indonesia	China	Malaysia	Thailand
1975	171	1561	275	1700	993
1980	193	1612	288	1615	1240
1985	211	1692	317	1535	1411
1990	289	1866	390	1614	1400
1995	356	2261	395	1689	1276
2000	400	2400	421	1431	1462
2005	447	3279	465	1271	1691
2010	477	3445	577	1020	1929
2017	457	3659	684	1082	3146

Source: FAO Statistics

The compound growth rate of area under rubber cultivation for the major producing countries during the period between 1975 and 2017 is presented in Table 4.28. All the countries had shown growth rate ranging between 2.12 per cent to 2.74 per cent during the period of 1975-2017 except Malaysia. Malaysia shows negative growth rate during the entire period and both pre-globalisation and post-globalisation periods. During the pre-globalisation period India shown the highest growth rate (3.56 per cent) of area under rubber cultivation followed by China (2.53 per cent). All the countries except India and Malaysia, expanded the area of rubber cultivation and higher growth rate

during the post-globalisation period. Among them Thailand had the highest growth rate (4.29 per cent) followed by China (3.15 per cent) and Indonesia (2.74 per cent).

**Figure 4.7**  
**Area under Rubber (000' ha)**



Source: Calculated from FAO Statistics

**Table 4.28**  
**Compound Growth rate of Area under Rubber**

Period	India	Indonesia	China	Malaysia	Thailand
1975-2017	2.74	2.43	2.22	-1.39	2.12
1975-1994	3.56	1.51	2.53	-0.26	0.92
1995-2017	1.11	2.74	3.15	-2.27	4.29

Source: Calculated from FAO Statistics

**Table 4.29**  
**Acceleration Deceleration Growth of Area under Rubber**

Period	India	Indonesia	China	Malaysia	Thailand
1975-2017	-1.13***	10.7***	2.29***	-4.94***	19.25***
1975-1994	5.62***	14.7***	4.2***	25.9***	-34.94***
1995-2017	-37.6***	-5.88	6.81***	14.49***	48.75***

Source: Calculated from FAO Statistics

The acceleration deceleration growth model of area under pepper cultivation for the major producing countries is presented in Table 4.29. All the countries except India and Malaysia had positive and significant result and shows an acceleration of growth rate. All the countries except Thailand had acceleration of growth rate during the pre-globalisation period. Whereas, India and Indonesia experienced a deceleration of growth rate during the post-globalisation period. China and Malaysia had acceleration of growth rate in post-globalisation period also. Thailand had improved its growth rate in the post-globalisation period compared to the pre-globalisation period.

**Table 4.30**  
**Share of Major Rubber Producing Countries in Global area**

Country	1975	1995	2017
India	3.13	4.77	3.67
Indonesia	28.58	30.31	29.46
China	5.04	5.30	5.50
Malaysia	31.13	22.64	8.70
Thailand	18.17	17.11	25.33

Source: Calculated from FAO Statistics

The share of major rubber producing countries in the global area is presented in Table 4.30. The change in the area under rubber over time has influenced the share of individual countries in the total global area. The most significant change was observed in Malaysia accounting for the maximum share of about one-third of the global area in 1975. By 1995, Malaysia's share was reduced to 22.64 per cent and further to 8.70 per cent in 2017. India, China and Indonesia have experienced gradual increase in their share of the global area between 1975 and 1995, but it was declined for India and Indonesia between 1995 to 2017. China had a shown a stable increase in the area of rubber cultivation during all the periods. Thailand experienced a higher growth in the share of area between 1975 and 2017 form 18.17 per cent to 25.33 per cent.



#### 4.4.2 Production of Rubber

The growth trends of rubber production for the major producing countries is presented in Table 4.31. From the table it was observed that, Malaysia was the leading producer with 1459 thousand tonnes followed by Indonesia (790 thousand tonnes), Thailand (349 thousand tonnes), India (130 thousand tonnes) and China (69 thousand tonnes). It can be observed that India occupying the fifth position in terms of area has moved to the fourth position in terms of production. Thailand recorded the highest increase and the phenomenal growth over the years has raised it to the position of top rubber producing country in 2017 followed by Indonesia. Malaysia was the leading rubber producing country in 1975 and it dropped down to the third position by 1995 and further down to the fourth position by 2017. The overall decline of Malaysian rubber production during 1975 to 2003 was 60 per cent. China had also recorded an impressive growth in the rubber production at 69 thousand tonnes in 1975 to 817 thousand tonnes in 2017. The graphical representation of the rubber production in the major producing countries is depicted in the Figure 4.8.

**Table 4.31**  
**Global Production of Rubber (000' tonnes)**

Year	India	Indonesia	China	Malaysia	Thailand
1975	130	790	69	1459	349
1980	148	1020	113	1530	465
1985	187	1055	188	1469	773
1990	297	1275	264	1292	1418
1995	472	1532	424	1089	1693
2000	630	1501	482	928	2279
2005	803	2271	514	1126	2980
2010	862	2735	691	939	3052
2017	965	3630	817	740	4600

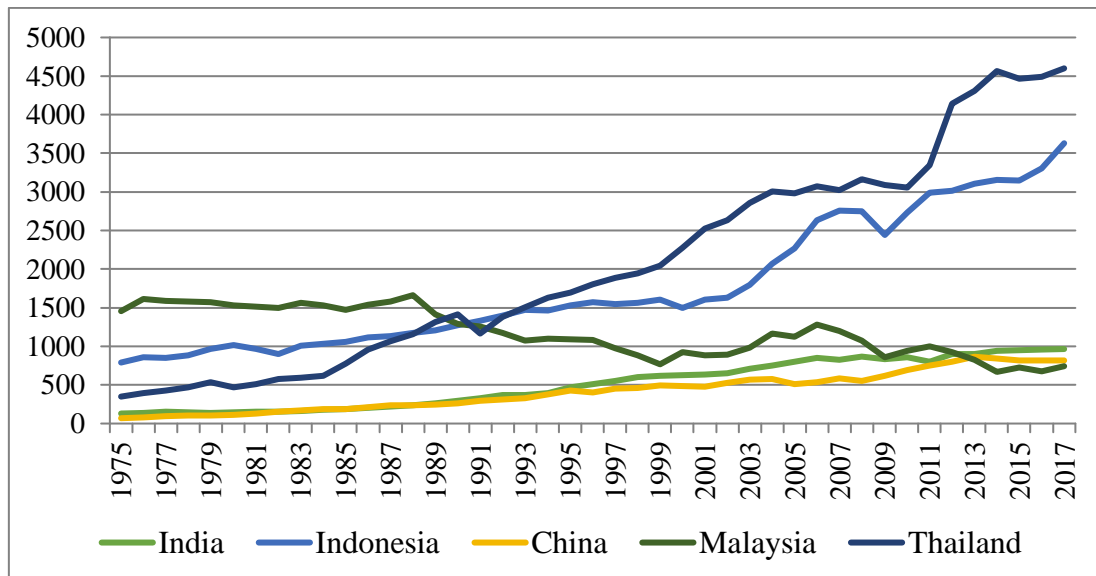
Source: FAO Statistics

**Table 4.32**  
**Compound Growth rate of Rubber Production**

Period	India	Indonesia	China	Malaysia	Thailand
1975-2017	5.76	3.67	5.76	-1.88	6.40
1975-1994	5.97	3.05	8.98	-1.39	8.76
1995-2017	3.05	4.50	3.56	-1.29	4.60

Source: Calculated from FAO Statistics

**Figure 4.8**  
**Global Production of Rubber**



Source: FAO Statistics

The compound growth rate of rubber production for major producing countries is presented in Table 4.32. The growth rate for the total period and pre-globalisation period of all the countries shows almost same trend. During the pre-globalisation period China had the highest growth (8.98 per cent) followed by Thailand (8.76 per cent) and India (5.97 per cent). Indonesia was the only country which experienced higher growth rate in the production of rubber during the post-globalisation period with 4.50 per cent growth per annum, but Thailand had experienced the highest growth rate during the post-globalisation period with 4.60 per cent. During the post-globalisation period also, Malaysia suffered a major setback in production to the extent of -1.29 per cent growth rate. Malaysia had negative growth during both pre-and post-globalisation periods.

**Table 4.33**  
**Acceleration Deceleration Growth of Rubber Production**

Period	India	Indonesia	China	Malaysia	Thailand
1975-2017	1.24*	15.91***	1.58***	1.27	15.61***
1975-1994	10.04***	12.07***	3.16***	-29.57***	23.34***
1995-2017	-6.02***	12.36	5.19*	-20.18**	17.92

Source: Calculated from FAO Statistics

The acceleration deceleration growth model of rubber production for the major countries is presented in table 4.33. All the countries except Malaysia show positive and significant result and it indicate that these countries have acceleration of growth rate during the period of pre-globalisation. Malaysia experienced deceleration of growth rate during the pre-globalisation period. During the post-globalisation period also, Malaysia had deceleration of growth rate. India also shows deceleration of growth rate during the post-globalisation period. China is the only one country which had acceleration of growth rate during the post-globalisation period. Indonesia and Thailand show a stable growth rate during the post-globalisation period.

**Table 4.34**  
**Share of Countries in Global Rubber Production**

Country	1975	1995	2017
India	0.79	2.90	6.40
Indonesia	4.79	9.40	24.08
China	0.41	2.60	5.42
Malaysia	88.61	66.80	4.91
Thailand	2.11	10.39	30.53

Source: Calculated from FAO Statistics

The global share of the production of major rubber producing countries is presented in Table 4.34. The changes in the production levels have brought about substantial changes in the relative shares of the major rubber producing countries in global production. In 1975 Malaysia accounted major portion of the global production of rubber, but it was declined sharply to 4.91 per cent in 2017. Thailand and Indonesia

accounted for about one-fourth of the global rubber production during 2017 with 30.53 per cent and 24.08 per cent share respectively. India, China, Indonesia and Thailand show gradual increase in the share of rubber production from 1975 to 2017.

#### 4.4.3 Yield of Rubber

The growth trends of rubber yield for the major producing countries during 1975-2017 is presented in the Table 4.35. During 1975 Malaysia had the highest yield of 858 kg/ha followed by India (760 kg/ha) and Indonesia (506 kg/ha). Both China and Thailand had yield levels below the global average in 1975. By 1995, Thailand had the highest yield of 1326 kg/ha followed by India (1325 kg/ha) and China (1075 kg/ha). India had the highest yield of 2111 kg/ha followed by Thailand (1462 kg/ha) and China (1195 kg/ha) in 2017. From 1975 to 1995 India had a substantial increase in yield levels (74 per cent) and from 1995 to 2017 the increase was 59 per cent. Malaysia had continuously experienced declining yield during 1975 to 1995. China has registered yield increase of about 11 per cent during 1995 to 2017. The graphical representation of the rubber yield for the major producing countries is depicted in the Figure 4.9.

**Table 4.35**  
**Yield of Rubber (Kg/ha)**

Year	India	Indonesia	China	Malaysia	Thailand
1975	760	506	251	858	351
1980	770	632	392	947	375
1985	886	623	626	957	547
1990	1028	683	677	800	1012
1995	1325	677	1072	644	1326
2000	1575	625	1142	648	1558
2005	1795	692	1105	885	1762
2010	1807	793	1197	920	1581
2017	2111	991	1195	684	1462

Source: FAO Statistics

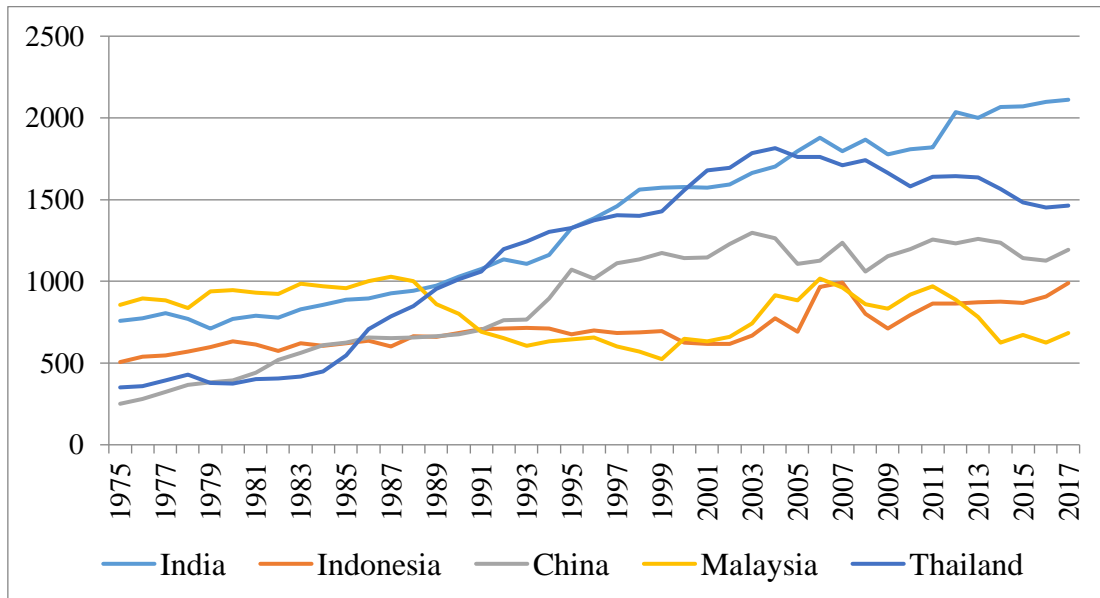
**Table 4.36**  
**Compound Growth rate of Rubber Yield**

Period	India	Indonesia	China	Malaysia	Thailand
1975-2017	2.94	1.21	3.46	-0.55	4.29
1975-1994	2.33	1.61	6.40	-1.19	7.79
1995-2017	1.92	1.71	0.46	1.27	0.37

Source: Calculated from FAO Statistics

The compound growth rate of the rubber yield for the major producing countries is presented in Table 4.36. The analysis for the total period and pre-globalisation period had almost same trend for all the countries. Thailand had experienced higher growth rate with 7.79 per cent followed by China (6.40 per cent) and India (2.33 per cent). While, the growth rate of Thailand (0.37 per cent) and China (0.46 per cent) was negligible during the post-globalisation period. Malaysia had negative growth (-1.19 per cent) during the pre-globalisation period. India had the highest growth rate (1.92 per cent) during the post-globalisation period followed by Indonesia (1.71 per cent) and Malaysia (1.27 per cent).

**Figure 4.9**  
**Yield of Rubber**



Source: FAO Statistics

**Table 4.37**  
**Acceleration Deceleration Growth of Rubber Yield**

Period	India	Indonesia	China	Malaysia	Thailand
1975-2017	1.86*	1.24*	-6.65***	2.66*	-12.15***
1975-1994	13.1***	0.1	-5.32*	-31.08***	33.69***
1995-2017	-2.31	2.61	-6.78*	-24.17***	-32.69***

Source: Calculated from FAO Statistics

The acceleration deceleration growth model of rubber yield for major producing countries is presented in table 4.37. The results show that all the countries except China and Thailand had acceleration of growth rate during the total period of analysis. China and Thailand experienced deceleration growth rate during the total period. While India and Thailand express acceleration of growth rate during the pre-globalisation period. China and Malaysia show deceleration of growth rate during the pre-globalisation period. During the post-globalisation period, all the countries except India and Indonesia had experienced deceleration of growth rate.

**Table 4.38**  
**Relative Productivity Index of Rubber**

Country	1975	1995	2017
Indonesia	6	677	983
Thailand	4.2	1326	1448
Malaysia	10.3	644	677
India	9	1325	2092
China	3	1072	1184

Source: Calculated from FAO Statistics

The relative productivity index has indicated major changes across the producing countries over time (see Table 4.38). During 1975 Malaysia and India had productivity index levels above the global average and Indonesia along with Thailand remained below the global level. By 1995, Thailand had made substantial improvements in the productivity index to the extent that it moved to the top position from its bottom position

in 1975. India and China also remained above the global average. However, by 1995 Malaysia's productivity index dropped below the global average. In 2017, India moved to the top position followed by Thailand and China. Indonesia remained below the global average and Malaysia was pushed down to the last position. In terms of individual country performance, productivity index of Malaysia and Indonesia continued to deteriorate over the years. Thailand, India and China had experienced continuous increase in the productivity index over time, with the most impressive gain of Thailand between 1975 to 1995.

#### 4.4.4 Decomposition of Production Changes in Rubber

During the pre-globalisation period area effect and yield effect had contributed the same level of about 42 per cent of the global production increase. Both India and Indonesia had area effect slightly above the global average, and yield effect below the global level. However, yield effect dominated the production increase in Thailand accounting for about 60 per cent production increase. The decline in Malaysia's production level was more or less equally influenced by the area effect and the yield effect.

**Table 4.39**  
**Contribution of Area Effect and Yield Effects (per cent)**

Country	1975–1994		1995–2017	
	Area effect	Yield effect	Area effect	Yield effect
Indonesia	47.7	36.2	303.4	-170.4
Thailand	10.3	59.6	66.4	26.6
Malaysia	-51.8	-55.2	-43.1	-70.8
India	43.6	27.8	31.6	59.2
China	36.7	32.4	21.3	74.3

Source: Calculated from FAO Statistics

During the post globalisation period was area effect accounted for 75.7 per cent of the global production increase. Indonesia's large contribution of area effect was somewhat offset by the decline in yield levels. In Thailand area effect accounted for two-thirds of

the production increase. Both India and China had yield effect dominating over area effect during the post-globalisation period. Malaysia's reduction in production level was influenced by a large negative yield effect and also a negative area effect.

#### **4.5 Conclusion**

This chapter was attempted to analyse the growth trends of the area, production and yield of coconut, pepper and rubber for the major producing countries during 1975-2017. The growth trends for the coconut, pepper and rubber was analysed for the pre-globalisation (1975-1994) and post-globalisation (1995-2017) periods. The compound growth rate, acceleration deceleration growth rate, graphical method was mainly used to analyse this chapter. The growth trends of Coconut area in all the major producing countries indicated a decline in growth rates during the post globalisation period. While Sri Lanka was the only country with negative growth rate during the pre-globalization period. Indonesia was the only country with positive growth rate in area during the post globalisation period. Growth rate of both production and yield of coconut during globalisation period was less than the growth rate during the pre-globalisation period in all the major producing countries, except for Philippines.

In the case of pepper, though, India, Indonesia and Sri Lanka had registered a decline in the growth rates of area under pepper during the post globalisation period, Malaysia, Thailand, Vietnam and Brazil had rapid increase in the growth rate of pepper area during this period. Growth rates of pepper production had improved during the post globalisation period in Indonesia, Malaysia, Thailand, Vietnam, and Brazil. Both India and Sri Lanka had negative growth rate in pepper production during the post globalisation period in spite of their strong positive growth rates during the pre-globalisation period. Thailand had the highest growth rate of pepper yield during the pre-globalisation period, but it was negative during the post-globalisation period. The impressive production growth rates in Vietnam during the pre-globalisation and post globalisation periods were influenced by the large growth rates of area.



Area under rubber had increased growth rates during the post-globalisation period in Indonesia and Thailand. India and Malaysia had reduced growth rates in area during the post-globalisation period. Rubber production growth rate had improved during the post-globalization period in Malaysia though the growth rates were negative for both the pre- and post-globalisation periods. India, Indonesia and Thailand had experienced declining growth rates of production during the post globalisation period. Growth rates of yield in India and Malaysia had improved during the post globalisation period and it had declined in Indonesia and Thailand. It is concluded that pre-globalisation period was better off for India in the growth trend of area, production and yield of coconut, pepper and rubber. The yield of rubber was the only exception on this.



## **Chapter 5**

### **Agricultural Scenario in Kerala**

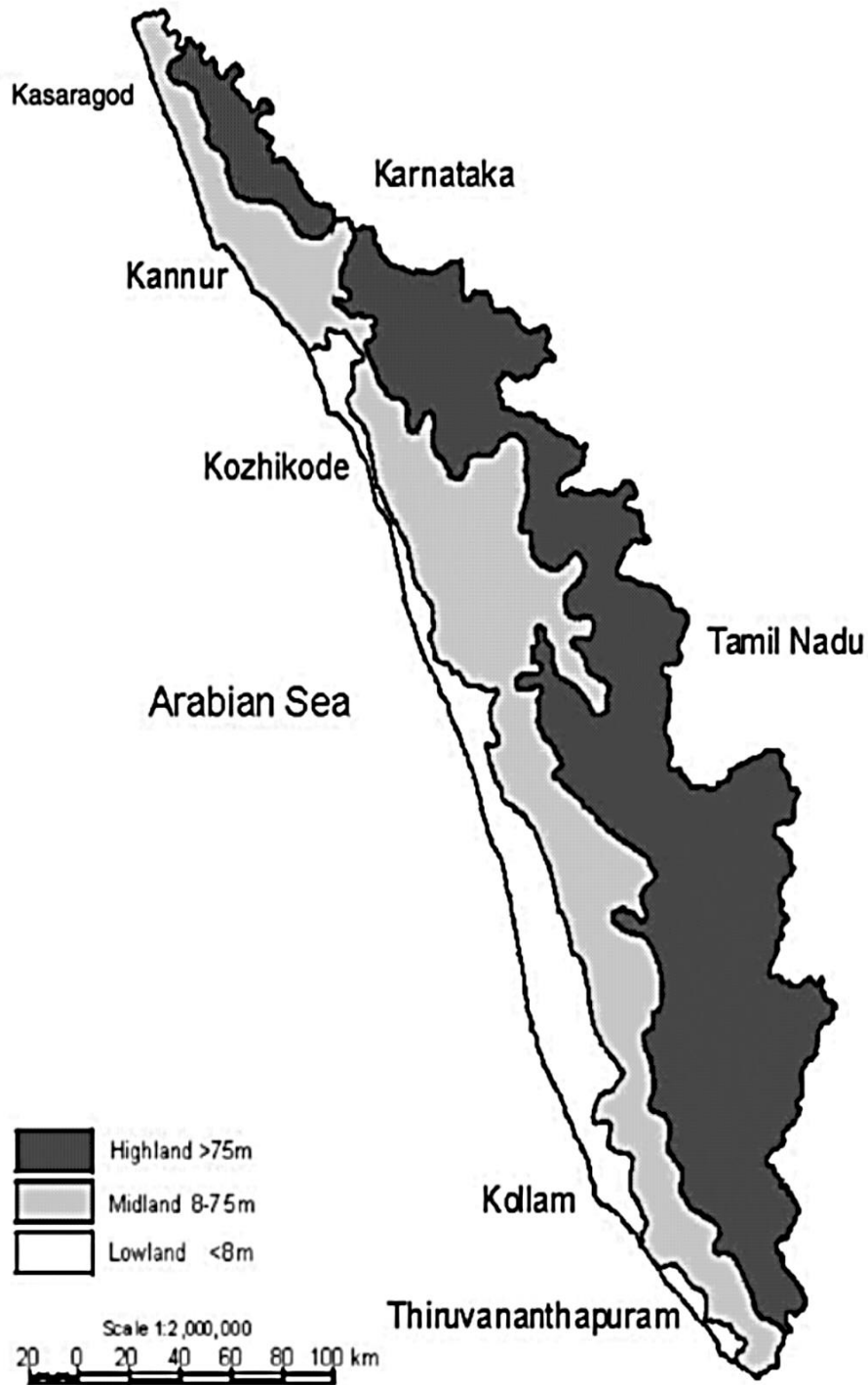
#### **5.1 Introduction**

The agricultural scenario in Kerala is somewhat unique and distinct from many other states in India in terms of the land utilization pattern and the cropping pattern. The dominance of tradable agricultural commodities in the cropping pattern makes its position somewhat heavily oriented towards WTO concerns. A brief review of the changing pattern of agriculture in Kerala is provided here in order to give some insights to the emerging tendencies in relation to land utilisation, cropping pattern, shifts in productivity and production of major crops and the price parity. In view of the limited scope of this review many other important aspects of Kerala agriculture are left out.

#### **5.2 Topography**

Kerala state lying between 8°18' and 12°48' north latitude and between 74°52' and 77°22' east longitudes has three natural divisions of low land, mid land and high land, forming parallel belts across the length of the state (Figure 5.1). The low land with stretches of sand and numerous backwaters lies on the western fringe of the state along the sea shore. This strip is ideally suited for the cultivation of coconut and rice. The mid land region with hills and valleys presents an undulating tract of laterite soil cut across by numerous rivers. This laterite belt is noted for a large variety of agricultural products like rice, coconut, pepper, cashew, ginger, tapioca and rubber. The high land consists mainly of mountains covered by dense forests bordering the Western Ghats. Important export-oriented plantation crops like tea, cardamom, coffee, pepper and rubber are grown in this region.

Figure 5.1  
Natural regions of Kerala



### **5.3 Climate**

The mean temperature varies from 75° to 90°F. In the high land region, the climate is cool and bracing, well suited for the cultivation of plantation crops. The annual rainfall in the high land region ranges from 2540 to 5080 millimetres. The mid land region also receives good rainfall ranging from 1400 to 3940 millimetres per annum. The annual rainfall in the coastal belt ranges from 980 mm in the south to 3560 mm in the north. The relative humidity is high.

### **5.4 Soil**

The major soil types in the state include laterite soil, black soil, peat soil, hill and forest soil, sandy soil, alluvial soil and red soil. The soil in the coastal strip forming the low lands is mainly of pure crystalline sands. The mid land is generally of laterite soil and the high land is of hill and forest soil.

### **5.5 Land Utilisation Pattern**

Data on land utilisation pattern in Kerala are reported according to a standard nine-point classification. Though annual data are available for the period up to 2016-17, here data relating to four periods of 1960-61, 1975-76, 1995-96 and 2016-17 are only presented. The rationale for choosing these four periods is that the first period corresponds to the early days of the state formation, the second period corresponds to the end of an expanding phase of the state agriculture, and 1995-96 is the first year after the establishment of WTO.

The total geographical area of the state is 3885 thousand hectares, of which 1082 hectares are classified as forest land. Forest land includes all forested areas and land classified or administered as forests under any legal enactment dealing with forests, whether state owned or private. If any portion of such land is not actually wooded, but put to some agricultural use, that portion is included under the appropriate heading of cultivated or uncultivated land. The area under forests for different years are reported

as stable at the same level. Though the ground realities indicate that the forest area has dwindled on account of various factors such as encroachment, development projects etc., official statistics continue to report the same number since the land classified as forest retains the same status until any fresh survey and reclassification occurs. In fact, studies based on the Survey of India topographical sheets for 1905, 1965 and 1973 indicate that the area under forest has declined from 44 per cent of the geographical area in 1905 to 27.7 per cent in 1965 and to 17.1 per cent in 1973.

Land put to non-agricultural use include land occupied by buildings, roads and railways or water (e.g. rivers and canals) and land put to uses other than agricultural purposes. From 1960-61 onwards area under this category had been steadily increasing from 205 thousand hectares to 259 thousand hectares in 1975-76, to 313 thousand hectares in 1995-96 and to 388 thousand hectares in 2016-17.

Barren and uncultivable land includes area under mountains, deserts etc. and land that cannot be brought under cultivation except at a prohibitive cost. This land could be isolated blocks or within cultivated holdings. There has been a continuous decline in the area classified as barren and uncultivated land. Permanent pastures and other grazing land include all grazing lands, whether they are permanent pastures and meadows or not, and village common grazing lands within forest areas. There was a steady decline of area under this category over the years.

Miscellaneous tree crops and groves not included in the net area sown represents land which is not included under the net area sown but is put to some agricultural use. Land under casuarina trees, thatching grass, bamboo bushes and other groves for fuel etc. which are not included under orchards are also included under this category. The total area under this category has also declined continuously from 204 thousand hectares in 1960-61 to 84 thousand hectares by 1975-76, to 27 thousand hectares by 1995-96 and to 12 thousand hectares by 2016-17.

Cultivable waste represents land available for cultivation, but not taken up for actual cultivation or abandoned after a few years of cultivation for one reason or other. Such

lands may be either fallow or covered with shrubs and jungles which are not put to any use. Land once cultivated but not cultivated for 5 years in succession is also included in this category. Between 1960-61 and 1995-96 cultivable waste land was reduced to about half the 1960-61 level and there was only marginal reduction between 1995-96 to 2016-17.

Cropped area which is kept idle during the current year is treated as current fallow. If any seedling area is not cropped again in the same year, it is also treated as current fallow. If any seedling area is not cropped again in the same year, it is also treated as current fallow. The area classified under current fallow was reduced from 67 thousand hectares in 1960-61 to 37 thousand hectares in 1975-76. Between 1975-76 to 1995-96 it had gone up to 51 thousand hectares, and further to 71 thousand hectares in 2016-17.

Fallow other than current fallow includes all lands which were taken up for cultivation but are temporarily out of cultivation for a period of not less than one year and not more than five years. The reasons for keeping such lands fallow may include factors such as (a) financial problems of cultivators, (b) inadequate supply of water, (c) silting of canals and rivers, (d) soil erosion and (e) unremunerative nature of farming. The area under this category in 1960-61 was 62 thousand hectares and it had declined to 23 thousand hectares in 1975-76. Then there was an increase to 29 thousand hectares in 1975-76, and to 39 thousand hectares in 2016-17. Thus, there was an increasing tendency among the farmers to keep land idle during 1995-96 to 2016-17.

Net area sown consists of area sown with crops and orchards, with area sown more than once during the same year being counted only once. Net area sown had increased from 1924 thousand hectares in 1960-61 to 2189 thousand hectares in 1975-76 and it further increased to 2265 thousand hectares during 1995-96. However, by 2016-17 net area sown had declined to the 1975-76 level.

Total cropped area represents net area sown and the area sown more than once during the same year. Between 1960-61 and 1975-76 area sown more than once had increased

from 425 thousand hectares to 792 hectares, and it increased marginally to 802 thousand hectares during 1995-96. However, by 2016-17 the area sown more than once had come down to below the 1975-76 level.

**Table 5.1**  
**Land Utilisation Pattern in Kerala ('000 hectares)**

Category	1960-61	1975-76	1995-96	2016-17
Total geographical area	3885	3885	3885	3885
Forest	1082	1082	1082	1082
Land put to non-agricultural use	205	259	313	388
Barren & uncultivable land	151	78	43	30
Permanent pastures & grazing land	45	20	1	0.5
Land under misc. tree crops	204	84	27	12
Cultivable waste	144	113	74	71
Fallow other than current	62	23	29	39
Current fallow	67	37	51	71
Net area sown	1924	2189	2265	2194
Total cropped area	2349	2981	3067	2976
Area sown more than once	425	792	802	783
Cropping intensity	122.1	136.2	135.4	135.6

Source: Department of Economics and Statistics, Kerala

Thus, the changes in the land use pattern in Kerala indicate a steady increase in land put to non-agricultural use over the entire period and rapid increase in total cropped area between 1960-61 to 1975-76 followed by slow increase between 1975-76 to 1995-96, and a reduction in cropped area between 1995-96 to 2016-17. Increased cropped area was due to increases in both net areas sown and area sown more than once, and both these factors had also contributed to the decline in area during 1995-96 to 2016-17. While reductions in all categories of land use had contributed to the increase in cropped area, the farmer's tendency of keeping land idle under both types of fallow land had contributed to the reduction in cropped area. The intensification of land use,



as reflected by the cropping intensity (total cropped area divided by net area sown), indicates that there was a substantial increase in intensive use of land during the period 1960-61 to 1975-76, but in the subsequent years cropping intensity was stagnant. Changes in the cropping pattern in favour of perennial crops might influence this pattern (See Table 5.1).

**Table 5.2**

**Percentage shares of Different Land Use Categories and the Changes over Time**

Category	Percentage Share of Different Land Use Categories and Changes Over Time						
	Percentage share of geographical data				Percentage change between		
	1960-61 (A)	1975-76 (B)	1995-96 (C)	2016-17 (D)	A to B	B to C	C to D
Forest	27.8	27.8	27.8	27.8	-	-	-
Land put to non-agricultural use	5.3	6.7	8.1	10.0	26	21	22
Barren & uncultivable	3.9	2.0	1.1	0.8	-48	-45	-45
Permanent pastures & grazing land	3.9	0.5	0.03	0.01	-56	-95	-35
Misc. tree crops	5.3	2.2	0.7	0.3	-59	-68	-56
Cultivable waste	3.7	2.9	1.9	1.8	-22	-35	-4
Fallow other than	1.6	0.6	0.7	1.0	-63	26	34
Current fallow	1.7	1.0	1.3	1.8	-45	38	39
Net area sown	49.5	56.4	58.3	56.6	14	3	-13

Source: Economic Review various issues

In terms of the relative shares of different land use categories, net area sown accounted for 49.5 per cent of area in 1960-61, and it increased to 56.4 per cent in 1975-76, to 58.3 per cent in 1995-96, and then declined to 56.5 per cent in 2016-17. While the net area sown has indicated an increase of 14 per cent during 1960-61 to 1975-76, it was three per cent during 1975-76 to 1995-96, and then there was a decline of three per cent during 1995-96 to 2016-17.

Land put to non-agricultural use had increased from 5.3 per cent in 1960-61 to 6.7 per cent in 1975-76 to 8.1 per cent in 1995-96 and to 10 per cent in 2016-17. The increase during all the three intervals had been above 20 per cent. While all the other categories represented only small percentages of the total geographical area, in each category the decline during all the three intervals had been somewhat high (See Table 5.2).

## 5.6 Size of Operational Holdings

One of the important considerations relevant to WTO provisions is the subsistence nature of agricultural operations in Kerala. The size of operational holdings in Kerala is extremely small (George, 1986). The average size of operational holdings was only 0.74 hectares in 1966-67, by 1976-77 it was reduced to 0.49 hectares and by 1990-91 it was further reduced to 0.33 hectares. During 1990-91 about 93 per cent of the holdings was below one hectare with an average size of only 0.18 hectare. Another five per cent of the holdings belonged to the category of 1-2 hectares with an average size of 1.36 hectares. The number of holdings with more than four hectares was only less than half a per cent (See Table 5.28).

**Table 5.3**  
**Distribution of Operational Holdings**

Size of holdings (hectares)	1966-67		1976-77		1990-91	
	Number average	% (size ha)	Number average	% (size ha)	Number average	% size (ha)
Marginal (below 1)	81.8	0.28	87.1	0.24	92.6	0.18
Small (1 to 2)	10.1	1.43	8.4	1.37	5.2	1.36
Semi-medium (2-4)	5.6	2.79	3.4	2.70	1.8	2.60
Medium (4-10)	2.1	5.60	1.0	5.49	0.4	5.27
Large (above 10)	0.5	19.86	0.1	19.06	0.06	55.74
All		0.74		0.49		0.33

Source: Economic Review various issues

## 5.7 Cropping Pattern

The cropping pattern in Kerala has undergone major changes over the last four decades. As indicated earlier, the total gross cropped area in the state had increased from 2349 thousand hectares in 1960-61 to 3067 thousand hectares during 1995-96, and then declined to 2976 thousand hectares in 2016-17. During 1960-61 rice was the most important crop occupying 779 thousand hectares, and the next important crop of coconut occupied 501 thousand hectares. Tapioca (242 thousand hectares), rubber (123 thousand hectares) and pepper (100 thousand hectares) were the other important crops. By 1975-76 all the important crops of Kerala had increased their area (rice 676 thousand hectares, coconut 693 thousand-hectare, tapioca 327 thousand hectares, rubber 207 thousand hectares and pepper 108 thousand hectares). Between 1975-76 to 1995-96 there was a rapid decline in the area under the food crops of rice and tapioca, and a substantial increase in the area under coconut, rubber and pepper. The declining trend of rice area continued during 1995-96 to 2016-17 so that the area under rice in 2016-17 was only about one-third of the area during 1975-76. While the area under coconut and tapioca had slightly declined during this period area under rubber and pepper continued the upward growth trend with a reduced rate of growth (See Table 5.4).

The changes in the share of major crops in the total cropped area indicate that rice which remained in the first position during 1960-61 and 1975-76 had slipped to the second position by 1995-96 and it further slipped down to the third position by 2016-17. Coconut that remained in the second position during 1960-61 and 1975-76 has replaced rice to occupy the first position during 1995-96 and 2016-17. Tapioca had occupied the third position during 1960-61 and 1975-76, and it moved down to the fifth position by 1995-96 and continued to remain in the same position during 2003-04. Rubber occupied the fourth rank during 1960-61 and 1975-76, and it moved down to the fifth position by 1995-96 and continued to remain in the same position during 2016-17. Rubber occupied the fourth rank during 1960-61 and 1975-76 and it moved upwards to the third rank during 1995-96 and again moved up to the second position by 2016-17. During 1960-61 pepper was fifth major crop and it slipped down to the sixth position in 1975-76, but moved upwards to the fourth rank by 1995-96 and 2016-17. Cashew nut, which

had occupied the sixth rank during 1960-61 moved to the fifth rank in 1975-76, but it moved back to the sixth position in 2016-17. During 1960-61 arecanut had occupied the seventh rank and it retained the same rank during 1975-76 and 2016-17, though it had slipped down to the 9<sup>th</sup> position during 1995-96. Plantains and banana remained at the eighth position during 1960-61, 1975-76 and 1995-96 before moving up to the sixth position in 2016-17. Tea, cardamom and coffee occupying the 9<sup>th</sup> to 11<sup>th</sup> ranks during 1960-61 had interchanged their ranks in the subsequent periods. Ginger remained at the 12<sup>th</sup> position during all the four years considered here (See Table 5.5). The changes in the cropping pattern over the period 1960-61 to 2016-17 had not been uniform for all crops.

**Table 5.4**  
**Area under Major Crops in Kerala (1000 hectares)**

Items	1960-61	1975-76	1995-96	2016-17
Rice	779	876	471	287
Coconut	501	693	914	906
Tapioca	242	327	114	111
Rubber	236	212	449	476
Pepper	100	108	192	207
Cashew nut	54	109	103	88
Arecanut	54	77	71	93
Plantations & banana	44	52	73	107
Tea	38	38	37	37
Cardamom	29	54	44	32
Coffee	17	42	82	85
Ginger	12	12	13	9
Total cropped area	2319	2981	3067	2976

Source: Department of Economics and Statistics, Kerala

**Table 5.5**  
**Share of the Major Crops in the Cropped Area and Their Ranks**

Crop	1960-61		1975-76		1995-96		2016-17	
	Share (%)	Rank	Share (%)	Rank	Share (%)	Rank	Share (%)	Rank
Rice	33.2	1	29.4	1	15.4	2	9.6	3
Coconut	21.3	2	23.3	2	29.8	1	30.4	1
Tapioca	10.3	3	11.0	3	3.7	5	3.7	5
Rubber	5.2	4	6.9	4	14.6	3	16.0	2
Pepper	4.3	5	3.6	6	6.3	4	7.0	4
Cashew nut	2.3	6	3.7	5	3.4	6	3.0	8
Arecanut	2.3	7	2.6	7	2.3	9	3.1	7
Plantains & banana	1.9	8	1.8	8	2.4	8	3.6	6
Tea	1.6	9	1.3	11	1.2	11	1.2	11
Cardamom	1.2	10	1.8	8	1.4	10	1.4	10
Coffee	0.7	11	1.4	10	2.7	7	2.9	9
Ginger	0.5	12	0.4	12	0.4	12	0.3	12

Source: Department of Economics and Statistics, Kerala

In fact, 1975–76 is considered as a major turning point in the cropping pattern when rice area had reached a peak level. While considering the three intervals of 1960-61 to 1975-76, 1975-76 to 1995–96 to 2016–17, it can be noticed that during the first interval, among the 12 major crops ten had increased the area and the remaining two (tea and ginger) had retained the same area. During the second period (1975-76 to 1995-96) six crops (coconut, rubber, pepper, plantains, coffee and ginger) had increased the area and the other six crops (rice, tapioca, cashew nut, areca nut, cardamom and tea) had decreased the area. During the third interval (1995-96 to 2016–17) five crops (rubber, pepper, areca nut, plantains and coffee) had increased the area, six crops, (rice, tapioca, coconut, cashew nut, cardamom and ginger) had reduced their area and tea had retained the same area. Only four crops (rubber, pepper, plantains and coffee) had increased their area during all the three intervals. The remaining eight crops had shown mixed

tendencies in the three periods. Of these eight crops rice, cashew nut, cardamom and tapioca had increased their area during the first period and they had decreased the area during the second and third periods. Coconut had increased the area during the first and second intervals, but there was slight decrease during the third period. Areca nut had increased the area during the first and third intervals, but it had reduced the area during the second interval. Ginger had gained area in the second interval, and lost during the third interval. Area under tea had remained more or less constant over the three intervals. Thus, the cropping pattern shows a clear shift away from subsistence-oriented crops (mainly rice and tapioca) from mid-seventies in favour of more remunerative tree crops such as rubber and coconut, and also to some of the export-oriented crops such as pepper and coffee (See Table 5.6).

**Table 5.6**  
**Changes in Area under Crops in Kerala**

Period	Increase	Decrease	No change
1960-61 to 1975 – 76	Rice (12.5) Pepper (8.5) Areca nut (42.6) Cashew nut (101.9) Cardamom (86.2) Plantains (18.2) Tapioca (35.1) Coconut (19.2) Coffee (147.1) Rubber (68.3)		Tea Ginger
1975- 76 to 1995- 96	Pepper (77.0) Ginger (8.3) Plantains (40.4) Coconut (31.9) coffee (95.2) Rubber (116.9)	Rice (46.2) Areca nut (7.8) Cardamom (18.5) Tapioca (51.4) Tea (2.6) Cashew nut (5.5)	
1995-96 to 2016-17	Rubber (6.0) Pepper (7.9) Areca nut (31.0) Plantations & Banana (46.6) Coffee (3.7)	Rice (39.1) Coconut (0.9) Cashew nut (18.5) Tapioca (2.6) Cardamom (4.5) Ginger (30.8)	Tea

Note: Numbers in the parenthesis correspond to percentage change. All numbers under the decrease column are negative numbers.

Source: Department of Economics and Statistics, Kerala

## 5.8 Productivity

The yield levels of different crops have indicated mixed trends during the three intervals of 1960-61 to 1975-76, 1975-76 to 1995-96 and 1995-96 to 2016-17. The rice yield of 1371 kgs/ hectare in 1960-61 had increased to 1520 kg/ha in 1975-76, and further increased to 2023 kg/ha in 1995-96 before it declined to 1994 kg/ha in 2016-17. During 1960-61 to 1975-76 rubber had the maximum growth in yield (233 per cent) followed by ginger (164 per cent), tapioca (141 per cent), rice (11 per cent), tea (7 per cent) and plantains (2 per cent). Coconut, cashew nut, cardamom, pepper and coffee had experienced decline in yield levels ranging between –11.9 per cent for coffee and –32.4 per cent for cashew nut.

**Table 5.7**  
**Yield Levels of Major Crops in Kerala (Kg/hectare)**

Crop	1960-61	1975-76	1995-96	2003-04	Percentage change during		
	(A)	(B)	(C)	(D)	A to B	B to C	C to D
Rice	1371	1520	2023	1984	10.9	33.1	-1.9
Coconut*	6430	4963	5638	6052	-22.8	13.6	7.3
Tapioca	6845	16491	22008	22484	140.9	33.9	2.2
Rubber**	187	623	1056	1377	233.2	69.5	30.4
Pepper	271	227	358	275	-16.2	57.7	-23.2
Cashew nut	1659	1122	801	737	-32.4	-28.6	-8.0
Plantains	7381	7556	6585	7446	2.4	-12.8	13.1
Tea	1073	1148	1762	1513	7.0	53.5	-14.1
cardamom	45	38	122	208	-15.6	221.0	70.5
Coffee	442	345	546	754	-11.9	58.3	38.1
Ginger	938	2479	3594	3330	164.3	45.0	7.3

\* Coconut yield is reported in nuts/hectare

\*\* Rubber yield is based on planted area. When the tapped area is considered yield, levels are higher.

Source: Department of Economics and Statistics, Kerala

Between 1975–76 to 1995–96, rice, coconut, tapioca, rubber, pepper, tea, cardamom, coffee and ginger had experienced yield increases. The maximum increase was for cardamom (221 per cent), followed by 69.5 per cent for rubber and the least increase was for coconut (14 per cent). Cashew nut and plantains were the only two crops with reduced yield levels. However, between 1995-'96 to 2016-'17, rice, pepper, cashew nut and tea had experience declined yield levels ranging between -1.9 per cent for rice and -23.2 per cent for pepper. During this period cardamom had recorded the maximum yield increase of about 70 per cent, followed by rubber (30 per cent). In fact, rubber had maintained a steady increase in yield levels over the three periods considered here. Tapioca and ginger were the other two crops with increased yield levels during all the three periods. Rice and tea had increased yield levels during the first and second periods with reduced yield levels during third period. Though coconut, cardamom and coffee had recorded a decline in yield during the first period, they had recorded increased yield levels during the second and third periods. Cashew nut was the only crop with reduced yield levels during all the three periods (See Table 5.7).

### **5.9 Production Trends of Major Crops**

Between 1960-61 and 1975-76 most of the crops grown in Kerala had increased the production levels. Pepper was the only exception among the crops considered here with about four per cent decline in the production level. Rubber had the maximum increase of about 455 per cent followed by tapioca (225 per cent), ginger (159 per cent) and coffee (150 per cent). Coconut had the least increase of about seven per cent. Between 1975 – 76 and 1995-96 three crops (rice, tapioca and cashew nut) had experienced shortfall in production. Tapioca had the maximum decline of about 54 per cent followed by cashew nut (31 per cent) and rice (28 per cent). During this period also rubber had the maximum production increase of about 268 per cent, and it was followed by pepper (179 per cent), cardamom (162 per cent), coffee (157 per cent), ginger (62 per cent) plantains and coconut (both 50 per cent) and tea (42 per cent).

During the period 1995-96 to 2016-17, five crops (rice, pepper, cashew nut, tea and ginger) had experienced decline in production levels. The maximum reduction was for



rice (40 per cent) followed by ginger (26 per cent), cashew nut (21 per cent), pepper (19 per cent) and tea (14 per cent). Cardamom had the maximum production increase of about 62 per cent, and it was followed by coffee (42 per cent), rubber (38 per cent), plantains (31 per cent) and coconut (6 per cent). Tapioca has only a marginal production increase of 0.1 per cent.

Thus, coconut, rubber plantains, cardamom and coffee maintained increased production levels during all the three periods considered here. Rice production had reached a peak during 1975-76 and then there was a continuous reduction in the subsequent years. Cashewnut had reduced production during the second and third periods. Pepper production had increased substantially during 1975-76 to 1995-96, but it has dropped down during 1995-96 to 2016-17 (See Table 5.8).

**Table 5.8**  
**Production of Major Crops in Kerala ('000 tonnes)**

Crop	1960-61	1975-76	1995-96	2016-17	Percentage change between		
	(A)	(B)	(C)	(D)	A to B	B to C	C to D
Rice	1050.7	1331.2	953.0	570.0	26.7	-28.4	-40.2
Coconut*	3220	3439	5155	5464	6.8	50.0	6.4
Tapioca	1656.5	5390.2	2500.1	2503.6	225.4	-53.6	0.1
Rubber	23.2	128.8	474.6	655.8	455.1	268.48	38.2
Pepper	27.0	24.6	68.6	55.9	-8.9	178.8	18.6
Cashew nut	83.3	119.9	82.8	65.2	43.9	-30.9	-21.3
Plantains	322.7	395.0	594.4	775.4	22.4	50.0	30.9
Tea	40.0	45.8	64.8	55.9	14.5	41.5	-13.7
Coffee	7.0	17.5	45.0	63.8	150.0	157.1	41.7
Ginger	11.1	28.8	46.5	29.7	159.5	61.5	-26.1

\* Coconut production is reported as million nuts.

Source: Department of Economics and Statistics, Kerala

## **5.10 Contribution of Area and Yield to Production**

During the period 1960-61 to 1975-76 ten major commodities had recorded production increases and only pepper had recorded a decline in the production level. An analysis of the contribution of area and yield changes towards production changes indicates that during 1960-61 to 1975-76 both area and yield increases had contributed to the production increase of rice, tapioca, rubber, and plantations. Production increases of coconut, cashew nut, cardamom and coffee were associated with increased area and decreased yield. Yield increases was the sole contributing factor for production increase of tea and ginger since area under these crops remained constant during this interval.

During 1975-76 to 1995-96 eight commodities had recorded production increases and three commodities had decreased production. Among the commodities with increased production coffee, coconut, rubber, pepper and ginger had registered increased in both area and yield. The contribution from area increase of both plantains and cardamom had exceeded the negative impact of reduced yield on production levels. Tea production increase was associated with positive contribution from yield increase and negative contribution from area. Among the three commodities with decreased production levels, for rice and tapioca the negative contribution of area had exceeded the positive contribution of yield. The fall in cashew nut production was associated with decrease in both area and yield.

During 1995-96 to 2016-17, six commodities had increased production and five had decreased production levels. Among the commodities with increased production rubber, plantains and coffee had recorded increase in both area and yield. Coconut, tapioca and cardamom had achieved production increase on account of the larger positive contribution of yield over the negative contribution of area. Decreased production of pepper was on account of the dominant negative role of yield over the positive role played by area. For ginger decreased production was on account of the dominant negative role of area over the positive role of yield. For rice and cashew nut both area and yield had contributed to the reduced production level. Since the area under

tea had not changed yield decline was the sole contributor to the production decline (See Table 5.9).

**Table 5.9**  
**Contribution of Area and Yield towards Production Changes**

1960-61 to 1975-76					
	Area + Yield+	Area + Yield –	Area – Yield +	Area – Yield –	Area (0) Yield +
Production + (10)	Rice Tapioca Rubber Plantains (4)	Coconut Cashew nut Cardamom Coffee (4)			Tea Ginger (2)
Production – (1)		Pepper (10)			
1975–76 to 1995–96					
Production (8)	Coffee Coconut Rubber Pepper Ginger (5)	Plantains Cardamom (2)	Tea (1)		
Production – (3)			Rice Tapioca (2)	Cashew nut (1)	
1995–96 to 2003–04					
Production + (6)	Rubber Plantains Coffee (3)		Coconut Tapioca Cardamom (3)		
Production – (5)		Pepper (1)	Ginger (1)	Rice Cashew nut (2)	

Source: Department of Economics and Statistics, Kerala

A further classification indicates that production increase during 1960–61 to 1975–76 was associated with both area and yield increase for rice, tapioca, rubber and plantains. As seen in the Table 5.10, during 1975–76 to 1995–96 congruence of area, yield and production increase occurred for coconut, pepper, rubber, coffee and ginger. During 1995-96 congruence of area, yield and production increase occurred for coconut, pepper, rubber, coffee and ginger. During 1995-96 to 2003-04, this congruence of area,

yield and production increase occurred only for rubber, plantains and coffee. Rubber was the only commodity for which there was simultaneous increase in the area, yield and production during all the three periods of 1960-61 to 1975-76, 1975-76 to 1995-96 and 1995-96 to 2016-17.

**Table 5.10**

**Alternate Classification of the Commodities According to Simultaneous Changes in yield and production**

Production	Area	Yield	1960-61 to 1975-76	1975-76 to 1995-96	1995-96 to 2016-17
+	+	+	Rice Tapioca Rubber Plantain (4)	Coconut Pepper Rubber Coffee Ginger (5)	Rubber Plantain Coffee (3)
+	+	-	Coconut Cashew Cardamom Coffee	Cardamom Plantains (2)	
+	-	+		Tea (1)	Coconut Cardamom (2)
+	∅	+	Tea Ginger (2)		
-	-	+		Rice Tapioca (2)	Ginger Tapioca (2)
-	+	-	Pepper (1)		Pepper (1)
-	-	-		Cashew nut (1)	Cashew nut Rice (20)
-	∅	-			Tea (1)

Source: Department of Economics and Statistics, Kerala

During 1960-61 to 1975-76 production increase was associated with area increase and yield decrease for coconut, cashew, cardamom and coffee. Cardamom and plantains were the only two commodities with increased production associated with increased area and decreased yield during 1975-76 to 1995-96. None of the commodities had

production increase associated with increased area and decreased yield during 1995-96 to 2016-17.

Increased production was associated with reduced area and increased yield for tea during 1975-76 to 1995-96 and for coconut during 1995-96 and for coconut during 1995-96 to 2016-17. Increased production of tea and ginger during 1960-61 to 1975-76 was mainly on account of yield increase alone. Production decline of rice and tapioca during 1975-76 to 1995-96 and of ginger and tapioca during 1995-96 to 2016-17 was associated with a reduced area and increased yield. For pepper both during 1960-61 to 1975-76 and 1995-96 to 2016-17 reduced production was the result of increased area and reduced yield. During 1995-96 to 2016-17 reduced production was the net result of increased area and reduced yield. During 1995-96 to 2016-17 tea production declined only on account of the decline in yield.

### **5.11 Price Parity and Profitability**

Between 1960–61 and 1975-76 farm cultivation cost in Kerala had increased by 293 per cent, prices received by the farmers increased by 256 per cent and prices paid by the farmers increased by 249 per cent. Between 1975-76 and 1995-96 the increase in farm cultivation cost, prices received by the farmers and the prices paid by the farmers had increased by 620 per cent, 369 per cent and 462 per cent respectively. During 1995-96 to 2003-04 also the increase in farm cultivation cost was maximum followed by increase in prices paid by the farmers. Thus between 1960-61 and 1975-76 though the farm cultivation cost was the maximum followed by the increase in prices paid by the farmers. Thus between 1960-61 and 1975-76 though the farm cultivation cost had increased at a faster rate than the prices received by the farmers, the prices paid by the farmers had increased at a lower rate. During both 1975-76 to 1995-96 to 2016-17 the increase in farm cultivation cost was maximum followed by prices paid by the farmers and the least increase was for prices received by the farmers (See Table 5.11).

**Table 5.11**  
**Increase in Prices during 1960-61 to 2016-17 (per cent)**

Period	Farm cultivation cost	Prices paid by the farmers	Prices received by farmers
1960-61 to 1975-76	293	249	256
1975-76 to 1995-96	620	462	369
1995-96 to 2016-17	113	84	42
1960-61 to 2016-17	5931	3509	2265

Source: Department of Economics and Statistics, Kerala

**Table 5.12**  
**Profitability Index and Price Parity Index**

Period	Index of cultivation cost (A)	Index of prices received (B)	Index of prices paid (C)	Profitability Index (B/A) x 100	Price parity Index (B/C) x100
1960-61	117	108	119	92	92
1975-76	460	384	415	83	93
1995-96	3312	1802	2331	54	77
2016-17	7056	2554	4295	36	57

Source: Department of Economics and Statistics, Kerala

During 1960-61 to 2016-17 the index of farm cultivation cost (1952-53=100) had increased from 117 to 7056. During the same period the index of prices received by farmers had increased from 108 to 2554 and the index of prices paid by the farmers had increased from 119 to 4295. The profitability index of the farmers measured by the ratio between the prices received and the farm cultivation cost decreased from 92 during 1960-61 to 36 during 2003-04 indicating that the farmers were continuously at a disadvantageous position in relation to profitability from agriculture. The traditional price parity measures obtained as the ratio of prices received by the farmers and the prices paid by the farmers indicate that there was a slight advantage for farmers between

1960-61 and 1975-76, but during the other two periods they were at a great disadvantage (See Table 5.12).

### 5.12 Share of Agriculture in State Income

The contribution of agriculture to the state income has been declining over the years since the other sectors had grown much faster than the agricultural sector. During 1960-61 agriculture accounted for 56.0 per cent of the state income. By 1975-76 and 1995-96 the share of agriculture had declined by 39.6 per cent. There was a drastic decline of 49.6 per cent in the share of agriculture during the eight-year period between 1995-96 and 2003-04. By 2016-17, agriculture's contribution to the state income was only 13 per cent (See Table 4.13).

**Table 5.13**  
**Agriculture's Share in the State Income**

Year	Share (per cent)
1960-61	56.00
1975-76	42.70
1995-96	25.78
2016-17	13.00

Source: Department of Economics and Statistics, Kerala

### 5.13 Conclusion

The dominance of tradable commodities in the cropping pattern of Kerala makes the state's position somewhat heavily oriented to WTO concerns. The cropping pattern in the state has undergone major changes over the last four decades. Rice which occupied 33 per cent of the cropped area during 1960-61 suffered a major decline to about 10 per cent of the cropped area during 2016-17. Tapioca area has also declined from 10 per cent to about four per cent during the same period. The major gains were for coconut (21.3% to 30.4%), rubber (5.2% to 16%), Pepper (4.3% to 7%) and coffee (0.7% to 2.9%).

Among the 12 major crops grown in Kerala 10 had increased the area and two had no change between 1960-61 to 1975. However, 1975-76 to 1995-96 six crops had increased area and the remaining six had reduced area, and during the post globalisation period only five crops had increased area. Rubber, pepper, coffee and plantains had increased area during all the three periods. The changes in the cropping pattern from mid-70 indicate a clear shift away from subsistence-oriented crops (mainly rice and tapioca) to more remunerative tree crops such as rubber and coconut, and also to some of the export-oriented crops such as pepper and coffee.

During 1960-61 to 1975-76 rice, tapioca, rubber and plantains had simultaneous increase of area, yield and production. Coconut, cashew, cardamom and coffee had production increase in spite of reduced yield. Pepper production declined in spite of increased area. During 1975-76 to 1995-96 coconut, pepper, rubber, coffee and ginger had simultaneous increase of area, yield and production. Cardamom and plantains had increased production in spite of reduced yield. Tea production increased even though area had declined.

The profitability index measured by the ration between the index of prices received by the farmers and the farm cultivation cost decreased continuously from 92 during 1960-61 to 36 during 2016-17 indicting that the farmers were continuously at a disadvantageous position in relation to profitability from agriculture. The traditional price parity index (ratio of prices received and prices paid by the farmers) indicates that there was a slight advantage for farmers between 1960-61 to 1975-76, but during the subsequent periods farmers were at a great disadvantageous position. The contribution of agriculture to the state income has been continuously declining over the years from 56 per cent during 1960-61 to 43 per cent during 1975-76, to 26 per cent during 1995-96 and to 13 per cent during 2016-17.



## Chapter 6

### An Analysis of Various Aspects of Coconut in Kerala

#### 6.1 Background

Coconut Cultivation in India has a long history of number of centuries. It is mainly cultivated by small farmers and it provides livelihood for about 10 million people though cultivation, processing and marketing of coconuts (Thampan 1998). Coconut palm supplies not only food, water and oil for cooking, but also leaves for thatching building roofs, fibre for ropes and mats, shells that can be used for different purposes such as making utensils and collecting latex from rubber trees, and for tapping toddy. The coconut wood can be used for making furniture, construction purposes and as a fuel wood. Taking into account the important role played by coconut in the daily life of a sizeable population living in the humid tropical region coconut had been described by different expression such as “tree of life” (Ohler, 1984), and “the milk bottle on the door step of mankind” (Harries, 1979).

As pointed out in Chapter 3 India is the third largest country in terms of global area and production after Philippines and Indonesia. Area under coconut cultivation in India during 1950-51 was 622 thousand hectares and it has reached about three times this level to 1870 thousand hectares during 2016-17. Kerala was traditionally a coconut growing area along with the coastal states of Karnataka, Tamil Nadu and Andhra Pradesh. During the middle of the last century Kerala had accounted for about 70 per cent of the area under coconut in India against a relatively small share of about 15 per cent in Karnataka, 10 per cent in Tamil Nadu, and five per cent in Andhra Pradesh. By the turn of this century Kerala’s share has dropped down to about half the all-India area while the other states have increased their share to 19 per cent in Karnataka and 17 per cent in Tamil Nadu. The increase in area in Andhra Pradesh was at the same rate as the all-India pattern so that the state retained its share at 5 per cent. The annual growth rate in area in India over the five decades was about 2.3 per cent with Kerala’s growth rate

of 1.6 per cent against 2.8 per cent for Karnataka, 3.9 per cent for Tamil Nadu and 2.3 per cent for Andhra Pradesh. Area increase in India was the maximum during the ten years starting 1985–86 with a 49.5 per cent increase during this period. During the five years with 1995–96 total increases in area was only 0.4 per cent. During the 20-year period between 1955–56 to 1975–76 total area of coconut increased by 65.5 per cent and during the next 20 years beginning with 1975–76 the area under coconut increased by 77.3 per cent. However, during the eight years beginning with 1995–96 the total increase in Indian coconut area was only 2.1 per cent.

Production of coconut in India during 1955–56 was 4226 million nuts which has gone up by 198 percent to 12597 million nuts in 2016–17. The highest increase was recorded during the ten years beginning with 1985-86 when production increase was 91.3 per cent. After 1995–96 there was a 2.8 per cent decline in production during the next five years and a further decline of 4.9 per cent between 2001-01 to 2016-17. During the 20 years beginning with 1955-56 production of coconuts increased by 37.9 per cent and during the next 20 years beginning with 1975-76 there was an increase of 122.2 per cent. The period between 1995-96 to 2016-17 witnessed a negative growth of 7.5 per cent in coconut production.

**Table 6.1**  
**Area and Production of Coconuts in India**

Year	Area		Production		Kerala's share	
	(000 ha)	Change %	(million nuts)	Change %	Area %	Production %
1955-56	647		4226		69.5	73.3
1965-66	884	36.6	5035	19.1	66.3	65.4
1975-76	1070	21.0	5829	15.8	64.8	59.0
1985-86	1226	14.6	6770	16.1	57.5	49.9
1995-96	1833	49.5	12952	91.3	49.9	44.4
2000-01	1840	0.4	12597	-2.8	50.3	43.9
2016-17	1870	1.6	11986	-4.9	48.4	47.6

Source: Department of Economics and Statistics, Kerala

Kerala's share of area under coconut in India gradually declined from 69.5 per cent during 1955-56 to 49.9 per cent during 1995-96. Though the share had marginally increased to 50.3 per cent by 2000-01 it had further declined to 48.4 per cent during 2016-17. During 1955-56 Kerala's share of All India production was 73.3 per cent which was above its share of area. As in the case of area, Kerala's share in production has also gradually declined over the years to reach 43.9 per cent during 2000-01. There was a recovery to 47.6 per cent by 2016-17. Here it is also worth pointing out that yield levels in Kerala which was above the all-India average during 1955-56 remained below the all India average during the subsequent years so that Kerala's share of production remained below the share of area (Table 6.1). In this background this chapter analyses the changes in area, production and yield, the changing pattern of land utilisation, cropping pattern, export, import, and the price parity of coconut in Kerala.

## **6.2 Area, Production and Yield of Coconut in Kerala**

Kerala in the local language means "the land of coconut" and it is believed that Kerala state has inherited the name from the coconut tree. As pointed out earlier during 2016–17 coconut was the dominant crop grown in the state with 41 per cent of the net cropped area and 30.4 per cent of the gross cropped area, well ahead of rubber which occupied the second position with 16 per cent of the gross cropped area. During the mid-seventy's coconut occupied only the second position with 23.3 per cent of the cropped area after rice with 29.4 per cent of the cropped area (George, 1979). By 1993 coconut occupied about 28 per cent of the cropped area against 24 per cent area of rice (Mathew, 1994). The expansion of coconut area was mainly from conversion of rice area from the low-land and mid-land regions in the state. According to Jeemol Unny (1982) the fluctuating paddy prices and rising input costs during the 60's and 70's 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 the profitability of coconut and these factors contributed to the conversion. Coconut is cultivated by more than 2.5 million holdings of which 90 per cent has less than one hectare of land.

The area under coconut in Kerala has been steadily increasing each year from 1960–61 to 1974–75 except during 1973–74 having a slight reduction in area. The decline in area during 1975–76 was partially recovered during 1976–77, but the next five years indicated a declining tendency. The recovery initiated in 1982–03 continued until 1989–90. Though there had been a decline in area during 1990–91 and 1991–92, the next four years witnessed increased area which was followed by three years of declining area from 1996–97. The recovery in 1999–00 continued in 2000–01 to achieve a peak level of 926 thousand hectares the loss in the area during the next two years was only partially recovered during 2016–17.

**Table 6.2**  
**Area, Production and Yield of Coconut in Kerala**

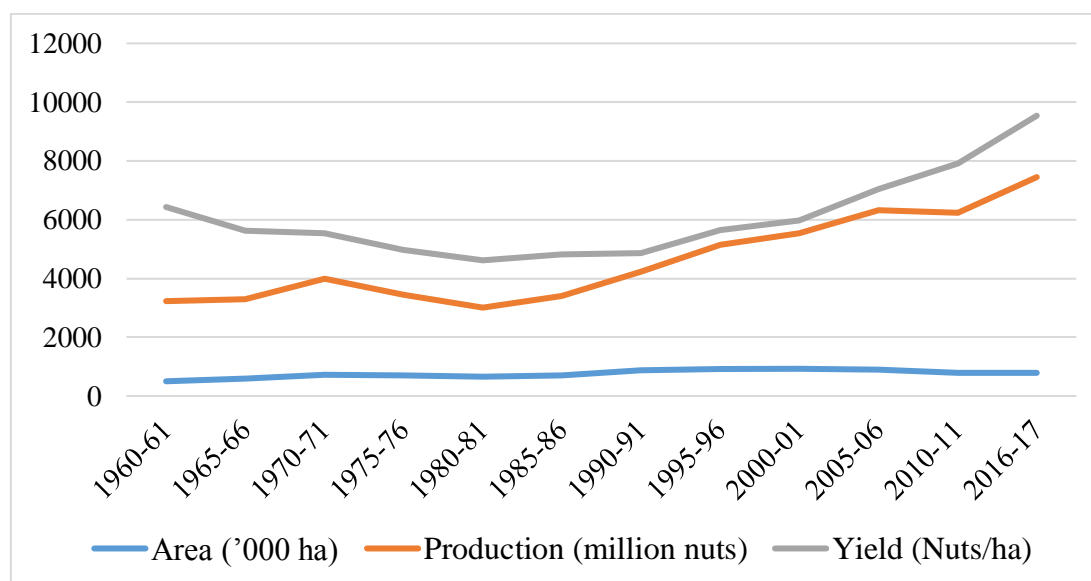
Year	Area		Production		Yield	
	('000 ha)	Average Growth	(million nuts)	Average Growth	(Nuts/ha)	Average Growth
1960-61	501	11.79	3220	3.90	6430	-7.04
1965-66	586	17.07	3293	2.27	5617	-12.65
1970-71	719	22.65	3981	20.89	5536	-1.43
1975-76	693	-3.64	3439	-13.61	4963	-10.35
1980-81	651	-5.99	3008	-12.53	4618	-6.96
1985-86	705	8.18	3397	12.93	4820	4.39
1990-91	870	23.46	4232	24.58	4864	0.91
1995-96	914	5.09	5155	21.81	5638	15.91
2000-01	926	1.26	5536	7.39	5980	6.06
2005-06	898	-3.02	6326	14.27	7046	17.83
2010-11	788	-12.23	6240	-1.37	7918	12.38
2016-17	781	-0.91	7449	19.38	9540	20.48

Source: Department of Economics and Statistics, Kerala

The average growth in the area under coconut over five-year intervals beginning with 1960–61 indicate negative values for the periods 1975–76, 1980–81, 2005-06, 2010-11 and 2011–17 (Table 6.2). All the other periods had positive growth in area. During the period 1990-91 shows higher growth rate of area under coconut production in Kerala

with 23.46 per cent followed by 22.65 per cent in 1970-71. During the recent decades the growth of area under coconut cultivation is decreasing. The area, production and yield of coconut in Kerala and their respective average growth is given in Table 6.2.

**Figure 6.1**  
**Area, Production and Yield of Coconut in Kerala**



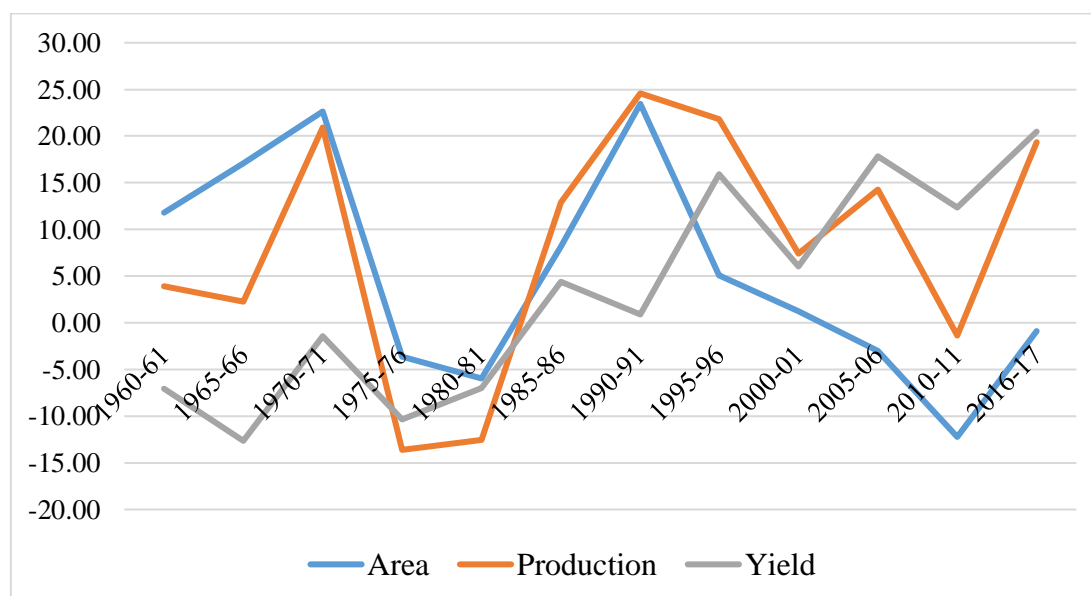
Source: Table 6.2

Coconut production in Kerala during 1960-61 was 3220 million nuts which had increased to 7449 million nuts 2016-17. There was a consistent period upward trend in the production of coconuts from 1961-62 to 1971-72 except during 1963-64. Subsequently there was a consistent downward trend in production from 1972-73 except during 1963-64. Subsequently there was a consistent downward trend in production from 1972-73 to 1983-84 (except during 1978-79 and 1982-83) when the production level had fallen to 2602 million nuts, which was 36 per cent below the 1971-72 production level. The recovery from 1983-84 continued until 1994-95 (except for minor shortfalls in three years) to raise the production level to 5536 million nuts which was 105 per cent above 1983-84 production. During 1995-96 to 2016-17 production had increased in three years and decreased in six years with the 2016-17 production being only 2.8 per cent above the 1994-95 level. The graphical representation of the area, production and yield of coconut in Kerala is given in Figure 6.1.

The average growth over five-year intervals from 1960-61 indicated negative production levels for three intervals beginning with 1970-71, 1975-76 and 2000-01 which coincides with the intervals with reduced area under coconut. The maximum increase of 923 million nuts (21.8 per cent) in absolute terms occurred during the five-year period beginning with 1990-91 and the second highest increase of 855 million nuts (25.3 per cent) occurred during the period beginning with 1985-86. The third highest increase of 688 million nuts (20.9) occurred during the period beginning with 1965-66. However, in terms of percentage changes the first and second positions were interchanged and the third position remained the same. The highest decline in the production level (542 million nuts corresponding to 13.61 per cent) occurred during the period beginning with 1970-71. During the 15 years beginning with 1960-61 production increase was 6.8 per cent, the next 20 years beginning with 1975-76 had 49.4 per cent increase and the nine years beginning with 1995-96 witnessed 6.4 per cent increase in the output level. Of the total output increase of 2264 million nuts during 1960-61 to 201-17 the contribution of the first 15 years was 219 million units (9.7 per cent), the next 20 years' contribution was 1716 million nuts (75.8 per cent) and the last nine years contributed 329 million nuts (14.5 per cent).

**Figure 6.2**

**Average Growth of Area, Production and Yield of Coconut in Kerala**



Source: Table 6.2

The average annual yield during the 60's was 5887 nuts/ha, it had dropped down to 4999 nuts/ha during the 70's and further down to 4640 nuts/ha during the 70's and further down to 4640 nuts/ha during the 80's. However, the recovery after the lowest yield of 3814 during 1983–84 had continued to the 90's to reach an average annual yield of 5716 nut/ha. During the four years of this century the average yield was 6107 nut/ha. The average growth in yield over five-year periods indicate a downward trend from the year beginning with 1960-61 and this tendency continued for the three periods with the maximum decline of 12.65 per cent during the period 1965-66. Yield levels continued to increase from the five-year periods from 1985-86 to 2016-17. Coconut yields in Kerala had been consistently below the levels obtained from the rest of India. The yield levels from rest of India was 15.7 per cent above the Kerala yield during 1970-71 and this gap widened continuously until 1990-91 to reach 74.6 per cent. However, the gap narrowed down subsequently to the extent of 1.8 per cent during 2016-17. The graphical representation of the average growth of area, production and yield of coconut in Kerala is given in Figure 6.2.

The reasons for the low yield levels in Kerala are stated to be the prevalence of root wilt disease affecting about one-third of the area, cultivation under rainfed conditions without adequate facilities for supplementary irrigation, poor management practices and unstable income to the cultivators due to price fluctuations. The state's draft Fifth Plan (1974-79) has provided the following explanation: "Some of the important conditions which affect the yield of coconuts in the state are as following: (1) Severe incidence of root-wilt disease in four important coconut growing districts, namely Quilon, Kottayam, Alleppy and Ernakulam which together account for 45 per cent of the area; (2) As coconut cultivation has been practiced in Kerala for centuries, a significant proportion of existing coconut population survives its economic life; (3) A good part of the land on which coconut trees are grown is marginal for coconut production; (4) Coconut production is in the small farm sector. It is an utterly disorganized area of agricultural production; (5) the problem of marketing and fluctuating prices has not been tackled; and (6) Technological development in coconut cultivation has been meagre"

In view of the importance of coconut in the state economy a massive coconut development programme was initiated during early 90's with emphasis on irrigation and adoption of scientific management practices. Cultivators were provided incentives for removing sick coconut trees and to replant with quality seedlings, installation of pump sets, supply of inputs, training of farmers and demonstration of improved farming practices. The improved yield performance from mid-90 indicates that some of these measures have been effective to raise the yield levels and to narrow down the yield gap.

### **6.2.1 Decomposition of Production Change**

While decomposing the production changes over five year intervals beginning with 1960 -61 it was observed that during the first period area effect dominated over a large negative yield effect. During the periods beginning with 1970-71 and 1975-78 both area effect and yield effect have contributed to the decline in production. However, during the period beginning with 1970-71 yield effect dominated with its contribution of about three-fourth of the production change, and during the period beginning with 1975-76 both area effect and yield-effect had more or less equal contribution. During the next two periods beginning with 1980-81 area effect dominated over yield effect with about two-thirds contribution during 1980-81 to 1985-86 and 93 per cent contribution during 1985-86 to 1990-91. Yield effect dominated over the area effect during the next three periods with about two-thirds contribution during the first two periods and the entire contribution for the period beginning with 2000-01 overcoming the negative area effect. During the 15 years beginning with 1960-61 yield effect was a large negative value and during the nine years of post-globalisation period the area effect had a small negative contribution. During the 20 years before the globalisation period the contribution of area effect was 64 per cent with yield effect accounting for 27 per cent. Here it should be pointed out that in the case of a tree crop such as coconut with a few years of maturity before production starts annual decomposition of area effect and yield effect will be more appropriate with adjustments to the maturity period. However, in the absence of suitable data for this adjustment process the values obtained will be only an approximation to the true values (See Table 6.3).



**Table 6.3**  
**Contribution of Area and Yield Effects**

Period	Area effect (%)	Yield effect (%)
1960-61 to 1965-66	739.1	-552.2
1965-66 to 1970-71	108.6	-6.7
1970-71 to 1975-76	-26.5	-76.5
1975-76 to 1980-81	-48.0	-56.0
1980-81 to 1985-86	66.7	30.9
1985-86 to 1990-91	92.9	5.9
1990-90 to 1995-96	23.4	70.6
1995-96 to 2000-01	17.6	82.6
2000-01 to 2016-17	-233.3	133.3
1960-61 to 1974-75	563.2	-263.2
1975-76 to 1994-95	63.9	27.3
1995-96 to 2016-17	114.1	114.7

Source: Calculated from Department of Economics and Statistics, Kerala

### 6.2.2 Growth Rates

As indicated earlier, the years 1975 and 1995 are considered to be turning points in Kerala agriculture and therefore growth rates are obtained for 1960-61 to 1974-75, 1975-76 to 1994-95 and 1995-96 to 2016-17. The compound growth rates of area, production and yield of coconuts in Kerala is estimated and given in Table 6.4. The growth rates of area under coconuts were 3.34 per cent per annum during 1960-61 to 1974-75 and it declined to 1.59 per cent per annum during 1975-76 to 1994-95 and further down to -1.41 per cent per annum during the post globalisation period. Production growth rate had increased from 1.87 per cent per annum during 1960-61 to 1974-75 period to 2.54 per cent during 1975-76 to 1994-95 period, and then declined to 0.87 per cent during the post globalisation period. Growth rate of yield was negative during 1960-61 to 1974-75 period and it had increased during both 1975-76 to 1994-95 period and 1995-96 to 2016-17 period. During 1960-61 to 1974-75 period the large

growth rate in area was partially offset by the negative growth rate of yield. During 1975-76 to 1994-95 period the positive growth rates of both area and yield had contributed to the production growth rate. However, during the post globalisation period yield increase had mainly contributed to the production growth rate. During the post globalization period, only yield of coconut in Kerala had improvement compared to area and production. Whereas, in the pre-globalisation periods area and production had better growth performance. The growth performance of overall period is better compared to the post-globalisation period except yield.

**Table 6.4**

**Compound Growth Rates of Area, Production and Yield of Coconut**

<b>Period</b>	<b>Area</b>	<b>Production</b>	<b>Yield</b>
1960-61 to 1974-75	3.34	1.87	-1.63
1975-76 to 1994-95	1.59	2.54	0.87
1995-96 to 2016-17	-1.41	0.65	2.17
1960-61 to 2016-17	0.75	1.87	0.71

Source: Calculated from Department of Economics and Statistics, Kerala

**Table 6.5**

**Acceleration Deceleration Growth Rates of Area, Production and Yield of Coconut**

<b>Periods</b>	<b>Area</b>	<b>Production</b>	<b>Yield</b>
1960-61 to 1974-75	-4.39	-8.5**	7.36
1975-76 to 1994-95	0.14***	0.34***	0.2***
1995-96 to 2016-17	0.27	9.74	7.67**
1960-61 to 2016-17	-2.34***	7.30*	5.39***

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Calculated from Department of Economics and Statistics, Kerala

The acceleration deceleration growth rates of area, production and yield of coconut in Kerala is given in Table 6.5. The results show that during the period of 1960-61 to 1974-75, the growth rate of the production of coconut in Kerala was decelerating, while during the pre-globalisation period (1975-76 to 1994-95) shows that an acceleration of

growth rate for the area, production and yield of coconut in Kerala. During the post-globalisation period, only yield has an acceleration of growth, whereas, both area and production is not significant acceleration of growth. The analysis of overall period shows that the area of coconut was decelerating growth rate while production and yield was accelerating growth rate.

### **6.3 Utilization of Coconuts**

The different uses of coconut can be broadly classified (Jacob Mathew, 1978) into three groups as follows:

- The meat of the nut is used in the fresh state as a food item or for culinary purposes, and in the dried state (copra) for extraction of oil and oil cake. Among the different oilseeds produced in India, coconut is one of the richest sources of vegetable oil used for both edible and industrial purposes (George, Srivastava and Desai, 1978). Tender coconuts are also used as a good soft drink.
- Fire from husk is used to make many products such as coir, yarn, matting's, carpets, brushes, brooms and in stuffing and padding cushions and mattresses. Dry hunk is also used as a fuel for heating purposes.
- Coconut shell is used for making charcoal and minor utensils. Coconut leaves are used for thatching buildings and fencing. Toddy is also extracted from the coconut trees. Wood is used as a construction material and for making furniture's.

Among these different uses commercial activities in Kerala are developed largely in relation to processing coconut oil and making coir products. Though a few units manufacturing products such as coconut milk, coconut water, vinegar, activated carbon, desiccated coconut powder, coconut biscuits and coconut chips are established in the state the volume of production is not significant.

According to available information (Markose, 1992) about 56 per cent of the total production in the country is consumed as fresh nuts and 42 per cent converted to copra

(6.4 per cent as edible copra and 35.6 per cent as milling copra). Less than two per cent of mature nuts were used for the manufacture of desiccated coconuts. In the national context 30 per cent coconut oil is used for edible purposes, 55 per cent for manufacture of toiletry items and 15 per cent for other industrial purposes. However, in the Kerala context it has been estimated (Thampan, 1990, 1998 & 1999) that about 50 percent of the copra produced in Kerala is utilised for crushing in the local milling sector and the balance is exported to up country markets, mainly Maharashtra. About 53 per cent of the coconut oil produced in the state was utilised for domestic edible purpose within the state, 10 per cent for non-edible toiletry use and the remaining 37 per cent was used outside the state. Coconut oil is not used as a medium of cooking outside the Kerala state except among the persons of Kerala origin living in other parts of the country.

#### **6.4 Farm Price**

Coconut prices at the farm level in Kerala indicated a general tendency of upward movement though there had been some seasonal and annual fluctuations. Annual price changes between 1960-61 and 2016-17 indicate that prices had increased in 27 years, decreased in 15 years from 1975-76 onwards price decrease was experienced only in six years. However, during the eight years of post-globalisation period prices had decreased in three years.

Farm prices of coconut at five-year intervals from 1960-61 indicate that the maximum change occurred during the last four years from 2000-01. The 2003-04 prices were more than double the price during 2000-01. In fact, the 2000-01 price, which was the lowest after 1900-91, had dropped down to Rs. 2.81 from the previous year's price of Rs. 4.76 and it had gone up to Rs.5.83 within the next three years. There was appreciable price increased during the 60's and from mid70's until the end of 80's. There was a negative change during the period 1995-96 to 2000-01 on account of the rapid decline in price during 2000-01. The change during the five years beginning with 1990-91 was also very small (6.7 per cent) and the next smallest change (17.5 per cent) was during the five years from 1970-71. Farm prices increased by 291 per cent during the

15 years beginning with 1960-61, by 304 per cent during the 20 years from 1975-76 and by 76 per cent during the eight years from 1995-96.

Though the price increases during the five-year intervals remained high, it was also associated with high variability. The ratio between the highest and lowest prices during the five-year intervals varied between 1.31 during the five years from 1990-91 and 2.51 during the five years from 1980-81. The highest ratio of 2.51 occurred during the five years from 1980-81. The ratio between the lowest and highest price during the 15 years from 1960-61 was 424 per cent and it was 587 per cent during the 20 years from 1970-71 and during the last eight years from 1995-96 the 2016-17 price ratio was 207 per cent (See Table 6.6).

**Table 6.6**  
**Farm level Prices of Coconut in Kerala**

Year	Price (Rs./nut)	Change (%)	Lowest price		Highest price		Ratio of (6) and (4) (%)
			(Rs./nut)	(year)	(Rs./nut)	(year)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
61-65	0.39	85.7	0.21	60/61	0.39	65/66	186
70-71	0.57	46.2	0.36	66/67	0.57	70/71	158
75-76	0.67	17.5	0.42	71/72	0.89	74/75	212
80-81	1.26	88.1	0.67	75/76	1.26	80/81	188
85-86	1.93	53.2	1.21	81/82	3.04	84/85	251
90-91	3.01	56.0	1.93	85/86	3.01	90/91	156
95-96	3.31	6.7	3.01	90/91	3.93	91/92	131
00-01	2.81	(-) 15.1	2.81	00/01	4.85	98/99	173
16-17	5.83	107.5	2.81	00/01	5.83	03/04	207
60-74		219.0	0.21	60/61	0.89	74/75	424
75-94		394.0	0.67	75/76	3.93	91/92	587
95-16		76.1	2.81	00/01	5.83	03/04	207

Source: Department of Economics and Statistics, Kerala

## 6.5 Price Parity

As mentioned earlier the substantial increase of coconut area in Kerala occurred due to substitution of paddy area by coconut. The changes in the relative prices of coconut and paddy from 1960-61 to 1976-77 indicated that coconut paddy price ratio had moved in favour of paddy for all years except 1962-63, 1963-64 and 1970-71. During 1960-61 price of one kilogram of paddy was Rs. 0.41 and price of one coconut was 0.20 so that the coconut-paddy price ratio was 51.2 per cent. With the 1960-61 price parity as the base, index of relative price parity was obtained for all the subsequent years. During 1960-61 to 1976-77 the parity index was favourable to paddy for all years except the three years mentioned above. However, the position was reversed in 1977-78 when the coconut-paddy price ratio became favourable to coconut in relation to the 1960-61 position. The coconut-paddy price ratio continued to remain in favour of coconut throughout all the years after 1977-78 except for a major decline in the price of coconut during 2000-01. During the period from 1977-78 there had been some years when the annual price change was negative, but it was only during 2000-01 that the coconut-paddy price parity index had fallen below the 1960-61 level.

Between 1960-61 to 1975-76 the parity index remained below 100 for 12 years indicating that during this period price parity was favourable to paddy. During the period 1975-76 to 1995-96 the parity index was favourable to coconut in all years except 1976-77 and during the period 1995-96 to 2016-17 the parity index favoured coconut in all years except 2000-01. Thus, coconut had a comparative advantage over paddy from 1977-'78 onwards, which is reflected in the expansion of coconut area at the expense of paddy area in Kerala (See Table 6.7).

**Table 6.7**  
**Coconut-Paddy Price Parity**

Year	Parity ratio	Parity index	Range of index		Number of years favourable to	
60-61	51.2	100				
65-66	44.8	87.5	78	119	2	3
70-71	60.6	118.4	64	118	1	4
75-76	35.4	69.1	68	93	0	5
80-81	70.0	136.7	94	165	4	1
85-86	79.8	155.9	131	257	5	0
90-91	100.3	195.8	137	203	5	0
95-96	60.5	118.2	118	205	5	0
00-01	43.5	85.0	85	154	4	1
16-17	83.9	163.9	110	164	3	0
				Total	29	14
60-74					3	12
75-94					19	1
95-16					7	1

Source: Department of Economics and Statistics, Kerala

### 6.6 Price, Support for Coconut

The high variability of coconut prices had introduced substantial handicaps for coconut farmers dominated by small holdings of less than one hectare. In order to safeguard the coconut growers from the vulnerability of market price the government had introduced a minimum support price for copra in 1988. According to this provision institutions were identified to buy copra from the market at a predetermined price if the market price fell below this level. Between 1986 and 2017 minimum support prices for milling copra were announced for all years except 1987, 1988 and 1992. Among these 16 years market price remained below the minimum support price only in five year, of which 4 years happened to be during the post globalisation period. Minimum support price for ball copra also was announced from 1996, but the market price remained below the support price only in 2001. Procurement operations under the minimum support

programme were not carried out during the years when the market price was above the support price level (See Table 6.8).

**Table 6.8**  
**Minimum Support Price for Copra**

Year	Milling Copra		(Rs./100kg.) Ball copra	
	Support price	Annual av. price	Support price	Annual av. price
1986	1200	1422		1688
1989	1500	1605		2498
1990	1600	1799		1988
1991	1700	2660		3053
1993	2150	2580		3700
1994	2350	2165		2619
1995	2500	2316		2596
1996	2500	2982	2725	3352
1997	2700	3484	2925	4921
1998	2900	2928	3125	4675
1999	3100	3506	3325	3850
2000	3250	2335	3500	3738
2001	9300	2046	3550	2558
2002	3300	2871	3550	3583
2016	3320	3861	3570	4482
2017	3500	4194	3750	5667

Source: Department of Economics and Statistics, Kerala

### 6.7 Market Price Movements of Coconut Oil

Coconut price movements are closely linked up with the prices of copra and coconut oil. It has been well established that the wholesale prices of coconuts and copra were moving in close sympathy with coconut oil price and the variations in the prices of coconut and copra could be explained by the variations in coconut oil prices (Jacob Mathew, 1978). Further it has been shown that coconut, copra and coconut oil markets in Kerala were spatially integrated (Thomas Mathew, 1994). Therefore, the pattern of



changes in coconut oil prices would adequately reflect the changes in coconut and copra prices also.

Coconut oil prices in Kerala have indicated substantial annual and seasonal fluctuations (Narayana, et.al, 1991). While analysing the movement of coconut oil prices in Kerala between 1950 to 1975 Jacob Mathew (1977) has broken up the period into three sub periods: (1) 1950 to 1956 during which period prices of coconut and coconut products declined continuously, (2) 1956 to 1965 during which period prices generally increased with moderate fluctuations, and (3) 1965 to 1975 during which period prices not only increased very sharply, but also tended to fluctuate more widely than in the previous periods. The steady decline in prices during the first sub-period is attributed to increased imports (from 107.2 gms per capita of copra equivalent in 1950 to 366.5 gms in 1957). With the decline in imports during the second sub-period (101 gms per capita in 1965) prices had moderately increased, and with the stoppage of imports during the third sub-period prices began to rise. Though imports in 1981 had brought down the prices by 8 per cent from the 1980 level, stoppage of imports in 1982 and the severe drought during the early part of the 1980's has contributed to an annual price increase of coconut oil by 45 per cent in 1983 and by 60 per cent in 1984. The large imports of palm oil during the 80's have induced substitution of coconut oil as a cooking medium in Kerala and this has kept price increase under control. During the 90's there was a steep fall in coconut prices mainly on account of the increased production level. A number of measures such as withdrawal of the 50 per cent excise duty on small pack coconut oil, lifting the two decade old ban on the use of coconut oil for manufacture of vanaspathy, allowing blending coconut oil with other oils for manufacture of dhara oil by NDDB, continuing the ban on the import of copra and coconut oil, and market interventions with or without support price of Rs. 23.50 for one kilogram of copra. In spite of all these measures the coconut oil prices remained low throughout 1994-'95. Though the prices had recovered after 1995-'96 there was a sharp fall in coconut prices during 2000-'01 on account of the decrease of international coconut oil price from US \$ 285 per tonne in 2001 against a peak price of US \$ 671 in 1998. With the recovery of international prices in 2002, Kerala prices also improved. The trend initiated in 2002 had continued till now.

The changes in the wholesale prices of account oil over five-year intervals from 1950 onwards indicate negative changes only during the five years beginning with 1950 and 1995. The increase during 2001 over 2000 was also relatively small compared with the other periods (See Table 6.9).

**Table 6.9**  
**Wholesale Price of Coconut oil in Kerala**

Year	Price (Rs./Quintal)	Change (Per cent)
1950	229	
1955	143	(-) 37.5
1960	240	67.8
1965	422	75.8
1970	510	20.9
1975	844	65.5
1980	1544	82.9
1985	1977	28.0
1990	2727	37.9
1995	3477	27.5
2000	55.86	60.7 (4 years)
2005	3100	-45.5 (one year)
2010	3252	4.9 (one year)
2016	4853	49.2 (one year)
1950-1975		268.6 (25 years)
1975-1995		312 (20 years)
1995-2016		39.5(7 years)

Source: Department of Economics and Statistics, Kerala

Though the five-year intervals indicate negative changes for only two periods, annual fluctuations of sizable magnitudes have occurred. Between 1950 and 1995 wholesale prices of coconut oil had declined 17 times and increased 28 times. The maximum annual increase of 67.1 per cent occurred in 1973 and the maximum decline of 40.4 per cent occurred during 1985. Between 1995 and 2002 prices had increased in five years

and decreased in two years. The maximum increase was 49.2 per cent in 2002 and the maximum decrease was 44.5 per cent in 2000 (See Table 6.10).

**Table 6.10**  
**Annual Change in Wholesale Prices of coconut Oil in Kerala**

Negative Change			Positive Change		
Annual Change (percent)	1950-1995	1995-2002	Annual Change	1950-1995	1990-2002
(-) 40 to (-) 50	1	1	50-70	2	-
(-) 30 to (-) 40	-	-	40-50	5	1
(-) 20 to (-) 30	3	-	30-40	2	1
(-) 10 to (-) 20	4	1	20-30	-	2
(-) 5 to (-) 10	3	-	10-20	9	-
0 to (-) 5	6	-	5-10	7	-
			0-5	3	1
<b>Total</b>	<b>17</b>	<b>2</b>	<b>Total</b>	<b>28</b>	<b>5</b>

Source: Department of Economics and Statistics, Kerala

There was a close relationship between the copra price and coconut oil price with the copra price remaining at 66 per cent of the coconut oil price for most years.

## 6.8 Imports

In view of the shortfall in the supply of coconut oil to meet the domestic demand imports of copra and coconut oil were allowed for a long time. During the 1930's the sizable quantities of copra and coconut oil have been imported to keep prices under control. By mid-1940's imports have been reduced and this had influenced the prices to double within a few years' time. As pointed out earlier, between 1950 and 1957 per capita imports of copra equivalent of coconut oil and copra increased from 107 gms to 366 which had brought about a steady decline in the prices during this period. Subsequently imports had gradually declined to 101 gms in 1965 resulting in a moderate recovery of prices. Imports had tapered off for ten years from 1966 during which times prices had gone up sharply (Jacob Mathew, 1977). During 1961 imports of coconut oil were stepped up to 44 thousand metric tonnes less than a thousand metric

tonnes in 1980 in order to arrest the price increase and it was dropped back to about nine thousand metric tonnes in 1982. Coconut oil imports remained at a very negligible level until 1999 before it increased to 8.6 thousand metric tonnes in 2000, to 23.6 thousand metric tonnes in 2001 and to 30.4 thousand tonnes in 2002. India's share of world imports of coconut oil was negligible -even the 2002 imports accounted for only about one percent of the world imports of coconut oil.

Coconut oil accounts only for a small share of the world edible oil production. During 1960 the share of coconut oil in the total edible oil production in the world was about 12 per cent while soybean oil had about 21 per cent share and palm oil had a share of about eight percent. The share of coconut oil in the total oil production experienced a gradual decline over the years (8.8 per cent in 1970, 7.3 percent 1980, 5.9 per cent in 1990, 3.7 percent in 2000, 3.4 per cent in 2016). During 2017 soybean oil's share had gone up to 32 per cent and palm oil's share was 28 per cent. Between 1960 and 2016 coconut oil production had increased by 68 per cent against soybean oil production increase of 849 per cent and palm oil production increase of 2050 percent (See Table 6.11).

**Table 6.11**  
**World Production of edible oil ('000 tonnes)**

Year	Soybean	Palm Oil	Coconut Oil	Total
1960	3,300	1,264	1,949	16,069
1970	6,477	1,742	2,020	22,932
1980	13,382	4,543	2,717	37,248
1990	16,097	11,014	3,387	57,511
2000	25,541	21,874	3,281	68,817
2016	31,303	27,209	3,281	97,817

Source: Department of Economics and Statistics, Kerala

There is certain amount of substitution among the different sources of edible oils. With substantial increase in the production of palm oil over the years and the wide gap between the prices of palm oil and coconut oil there was a steady flow of palm oil to the Indian market (Varma, 2002). Palm oil imports to India increased from about 722 thousand tonnes in 1980 to 3052 thousand tonnes in 2002 with a major increase after

1995. The average annual imports of edible oil were about 1200 thousand tonnes in 1980 which had double during 1995-99. It had further increased to about 3050 thousand tonnes during 2000-01. The sharp decline in coconut prices during the 2000-01 is attributed to the fall in world oil prices and the import of palm oil (See Table 6.12).

**Table 6.12**  
**Imports of Palm Oil**

Year	Quantity (‘000 tonnes)	Value	
		US \$ (Million \$)	Indian Rs. (Rs. Crores)
1980	722	339	
1985	1097	331	
1990	487	154	269
1995	850	553	1793
1996	1114	649	2299
1997	1044	613	2226
1998	1608	1114	4584
1999	2868	1229	5298
2000	3055	907	4082
2001	2733	836	3970
2002	3052	1212	5817

Source: Department of Economics and Statistics, Kerala

The price advantage for switching over from coconut oil to palm oil is evident from the fact that palm oil price remained well below the coconut oil price in Kerala. The ratio between the wholesale price of coconut oil in the Kochi market in Kerala and the rupee equivalent of imported palm oil derived from the quantity and value of imports in Table 5.13 using the prevalent exchange rate indicates that palm oil cost was as low as 20 percent of the coconut oil price in 1990 and the maximum level of 67.2 percent was in 1998. The improvement after 1994 is partly due to the exchange rate adjustment which made the rupee equivalent of dollars in 1995 about twice the level in 1990 (Table 6.13).

**Table 6.13****Wholesale price of Coconut Oil in Kochi and import cost of Palm Oil**

Year	Coconut Oil Price (Rs/100kg)	Palm Oil cost (Rs/100kg)	Ratio of (3)/(2) (per cent)	Exchange rate (1\$ =Rs)
(1)	(2)	(3)	(4)	(5)
1990	2727	553	20.3	17.50
1991	4060	857	21.1	22.74
1992	4509	1102	24.4	25.92
1993	3803	1125	29.6	30.49
1994	3228	1700	52.7	31.37
1995	3477	2108	60.6	32.43
1996	4314	2062	47.8	35.43
1997	5195	2131	41.0	36.31
1998	4254	2859	67.2	41.26
1999	5586	1845	33.0	43.11
2000	3100	1337	43.1	45.0
2001	3252	1453	44.7	47.43

Source: Department of Economics and Statistics, Kerala

**6.9 Exports**

India's exports of coconut products were insignificant in the context of international trade. Though India is the third leading producer of coconuts in the world, it shares of international trade in value added products is insignificant. While the exports earnings of coconut products from Philippines, Indonesia and Sri Lanka in 2001 were US\$ 1028 million, US \$ 525 million and US \$ 121 respectively. Indian exports of coconut and desiccated coconuts had contributed only less than one million US dollars. Indian exports of coconut oil had crossed one thousand metric tonnes in 1998 only. The maximum exports of 2.4 thousand tonnes during 2001 were insignificant in relation to the total export of 2132 thousand tonnes of coconut oil. India had also exported small quantities of copra and desiccated coconuts. A portion of the imported palm oil was exported in certain years with the highest export of about 26 thousand tonnes against the imports of 2733 thousand tonnes during 2001. Between 1998 and 2002 the share of

India's export value of coconut products in the world exports ranged between 4.0 and 6.8 percent (See Table 6.14).

**Table 6.14**  
**Exports of Coconut and export of Palm Oil (Metric tonnes)**

Year	Coconut	Coconut Oil	Desiccated Coconut	Palm Oil	India's share in world (%)
1991	4		0	15	
1993	28		17	8	
1996	23		5	1	
1999	160		0	0	
2002	80		174	0	
2005	123		25	59	
2008	96	787	134	206	
2011	183	1256	211	1700	4.1
2014	319	859	209	5	6.1
2015	554	1535	144	220	5.2
2016	439	2393	197	25,687	6.8
2017	1188	3000	482		4.0

Source: Department of Economics and Statistics, Kerala

### 6.10 WTO Concerns

According to the WTO agreement coconut and its sub products are treated as agricultural products and therefore it is expected that the tariff rates fixed for coconut oil and other edible oils will be consistent with the bound rates applicable for agricultural products. The bound rates for edible oils were 300 percent which is much higher than the base rates for coconut oil and palm oil. The basic duty and the bound duty as on April 1, 2004 are available in Table 6.15.

Further preferential rates were available for imports from preferential areas. The price differentials in the major producing countries indicate that coconut prices in India had been substantially higher than the other countries. Coconut oil prices from 1998 to

2017 indicate that Indonesia had the lowest price for coconut oil and prices in Philippines were very close to the Indonesian prices. India had the highest price and Sri Lanka was closely behind India in many years. Coconut oil prices in India were more than twice the Indonesian price levels (See Table 6.16).

**Table 6.15**  
**Base Duty and Bound Duty for Coconut and Coconut Products**

Item	Base duty	Bound duty (%)
Coconut	70	100
Copra	70	100
Coconut Oil	70	300
Coconut Oil (edible grade)	85	300
Coconut oil (other)	100	300
Palm oil	70	300
Palm oil (for vanaspathi)	85/100	300

Source: Department of Economics and Statistics, Kerala

**Table 6.16**  
**Relative Prices of Coconut Oil in Major Producing Countries**

Year	Indonesia	Philippines	India	Sri Lanka
2011	100	134	225	217
2012	100	123	201	150
2016	100	109	200	162
2014	100	106	243	255
2015	100	105	233	219
2016	100	99	283	158
2017	100	113	238	146

Source: Department of Economics and Statistics, Kerala

A similar scenario exists for coconut oil price in Kerala. A comparison of the price of coconut oil in Kerala with the international price indicates that prices in Kerala were above the international prices. While the price in Kerala had been about four times the international price during the early part of the 1990's the gap had narrowed down by



mid – 1990's. However, when prices started recovering there is a tendency of further widening the gap between Kerala price and the international price? The narrowing down of the gap between the two prices during the first half of the 90's was due to the exchange rate adjustments in India during this period. As pointed out earlier the exchange rate of one US dollar was Rs 17.50 in 1990 and this had doubled by 1995. However, with somewhat stable exchange rate the widening gap reflects the relatively higher growth of coconut oil prices in Kerala (See Table 6.17).

**Table 6.17**  
**Comparison of Kerala Prices with International Prices**

Year	Coconut Oil Price			Copra Price		
	Kerala (Rs/100kg)	World	(2)/(3) (%)	Kerala (Rs/100kg)	World	(5)/(6) (%)
(1)	(2)	(3)	(4)	(5)	6	7
2005	2662	580	520	1250	311	339
2006	2726	590	462	1800	404	446
2007	3977	985	404	2660	650	409
2008	4543	1498	304	2993	985	304
2009	3915	1372	285	2580	899	287
2010	3234	1907	170	2165	1308	166
2011	3460	2173	159	2316	1424	163
2012	4456	2664	167	2975	1733	172
2013	5218	2367	220	3484	1576	221
2014	4404	2715	162	2911	1696	172
2015	5446	3182	171	3506	1992	176
2016	3430	2025	169	2324	1413	165
2017	3118	1510	206	2046	959	213

Source: Department of Economics and Statistics, Kerala

With the substantial price advantage of the major coconut producing countries for coconut products over the Indian prices there is a strong tendency for importing coconut oil to India. Further with the strong possibility of substituting palm oil for coconut oil the price differential between palm oil and coconut oil provides enough incentives for

palm oil imports. Thus, coconut oil in India is facing strong competition from coconut oil from other major producing countries and from cheap palm oil. With the applied tariff rate much below the base rate and bound duty rate and in the absence of quantity restrictions there is every chance that the crisis situation of 2001 created by imports in excess of requirements might be repeated during the coming years. Therefore, in order to safeguard the interests of the coconut producers in Kerala it is important that adequate measures are built into the system to provide livelihood support for a sizable number of small holdings engaged in coconut cultivation and households dependent on coconut based ancillary industries such as coir. These safeguards will have to include both short term and medium- or long-term measures.

In the short run the only option available is to adjust the tariff rates on coconut oil, Palm oil and soybean oil. The applied tariff rate of edible grade crude palm oil and its fractions at 15 per cent will not provide any disincentives for imports. The AoA committed tariff rate provides enough room for readjustment of the existing import tariff rests on items directly competing with coconut oil.

In the long run it is important that the efficiency of domestic production should be improved in order to effectively compete in the international markets. This will involve improvements in the farm conditions to raise the yield levels and to effectively utilize the output consistent with international market conditions.

Though coconut development measures initiated during early 90's have improved the yield of coconuts in Kerala there is still scope for further improvement in coconut production. About 30 percent of the coconut trees in Kerala have outlived their economic life and they have to be replanted for which the farmers might require financial support. Measures for disease control, selection of coconut varieties suitable for local conditions, and research and extension on appropriate farming practices are also areas of prime concern. Obviously, this will involve active collaboration of the research and development agencies in the state and also farmer's organizations and other organizations involved in activities related to input supply and marketing.

In order to improve the value of coconut output it may be necessary to diversify the utilization of coconut to new products outside the traditional products of copra and coconut oil. Utilization of tender coconut and manufacture of other value-added products offer enough opportunities if adequate infrastructural and marketing support are provided. In fact, the opportunities available for diversifying to value added products can be a counteracting force against the price depressing effects of import of traditional products.

There is also scope for improving the efficiency of minimum support price operations to ensure remunerative prices to the farmers. Apart from strengthening the institutional mechanism available for this purpose there is scope for establishing a price stabilization mechanism with the active collaboration of the farmer's organizations. Extension of export subsidy for coconut products and ensuring the availability of proper marketing intelligence to all concerned are also important considerations. All these measures are within the framework of the WTO provisions since the existing support measures under both domestic support and export subsidies are well below the admissible levels.

## **6.11 Conclusion**

This chapter analyses the changing pattern of area, production and yield of coconut, the cropping patterns, price parity, export and import of coconut in Kerala for the pre-globalisation and post globalization period using the data from 1960-61 to 2016-17. The major concentration of coconut in India is at Kerala. During 2016-17 coconut was the dominant crop in the state occupying about 41 percent of the net cropped area and about 30 per cent of the gross cropped area. The area under coconut during 1965-66 was 586 thousand hectares which had increased by 18 per cent by 1975-76 and there was an increase of 32 per cent during the 20 years beginning with 1975-76. However, during the post globalisation period coconut area has declined by close to one per cent. Coconut production in Kerala during 1965-66 was 3293 million nuts which had increased by about four per cent during 1975-76 and there was an increase of about 50 per cent during the next 20 years. The production of 5484 million nuts during 2003-04 was six per cent above the 1995-96 production level. Coconut yield in Kerala declined

continuously from 1965-66 to 1980-81 (from 5613 nuts/ha to 4618 nuts/ha) and subsequently there was an upward movement. The 2003-04 yield was 6052 nuts/ha. Between 1965-66 to 1975-76 yield had dropped by 11.6 per cent and it increased by 13.6 per cent between 1975-76 to 1995-96. During the post globalisation period of 8 years yield increase was 7.3 per cent.

The growth rate of pre-globalisation period for the area, production and yield expressed better growth performance. During the post-globalisation period coconut production growth rate had declined mainly on account of the decline in area growth rate even though there was a marginal increase in the yield growth rate. While decomposing the production changes according to area effect and yield effect, it was observed that production increase during 1965 to 1975 was influenced by a strong area effect overcoming the large negative yield effect. Between 1975-76 to 1995-96 both area effect and yield effect had contributed to the production increase with a major share from area effect. However, during the post globalisation period the large positive yield effect had wiped out the negative area effect.

Farm level prices of coconut in Kerala have indicated a general upward tendency with some fluctuations. Between 1960-61 and 2016-17 prices had increased in 27 years, decreased in 15 years and remained stable for one year. During the post globalisation period there was a sharp decline in the prices during 2000-01 along the crash in world edible oil prices. The relative prices of coconut and rice moved in favour of rice for most of the years from 1960-61 to 1976-77 and this position was reversed in 1976-77. The rapid increase of coconut area occurred on account of the shift from rice due to favourable price parity after 1976-77. The decline in coconut price during 2000-01 was so large to make the coconut-rice parity index fall below the 1960-61 level. Though price support for coconut was introduced in 1986 through support price for copra, market prices remained below the support price only in five years of which four years were during the post globalisation period.

Coconut price movements are closely linked up with the prices of copra and coconut oil. Coconut oil prices in Kerala had indicated substantial annual and seasonal

fluctuations. There was a strong linkage between the quantity of oil imports and the domestic price level. The changes in the international market prices were also reflected in the coconut oil price. In the international arena soybean oil and palm oil production had increased at a much faster rate than coconut oil. The relatively low price of palm oil has influenced substitution of palm oil for coconut oil. During the post globalisation period massive imports of palm oil had depressed the coconut oil price, which was also reflected in the coconut price.

Removal of quantity restrictions and low levels of applied tariff below the base and bound levels provide a strong possibility of repeating the crisis created for the coconut producers in Kerala during 2000-01. A number of short term and long-term measures are necessary to protect the income levels of the coconut farmers in Kerala and to ensure livelihood sustainability for them.



## Chapter 7

### An Analysis of Various Aspects of Rubber in Kerala

#### 7.1 Background

Natural rubber cultivation in India has been traditionally concentrated in Kerala and to some extent in the adjoining states of Karnataka and Tamil Nadu. The agro-climatic condition in the state was very favourable for rubber cultivation. The traditional rubber growing belt consists of a 600-kilometer stretch extending from the Kanyakumari district of Tamil Nadu in the south to Coorg district of Karnataka in the north. This situation continued until mid-eighties when rubber cultivation was extended to the north-eastern states of Tripura, Assam, Meghalaya and Nagaland. Though rubber plantations were established in India from the beginning of the twentieth century, area under rubber cultivation during 1950-51 was only about 75 thousand hectares and it expanded to about 144 thousand hectares by 1960-61. While Kerala had accounted for about 94 percent of area under rubber in India during 1960-61, with the expansion of area in the other states Kerala's share of area under rubber has gradually decreased to about 83 percent during 2016-17 (see Table 7.1). During 2016-17 Tripura was the second largest rubber producing state with about five percent share of the all-India area followed by 3.6 percent in Karnataka and 3.3 percent in Tamil Nadu. Though area has expanded to some of the other states in the recent years, in view of the maturity period involved before starting rubber production, Kerala still accounts for more than 90 per cent of the production of natural rubber in India.

Based on the area under rubber cultivation often a distinction is made between rubber "holdings" and rubber "estates". Holdings correspond to rubber area, contiguous or non-contiguous, of less than 29 hectares under a single ownership Land, contiguous or noncontiguous; aggregating more than 20 hectares planted with rubber under a single ownership is treated as an estate. During the initial years cultivation of rubber was mainly in the estate sector, but gradually cultivation of rubber was mainly in the estate sector, but gradually cultivation was extended to small holdings and currently it is

predominantly grown by the small farmers. As we can see from the Table 7.2, between 1960-61 to 2016-17 the area under rubber holdings increased from 90.4 thousand hectares to 502.9 thousand hectares, indicating an increase of 456 per cent. During the same period, the area under rubber estates had increased only by about 25 per cent. While the area under rubber holdings had registered a continuous growth over the years, the area under rubber estates had increased until 1990-91 and subsequently there had been a decline. The share of rubber holdings area in the total rubber area had continuously increased from 62.8 per cent during 1960-61 to 88.3 per cent during 2016-17 at the expense of the share of area under rubber estates.

**Table 7.1**  
**Area and Production of Rubber in India**

Year	Area (‘000 ha)	Production (‘000 ton)	Kerala's share of	
			Area	Production
1960-61	143.9	25.7	94.4	90.3
1975-76	235.9	137.8	89.8	93.5
1985-86	382.8	200.5	89.2	92.1
1995-96	524.1	506.9	85.7	93.6
2000-01	562.7	630.4	84.3	92.0
2016-17	569.7	649.4	83.6	91.6

Source: Department of Economics and Statistics, Kerala

**Table 7.2**  
**Share of Holdings and Estates in total Rubber Area in India**

Year	Holdings		Estates		Total area (‘000 ha)
	Area (‘000 ha)	Share (%)	Area (‘000 ha)	Share (%)	
1960-61	90.4	62.8	53.5	37.2	143.9
1975-76	168.7	71.5	67.2	28.5	235.9
1995-96	449.5	85.8	74.6	14.2	524.1
2000-01	495.4	88.0	67.3	12.0	562.7
2016-17	502.9	88.3	66.8	11.7	569.7

Source: Department of Economics and Statistics, Kerala



As indicated earlier, at present rubber cultivation of the rubber holdings is essentially a small farming operation. Classification of rubber holdings according to size is given in Table 7.3. The total number of holdings had increased from 75.4 thousand units during 1960-61 to 1000.8 thousand units during 2016-17. The average size of holdings had decreased from 1.20 hectares during 1960-61 to 0.50 hectares during 2000-01 mainly on account of the emergence of a large number of small holdings. While the holdings with less than two hectares had accounted for about 90 per cent of the total holdings during 1960-61, about 98 per cent of the holdings of a substantially increased number had belonged to this category by the middle of 1990's. The share of holdings with 4 to 20 hectares had declined from 3.8 per cent during 1960-61 to 0.4 per cent during 2016-17. While the share of the total area operated by the holdings with less than two hectares had increased from 57.9 per cent by 2016-17, the share of area operated by the holdings with 4-20 hectares had declined from 26.6 per cent during 1960-61 per cent during 2016-17.

**Table 7.3**  
**Classification of Holdings According to Size**

Size of Holdings (hectares)		1960-61	1975-76	1995-96	2000-01	2016-17
Below 2	Number of holdings (%)	90.0	88.2	97.9	97.7	98.5
	Area share (%)	57.9	54.8	83.6	83.3	86.5
	Average size (ha)	0.77	0.69	0.42	0.43	0.44
2 - 4	Number of holdings	6.3	7.6	1.6	1.8	1.1
	Area share (%)	15.2	17.3	8.7	9.1	7.0
	Average size (ha)	3.00	2.57	2.70	2.55	3.16
4 -20	Number of holdings	3.8	4.2	0.5	0.5	0.4
	Area share (%)	26.6	27.9	7.7	7.6	6.5
	Average size (ha)	8.35	7.30	7.30	7.17	8.19
All holdings	Total holdings ('000)	75.4	150.7	911.3	991.6	1000.8
	Total area ('000 ha)	90.4	168.7	449.5	495.4	502.9
	Average size (ha)	1.20	1.12	0.49	0.50	0.50

Source: Department of Economics and Statistics, Kerala

**Table 7.4**  
**Classification of Estates**

Size of estates (hectares)		1960-61	1975-76	1995-96	2000-01	2016-17
20-40	Number	271	289	114	108	90
	Area (%)	14.2	12.3	4.9	4.6	4.0
	Average size (ha)	25.0	28.5	28.8	28.8	29.4
40-200	Number	216	242	134	135	136
	Area (%)	33.3	28.8	16.5	17.2	17.2
	Average size (ha)	82	80	92	86	84
200-400	Number	29	27	25	24	23
	Area (%)	15.1	11.0	10.1	11.1	10.37
	Average size (ha)	279	273	304	312	312
400-600	Number	18	17	19	21	22
	Area (%)	16.4	12.1	13.2	15.9	16.7
	Average size (ha)	487	476	518	510	505
600-800	Number	5	9	15	9	9
	Area (%)	6.4	9.1	13.6	8.7	8.8
	Average size (ha)	687	682	674	654	654
Above 800	Number	8	14	19	19	19
	Area (%)	14.6	26.8	42.2	42.4	36.8
	Average size (ha)	980	1287	1656	1500	1498
All groups	Number	547	598	326	316	299
	Area ('000 ha)	53.5	67.2	74.6	67.3	66.8
	Average size (ha)	98	112	229	213	223

Source: Department of Economics and Statistics, Kerala

In the rubber estates sector, there was a trend somewhat different from the rubber holdings. The number of estates in the smallest category of 20-40 hectares has declined from 271 during 1960-61 to 90 during 2016-17 (See Table 7.4). The share of total area operated by this group has declined from 14.2 per cent during 1960-61 to 4.0 per cent during 2016-17. The average area of estates indicated a slight increase from 25 hectares to 29.4 hectares. A somewhat similar change occurred in the size groups of 40-200

hectares and 200-400 hectares. In the remaining three size groups though the number has increased from the 1960-61 level, the change was more visible in the size group of more than 800 hectares where the number, share of area and average size had increased. The disappearance of the rubber estates in the lower size groups was mainly responsible for the decrease in the total number of estates from 547 during 1960-61 to 299 during 2016-17. At the same time increased number of estates and the increase in the average size of estates in the upper size holding has resulted in the increase of the average size of all estates from 98 hectares during 1960-61 to 223 hectares during 2016-17.

**Table 7.5**

**Share of Area and Production of Holdings and Estate Sectors, and Yield Levels**

Year	Holding sector			Estate Sector		
	Area share (%)	Production share (%)	Yield (kg/ ha)	Area share (%)	Production share (%)	Yield (kg/ha)
1960-61	62.8	25.4	72	37.2	74.6	358
1975-76	71.5	61.4	287	28.5	38.6	791
1995-96	85.8	86.1	971	14.2	13.9	944
2000-01	88.0	87.8	1118	12.0	12.2	1120

Source: Department of Economics and Statistics, Kerala

The rapid expansion of area under rubber holdings and the time involved in the maturity of newly planted area after 1960's has produced a lagged response to reduce the share of the estate sector in total production of natural rubber from about 75 per cent during 1960-61 to about 11 per cent during 2017-18. During 1960-61 the rubber holdings sector had a share of about 63 per cent of the total planted area under rubber, but the production share was only about 25 per cent. The most important reason for this disparity is the fact that the rubber holdings sector had a larger proportion of relatively young plantations and the rubber estate sector had mature rubber plants. However, by 2016-17 the rubber holdings sector had a share of 88 per cent of the area under rubber and the production share was 89 per cent. The changes in the shares of area and production in the rubber holdings sector and the rubber estate sector imply that the wide gap in the yield per hectare of planted area from the two sectors during 1960-61 has

considerably narrowed down. It may be observed that during 1960-61 yields from the rubber estate sector was about 5 times the yield from the holdings sector. Though the position had somewhat improved in the subsequent years, the yield levels of both the sectors were equalized only after 1995-96. By 2016-17 yield from the rubber holdings sector was about one per cent above the yield from the rubber estate sector (See Table 7.5)

An analysis of the newly planted area under rubber from 1960-61 onwards indicates that during the 60's the average annual newly planted area was 8220 hectares and it came down to 5672 hectares during the 70's. There was a rapid expansion during the 80's when the annual average newly planted area was 19,872 hectares. However, during the 90's the newly planted area decreased to 9609 hectares per annum and during the four years of this century the average annual addition was only 4500 hectares. further it can be observed that during the 15 years prior to globalization the average annual addition of newly planted rubber area was 16561 hectares and during the nine years after 1996-96 the average addition has come down to 7155 hectares. In this background this chapter analyses the changes in area, production and yield, the changing pattern of land utilisation, cropping pattern, export, import, and the price parity of rubber in Kerala.

## **7.2 Area, Production and Yield of Rubber**

Since Kerala accounted for a major share of the all-India rubber scenario, the Kerala scenario is not very much different. However, in order to provide some more insights of the changes a brief analysis of the area, production and yield levels of rubber in Kerala is provided here.

Considering the area under rubber cultivation, it has planted area and tapped area. The total planted area under rubber increased from 135.8 thousand hectares during 1960-61 to 476 thousand hectares during 2016-17. The bulk of the increase occurred during the 1980's when the total increase was 154 thousand hectares (37.7 thousand hectares during 1980-81 to 1985-86 and 66.3 thousand hectares during 1985-91). During the 20 years from 1975-76 the area had more than doubled from the base level of 211.8 thousand hectares.

The average annual growth in area during this period was about 11.8 thousand hectares. However, the average annual expansion in area after 1995-96 was less. Obviously, there has been a slowdown in the expansion of rubber area during the post globalization period.

**Table 7.6**  
**Area under rubber in Kerala**

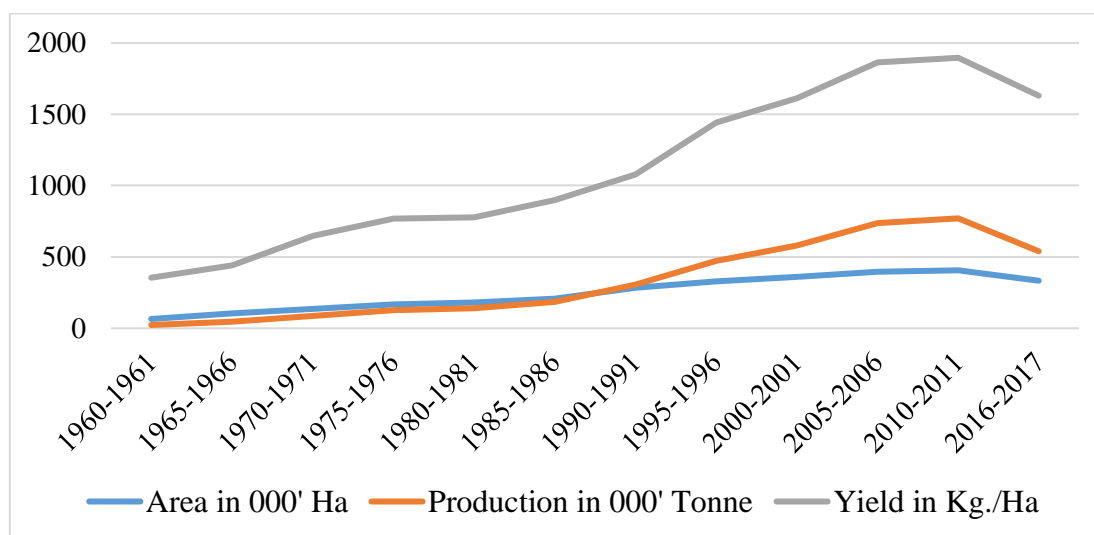
Year	Planted area			Tapped area			as % of planted area
	Total	Change		Total	Change		
	('000 ha)	('000 ha)	%	('000 ha)	('000 ha)	%	
1960-61	135.80			65.40			48.20
1965-66	174.60	38.80	28.60	106.60	41.20	63.30	61.10
1970-71	198.40	23.80	13.60	134.10	27.50	25.80	67.50
1975-76	211.80	13.40	11.40	167.70	33.60	25.10	79.20
1980-81	253.80	42.00	19.80	180.00	12.30	7.30	70.90
1985-86	341.50	87.70	34.60	205.80	25.80	14.30	60.30
1990-91	407.81	41.20	19.40	285.00	79.20	38.50	69.90
1995-96	449.98	41.20	10.10	328.80	43.80	15.40	73.20
2000-01	474.40	25.40	5.43	359.80	31.00	9.40	75.80
2005-06	497.61	23.21	4.89	396.39	36.59	10.17	79.66
2010-11	534.23	36.62	7.36	406.39	10.01	2.53	76.07
2016-17	476.98	-57.25	-10.72	331.80	-74.59	-18.36	69.56

Source: Department of Economics and Statistics, Kerala

When the five-year intervals from 1960-61 onwards are considered the maximum growth of 34.6 per cent increase was during 1980-81 to 1985-86 and it was followed by 28.6 per cent between 1960-61 to 1965-66. The least growth in area occurred during the five years following 1995-96 and it reached -10.72 per cent decline in the planted area of rubber during 2016-17 and -18.36 per cent decline in the tapped area of rubber during the same period. The percentage of rubber area under tapping remained somewhat low until the mid-seventies when new area had been brought under rubber planting. The tapping starts after six to seven years of planting and this lag is reflected

in the tapped area. The planted area and the tapped area under rubber cultivation is given in Table 7.6. The graphical representation of the area (tapped), production and yield of rubber in Kerala is presented in Figure 7.1.

**Figure 7.1**  
**Area (Tapped), Production and Yield of Rubber in Kerala**



Source: Table 7.6 and Table 7.7

Production of rubber in Kerala had increase rate a steady rate over the years. The 1960-61 production level of 23.2 thousand tonnes was doubled in five years and during the next ten years production increased by 175 per cent. During the twenty years starting 1975-76 production increased by 435.8 thousand tonnes which represents 168 per cent increase over the 1975-76 level. The total production increase during the eight years starting 1995-96 was 120.3 thousand tonnes. In terms of production increase over five years' intervals the maximum increase of 167.1 thousand tonnes occurred from 1990-91 to 1995-96 and it was followed by 122.9 thousand tonnes during 1985-86 to 1990-91. It may be recalled that the period 1985-86 to 1995-96 also corresponds to the period with maximum increase in the tapped area under rubber. In terms of percentage changes over five-year intervals the maximum change of 102.2 per cent occurred during the five years following 1960-61 and the minimum change of 8.9 per cent occurred during the five years following 1975-76. During the period 2016-17 witnessed a decline of -29.87 per cent on the total production of rubber in Kerala. It can be seen from the Table 7.7.

**Table 7.7**  
**Production and Yield of Rubber**

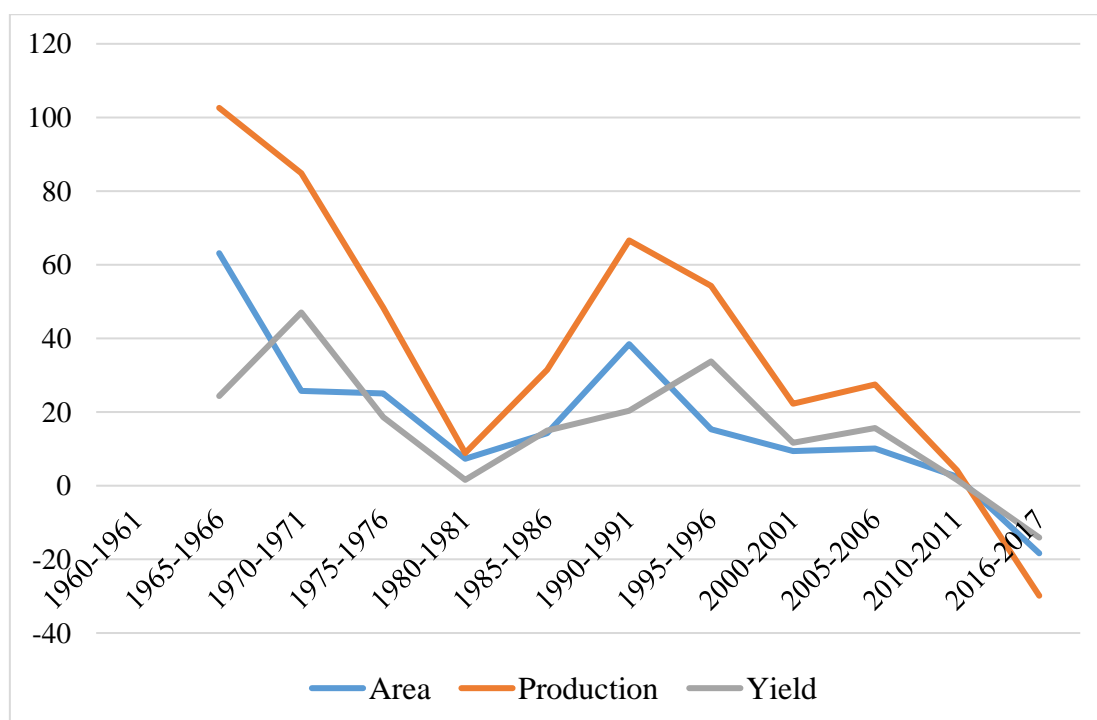
Year	Production		Yield	
	In '000 Tonne	Average Growth	In Kg./ Hectare	Average Growth
1960-61	23.18		354	
1965-66	46.95	102.60	440	24.29
1970-71	86.77	84.81	647	47.05
1975-76	128.77	48.40	768	18.70
1980-81	140.32	8.97	780	1.56
1985-86	184.56	31.53	897	15.00
1990-91	307.52	66.62	1079	20.29
1995-96	474.56	54.32	1443	33.73
2000-01	579.87	22.19	1612	11.71
2005-06	739.23	27.48	1865	15.69
2010-11	770.58	4.24	1896	1.66
2016-17	540.40	-29.87	1629	-14.08

Source: Department of Economics and Statistics, Kerala

There has been a continuous improvement in the yield per hectare of tapped area. The yield of 354 kg/ha during 1960-61 was more than doubled during 15 years to reach 768 kg/ha. There was only a slow growth during the five years starting 1975-76 during which time the total increase in yield was only 12 kg/ ha or 1.6 per cent. The maximum yield increase occurred during the period 1990-91 to 1995-96 with an increase of 364 kg/ha. The yield increase during the 15 years from 1960-61 to 1975-76 was 414 kg/ha and it was 663 kg/ha during the 15 years starting with 1980-81. However, during the eight years from 1995-96 to 2016-17 the yield increase was only 192 kg/ha. In terms of growth in five years intervals, the maximum growth of 47 per cent occurred during the five years starting with 1965-66 and it was followed by 33.7 per cent during the five-year starting with 1990-91. The least percentage growth of 1.6 per cent occurred during the five years starting with 1975-76. While the yield had increased by 116.9 per cent during the 15 years from 1960-61, the increase was 87.9 per cent during the 20

years from 1975-76 and 13.3 per cent during the eight years starting from 1975-76. As seen in the production the yield of rubber in Kerala also decline to -14.08 per cent during 2016-17. It is clear from the Table 7.7. The graphical representation of the average growth of the area (tapped), production and yield of rubber in Kerala is presented in Figure 7.2.

**Figure 7.2**  
**Average Growth of Area, Production and Yield of Rubber in Kerala**



Source: Table 7.6 and Table 7.7

### 7.2.1 Decomposition of Production Changes

When the production increase was decomposed in terms of area effect and yield effect, it was observed that the area effect dominated over yield effect during the five-year intervals with 1960-61, 1970-71 and 1985-86. During the remaining periods yield effect had dominated over the area effect. The decomposition of area effect and yield effect of rubber in Kerala is given in Table 7.8.



During the interval 1960-61 to 1975-76 though area effect dominated over the yield effect it could explain only about a little more than one-third of the production increase during this period since the interaction effect had played a major role. This was also true, although at a reduced level, for the 20-year period starting 1975-76. However, during the eight years of post globalisation period starting 1995-96 area effect and yield effect together explained 94.5 per cent of the production increase with the contribution of yield effect being 52.6 per cent.

**Table 7.8**  
**Contribution of Area Effect and Yield Effect**

Period	Area Effect (Per cent)	Yield Effect (Per cent)
1960 - 61 to 1965 - 66	61.9	23.8
1965 - 66 to 1970 - 71	30.3	55.2
1970 - 71 to 1975 - 76	51.9	38.6
1975 - 76 to 1980 - 81	82.0	18.0
1980 - 81 to 1985 - 86	45.3	47.4
1985 - 86 to 1990 - 91	57.8	32.4
1990 - 91 to 1995 - 96	28.4	62.1
1995 - 96 to 2000 - 01	42.3	52.7
2000 - 01 to 2016 - 17	42.3	53.8
1960 - 61 to 1975 - 76	34.3	25.7
1975 - 76 to 1995 - 96	35.8	32.7
1995 - 96 to 2016 - 17	41.9	52.6

Source: Calculated from Department of Economics and Statistics, Kerala

### 7.2.2 Growth Rates

The growth rates of rubber area have indicated a consistent downward trend during the three periods of 1961 to 1974, 1975 to 1995 and 1996 to 2017. This was also true for

the growth rate of production and yield. The growth rates of area, production and yield during the post globalisation period was less than one-fourth of the growth rates during 1961 to 1974. The compound growth rate of the area, production and yield of rubber in Kerala is given in Table 7.9. The growth rate shows that the growth performance of area, production and yield of rubber in Kerala is better during the pre-globalisation periods. The growth performance was consistently declining over the periods.

**Table 7.9**  
**Compound Growth Rates of Area, Production and Yield of Rubber in Kerala**

Periods	Area	Production	Yield
1960-61 to 2016-17	3.04	6.15	3.02
1960-61 to 1974-75	6.42	13.31	6.49
1975-76 to 1994-95	3.63	6.72	2.97
1995-96 to 2016-17	1.46	2.14	1.68

Source: Calculated from Department of Economics and Statistics, Kerala

**Table 7.10**  
**Acceleration Deceleration Growth of Area, Production and Yield of Rubber in Kerala**

Periods	Area	Production	Yield
1960-61 to 2016-17	-1.61***	-1.15***	-1.24***
1960-61 to 1974-75	-2.53***	-2.92***	-1.12
1975-76 to 1994-95	1.76***	2.36***	1.18***
1995-96 to 2016-17	-1.44***	-1.14***	-1.12***

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Calculated from Department of Economics and Statistics, Kerala

The acceleration and deceleration of the growth of area, production and yield of rubber in Kerala is given in Table 7.10. The analysis results show that during the period of 1960-61 to 1974-75 shows a deceleration of growth for the area and production. The growth of yield is not significant. The pre-globalisation period of 1975-76- to 1994-95 have acceleration of economic growth for area, production and yield of rubber in

Kerala. The post-globalisation result shows that the area, production and yield of rubber in Kerala is decelerating growth rate.

### **7.3 Price of Rubber**

Rubber price had been determined in isolation from international markets for a number of years through government interventions. Statutory minimum and maximum prices were fixed by the government in 1942 and natural rubber exports were banned. The Tariff commission was responsible for determining the statutory prices based on domestic cost of production. Though a monopoly purchase depot was opened to handle the entire procurement it was abandoned after the Second World War. The statutory maximum price was abolished in 1969 in response to the representations from the rubber growers indicating that the maximum prices were not remunerative. However, along with the abolition of the statutory maximum prices, rubber imports were permitted through government agencies. A buffer stocking scheme introduced in 1986 had specified lower and upper “indicator prices” for entering the market through additions or depletions of stocks. Further the conditions imposed on the imports from time to time had an impact on the domestic prices. These measures were expected to control the speculative tendencies in the market and to ensure remunerative prices to the rubber growers. Many of these measures were modified or abolished subsequent to the liberation regime and their impact was reflected in the price situation.

The average price of RSS 4 grade at the Kottayam market, which is the biggest natural rubber market in Kerala, during the 70's was Rs. 6.61/kg and it experienced a consistent upward trend over the years though there had been annual fluctuations. The average price at Kottayam during the 80's was Rs 16.39/kg which increased to Rs. 32.57 during the 90's and to Rs 40.66 during the first five years of this century. The average price during the 15 years prior to 1995 was Rs 19.19/kg which had more than doubled to Rs 40.51 during the 10 years from 1995. Though the price increase was at a moderate level between 1980 and 1992 there was an accelerated growth in rubber prices when the 1993 price of Rs 25.46/kg increased to Rs 51.22/kg in 1995. The doubling of prices within the three-year period was mainly on account of the increased demand for rubber

attributed to the recovery of the world automobile sector (Veeraputhran, 1999). Nearly half the natural rubber consumption in the world is for tyre production and the changes in automobile demand will be reflected in the demand for natural rubber. However, there was a sharp decline in prices between 1996 and 1998 when the 1998 price was 41 per cent below the 1996 price. The drastic decline was attributed to the South-east Asian currency crisis around this period (Harilal and Joseph, 1998). Rubber price had recovered during 2002 and continued an accelerated upward trend with an average price of Rs 48.14 during 2003 and Rs. 56.60/kg during 2004. This increase was the response to increased world market price due to several factors such as decline in world natural rubber supply (four percent decline between 2001 and 2002), exchange rate changes in the producing countries, large purchases by China, depletion of world natural rubber stock levels in 2002 and revival of the world automotive tyre industry. Further higher demand for tyres stimulated by increased demand for motor vehicles on account of accelerated economic growth in China and Asian countries, together with hike in oil prices including higher prices for synthetic rubber had generated stronger demand for natural rubber.

The rubber prices in Kerala were well above the world market prices during the 70's and 80's and the margin has narrowed down from the 90's onwards. The average price of comparable grade of RSS 4 in Kerala at the Kaula Lumpur Market, which can be considered as a proxy for the world market price, during the 70's was Rs 5.41/kg and it increased to Rs 10.95/kg during the 80's, to Rs 30.63 during the 90's and to Rs 40.52/kg during the five years of the current century. The price of rubber at Kottayam was 21.3 per cent above the world market price during the 70's and the range had gone up to 49.7 per cent during the 80's. However, by the 90's the gap had narrowed down so that the price at Kottayam was only 6.3 per cent above the world market price, and during the five years of the current century the gap was only 0.3 per cent. During the 15 years prior to globalization the average price in Kerala was 27.3 per cent above the world market price, but during the ten years of the post globalisation period price at Kottayam was only 3.4 per cent above the world market price. Thus, there has been a substantial integration of the Kerala rubber market with the international market to bring about price parity.

The synchronisation of the Kerala price with the world market price is also evident in the annual variations of prices. During the 70's the world market price was above the Kottayam rubber price in 1973, 1976 and 1977. During the next 16 years from 1978, the Kerala price remained above the world market price and during the 90's world market price was above the Kerala price only in 1994. However, during this century world market prices were above the Kerala Prices in three out of five years. The annual variations in the price levels also indicate that the gap between the two prices has narrowed down and also the range has decreased. During the 1970's the range of price ratios varied between 91 to 187 per cent and it was 106 to 199 during the 1980's. By 1990's the range had come down to 90 to 151, and it further narrowed down to 97 to 119 during the five years of this century. Between 1980 and 1994 the ratio of the two prices had a range from 90 to 199 per cent, but during the ten years of the post globalisation period the range was only from 97 to 119 per cent (See Table 7.11).

**Table 7.11**  
**Price of Rubber at Kottayam and Kaula Lumpur Markets**

Period	Average Price		Price Ratio (percent)		
	Kottayam (Rs/kg)	K.L (Rs/kg)	Average (per cent)	Range	
				Minimum	Maximum
1970's	6.61	5.45	121.3	91 (1977)	187 (1972)
1980's	16.39	10.95	149.7	106 (1980)	199 (1982)
1990's	32.57	30.63	106.3	90 (1994)	151 (1990)
2000's	40.66	40.52	100.3	97 (2003)	119 (2001)
1980-94	19.19	15.08	127.3	90 (1994)	199 (1982)
1995-2017	40.51	39.17	103.4	97 (2003)	119 (2001)

Source: Department of Economics and Statistics, Kerala

#### **7.4 Variability of Rubber Prices**

During the 70's rubber price at Kottayam increased from Rs. 4.21/kg to Rs 10.24/kg and during the same period prices at Kaula Lumpur ranged between Rs 2.35/kg to Rs 10.11/kg. The range between the minimum and maximum prices at both these markets

had narrowed down during the 1980's and it had further widened during the 1990's. The variability in rubber prices in Kerala and world markets is given in Table 7.12.

**Table 7.12**  
**Variability in Rubber Prices in the Kerala and World Markets**

Period	Price Range (Rs/kg)				Coefficient of variation (%)	
	Kerala		World		Kerala	World
	Minimum	Maximum	Minimum	Maximum		
1970's	4.21 (1970)	10.24 (1979)	2.35 (1971)	10.11 (1979)	28	42
1980's	11.54 (1982)	20.40 (1989)	7.39 (1982)	16.00 (1988)	14	24
1990's	21.28 (1991)	51.22 (1996)	14.25 (1990)	50.30 (1995)	34	36
2000's	31.90 (2001)	56.60 (2004)	27.32 (2001)	58.41 (2004)	6	5
1980-94	11.54 (1982)	31.07 (1994)	7.39 (1982)	34.55 (1994)	26	49
1995-17	29.97 (1999)	56.60 (2004)	27.32 (2001)	58.41 (2004)	20	25

Source: Department of Economics and Statistics, Kerala

The coefficient of variation in prices during the different decades indicates the following tendencies.

1. The coefficient of variation of both the Kerala market and the world market prices had decreased during the 1980's from the levels during the 1970's and it had gone up during the 1990's. However, the variation was least during the five years of the current century.
2. The coefficient of variation for the Kerala market price was below the world market price indicating that the variability in the world market was more than the Kerala market price.
3. The gap between the variability in the price levels between Kerala and world market prices during the 15 years of pre-globalisation period has been substantially reduced during the post globalisation period. During the pre-globalisation period the coefficient of variation of the world market price was 49 per cent against 26 per cent

for the Kerala market price, and during the ten years after 1995 the coefficient of variation in prices at the world market and Kerala market were 25 per cent and 20 per cent respectively.

### 7.5 Annual Changes in Rubber Prices

The annual variations in rubber prices indicated that between 1970 and 2004 the prices at the Kerala market has declined nine times and increased 25 times. At the same time during the same period prices at the world market had decreased 13 times and increased 21 times. The price movements in both the markets were in the same direction for 24 times (6 times for price reduction and 18 times for price increase) and during the remaining 10 times price movements in the two markets were in the opposite direction (Table 7.13).

**Table 7.13**  
**Annual Price Movements in Kerala and World Markets**

World Kerala	Decrease	Increase	Total
Decrease	6	3	9
Increase	7	18	25
Total	13	21	34

Source: Department of Economics and Statistics, Kerala

### 7.6 Recent Price Trends

The synchronization of the domestic price with the international price has major implications for a large number of small-scale rubber producers in Kerala. Though during the steep fall in world rubber prices during the late 90's was also reflected in India the Indian price levels were maintained ahead of the world market price through some government initiatives such as procurement by the State Trading Corporation for sales to the exporters of rubber goods in lieu of import against Advanced License Scheme. However, these measures were not sufficient to protect the incomes of the

rubber cultivators. The price increase during 2015 and 2016 has revealed a situation where the Kerala market prices lag behind the world market price. Kerala market price, which was higher than the world price till June 2016, started falling below the international price in July 2015 and it remained in this position until May 2017. The revival of this trend lasted only for June and July 2017, and from August onwards Kerala market prices lagged behind the international prices. The prices in Kerala were only about 90 per cent of the world price in a number of months. This tendency will have serious implications for the farm incomes of a large number of small-scale rubber producers when the periodic price fluctuations of the international market reach the declining phase (See Table 7.14).

**Table 7.14**  
**Recent Price Trend of Natural Rubber (Rs./Kg)**

Month	2016			2017		
	Kerala	World	K/W (%)	Kerala	World	K/W (%)
January				51.53	56.72	90.8
February				51.92	57.45	90.4
March				55.57	60.08	92.7
April	50.74	47.55	106.7	57.79	59.73	96.8
May	48.51	46.28	104.8	58.55	62.89	93.1
June	44.53	47.86	100.9	63.43	62.37	101.7
July	44.53	45.90	97.0	65.60	59.29	110.6
August	46.93	47.63	98.8	55.72	57.72	96.5
September	48.49	50.32	96.4	51.63	57.10	90.4
October	51.55	57.37	89.9	52.77	58.88	91.0
November	53.46	59.54	89.8	52.07	56.15	92.7
December	53.15	56.72	93.9	51.81	52.48	98.7

K = Kerala, W= World

Source: Department of Economics and Statistics, Kerala



## 7.7 Consumption of Rubber

Consumption of rubber in India consists of natural rubber, synthetic rubber and reclaimed rubber. During 1970-71 the total consumption of rubber was 134.7 thousand tonnes of which the share natural rubber was 64.7 per cent. Synthetic rubber accounted for 24.6 percent and the remaining 10.7 per cent was reclaimed rubber. By 2015-16 consumption of rubber had increased by about 611 per cent and the increased in the natural rubber consumption during the same period was 697 per cent. The relatively higher growth of natural rubber consumption implies that the share of natural rubber in the total consumption of rubber has gone up from 64.7 per cent during 1970-71 to 72.6 per cent during 2015-16 at the expense of both synthetic rubber and reclaimed rubber. The share of synthetic rubber had declined from 24.6 percent during 1970-71 to 20.3 per cent during 2015-16 and during the same period the share of reclaimed rubber had decline from 10.7 per cent to 7.1 per cent of total consumption (See Table 7.15).

**Table 7.15**  
**Consumption of Rubber in India**

Year	Natural rubber (%)	Synthetic rubber (%)	Reclaimed rubber (%)	Total ('000 tonnes)
1970 - 71	64.7	24.6	10.7	134.7
1975 - 76	70.8	18.3	10.9	177.5
1980 - 81	70.1	19.0	10.9	247.5
1985 - 86	68.7	20.2	11.1	345.7
1990 - 91	69.9	20.1	10.1	521.5
1995 - 96	72.4	18.5	9.1	725.3
2000 - 01	73.1	19.7	7.2	864.4
2016 - 17	72.6	20.3	7.1	957.6

Source: Department of Economics and Statistics, Kerala

Consumption of natural rubber during 1960-61 was 48.1 thousand tonnes and it had gone up to 86.2 thousand tonnes by the end of that decade. During the 60's the average annual consumption was 65.21 thousand tonnes. The average annual consumption during the 70's had increased to 128.87 thousand tonnes indicating an annual average

growth of more than 9 per cent. The maximum decadal growth in consumption occurred during the 90's when the average annual consumption was more than doubles the annual consumption level of the 1980' (See Table 7.16).

**Table 7.16**  
**Consumption of Natural Rubber in India**

Period	Average annual		Minimum		Maximum	
	('000 tonnes)	Change (%)	Quantity ('000 tonnes)	Year	Quantity ('000 tonnes)	Year
1960's	65.21		48.1	60/61	81.9	69/70
1970's	128.87	97.8	87.2	70/71	165.2	79/80
1980's	242.25	88.0	173.6	80/81	341.8	89/90
1990's	497.36	105.3	364.3	90/91	628.1	99/00
2000's	671.18	35.8	631.5	00/01	719.6	03/04
1980-1994	287.19		173.6	80/81	485.8	94.95
1995-2017	556.34	93.7	525.5	95/96	719.6	03.04

Source: Department of Economics and Statistics, Kerala

The changes in the natural rubber consumption during the last four decades indicate that during the 1960's consumption had been in excess of production and this gap was met by imports. However, during the 70's consumption level was less than the production level and during both the 80's and 90's consumption was higher than production indicating imports of natural rubber (Mani, 1992). Kerala's share of natural rubber consumption in India was only 7.7 per cent during 1970-71 since the manufacturing units of rubber produce were located outside the state. Though there has been some improvement in the Kerala's share during the subsequent years it still accounts for only about one-sixth of the total consumption in India. Since Kerala accounts for more than 90 per cent of the production of natural rubber and its share of consumption being only a small portion of the total production it can be visualized that on matters related to imports there is a likelihood of conflict of interest between the rubber producers in Kerala and the rubber products manufactures outside Kerala (See Table 7.17).

**Table 7.17**  
**Consumption of Natural Rubber in Kerala and India**

Period	Consumption		Kerala's share of	
	Kerala ('000 tonnes)	India ('000 tonnes)	Production (per cent)	Consumption (per cent)
1970 - 71	6.7	87.2	94.1	7.7
1975 - 76	9.3	125.7	93.5	7.4
1980 - 81	19.3	173.6	91.7	11.1
1985 - 86	28.3	237.4	92.1	11.9
1990 - 91	55.4	345.7	93.3	16.0
1995 - 96	75.2	521.6	93.6	14.4
2000 - 01	88.2	631.5	92.0	14.0
2016 - 17	126.1	695.4	91.6	18.1

Source: Department of Economics and Statistics, Kerala

### 7.8 Imports of Rubber

Rubber imports to India were permitted under the following provisions in force from time to time:

1. Against a license issued by the Government of India or in accordance with a public notice on this behalf with the rate of duty as fixed by the government of India
2. Advance License, a facility available to exporters of rubber products who can bring in rubber equivalent of the quantity of rubber in the products exported.
3. Special Import License.
4. Import in the Export Promotion zone by Export Oriented Units
5. Under OGL in accordance with the SAARC agreement; and
6. Under the Bangkok agreement with a duty concession of 5 per cent. Among these alternative channels item 2 was banned from February 1999, but the ban was removed from July 2016 with the conditions that the imports should be through the ports of Kolkata and Vishakhapatnam. Item 3 is not available now. With the removal of quantitative restrictions rubber can be freely imported under OGL. the import tariff on rubber was also gradually reduced from 60 per cent in 1983 to 30

per cent in 1991, and to 25 per cent in 1995 (Veeraputhran, 1999). The basic customs duty on rubber was reduced from 25 per cent to 20 per cent and the Special Additional Duty of four per cent was abolished with effect from January 9, 2017.

**Table 7.18**  
**Imports of Rubber to India**

Period	Annual imports			Imports-consumption ratio		
	Average	Minimum	Maximum	Average	Minimum	Maximum
	('000 tonnes)			(% )		
1960's	18.67	8.5 (69/70)	26.3 (63/64)	28.6	9.9 (68/69)	48.0 (60/61)
1970's	5.03	0	32.2 (79/80)	3.9	0	19.5 (79/80)
1980's	40.36	9.3 (80/81)	59.8 (88/89)	16.7	5.3 (80/81)	22.7 (81/82)
1990's	26.3	8.1 (94/95)	51.6 (95/96)	5.3	1.7 (94/95)	13.5 (95/96)
2000's	39.07	9.0 (00/01)	66.2 (01/02)	5.7	1.4 (00/01)	8.8 (04/05)
1980-1994	34.24	8.1 (84/85)	59.8 (88/89)	11.9	1.7 (94/95)	22.7 (81/82)
1916-2017	34.86	9.0 (00/01)	66.2 (01/02)	5.5	1.4 (01/02)	9.8 (94/95)

Source: Department of Economics and Statistics, Kerala

As mentioned earlier, during the 60's India has been importing a sizeable quantity of natural rubber since the local production was far below the consumption requirements. While about 48 per cent of the consumption during 1960-61 was met from imports, by the end of that decade imports accounted for only about 20 per cent of consumption. During the 70's production and consumption were more or less balanced so that imports were necessary only during 1979-80. However, consumption during the 80's had increased at a much faster rate that the production and the imports had reached a maximum level of 59.8 thousand tonnes (19 per cent of consumption) during 1988-89. There had been a fall in the average volume of imports during the 1990's. Though some of the import duties were abolished in 2004, since the domestic prices remained below the international prices for most of the period's imports were uneconomic even

after lowering the tariff. Further in two years of the current century exports had exceeded imports so that the net import was negative. However, during, 2016-17 imports have again gone up to about 66 thousand tonnes which was about 20 thousand tonnes above the exports. This may be a response to the lowering of customs duty on sheet rubber from 25 per cent during the previous year to 20 per cent during this year and abolishing the Special Additional duty levied at four per cent effect from January 9, 2017 (See Table 7.18).

**Table 7.19**  
**Share in India's Rubber Imports**

Year	Indonesia (%)	Malaysia (%)	Sri Lanka (%)	Thailand (%)	Vietnam (%)	Total Value (million rupees)
2010-11	9.1	46.1	2.6	31.0	-	272.1
2011-12	2.5	41.0	7.7	32.6	-	2784.4
2012-13	1.8	332.4	21.6	33.0	-	1004.4
1913-14	9.8	34.8	7.2	443.1	0.4	1216.6
2014-15	9.2	29.7	4.5	29.0	10.1	303.8
2015-16	12.6	39.2	1.5	34.8	2.8	1444.6
2016-17	15.0	48.3	0.9	28.7	3.8	2201.4

Source: Department of Economics and Statistics, Kerala

The value of imports of rubber in India during the post globalization period ranged between 272.1 million rupees in 1994-95 and 2784.4 million rupees during the next year. Though exports had exceeded imports during 2015-16 and 2016-17 there was a sizeable import during 2016-17. The traditional importers of Malaysia and Thailand had experienced some fluctuation in the share of imports to India ranging between 16.4 per cent to 48.3 per cent for Malaysia and 29.0 per cent to 43.2 per cent for Thailand. Indonesia had a steady increase from 1998-099 onwards. Though Sri Lanka has a share of 21.6 per cent during 1996-97 its share had dropped subsequently. Vietnam was a recent entry and their share is more than Sri Lanka's share (See Table 7.19).

## 7.9 Exports of Rubber

India has not been a traditional rubber exporting country. The best year in terms of India's rubber export was 2016 and even during this year exports accounted for only one per cent of the world export of rubber. The wide gap between domestic demand and consumption of rubber along with the huge price advantage in the domestic market over the world market price are adequate explanations for the poor export performance.

While there had been ban on rubber exports from India until 1972-73 a beginning was made during 12973-74 with an export volume of 2700 tonnes. While this effort was not followed up during the next two years 12, 296 tonnes were exported during 1976-77 and another 11,078 tonnes during 1977-78 accounting for about 8 per cent of domestic production. During both these years the domestic production exceeded domestic consumption and also the domestic market price was only about 91 per cent of the world market price. Exports had dried up during the subsequent years until 1991-92 when 5834 tonnes (1.6 per cent of local production) were exported. It was only during the years from 2002 that exports have picked up. Exports from India remained buoyant during 2016-17 to reach a record level of 75905 tonnes due to the favourable price trends in the international market and the financial incentives provided for quality improvement, certification, packaging and transportation (Rubber Board, 2016). However, during 2016-17 exports had declined by about 30 thousand tonnes from the 2016-17 level.

During the last century the ratio between export and domestic production exceeded one per cent only during 1973 - 74, 1976 - 77, 1977 - 78, 1991 - 92 and 1992 - 93. However, during the current century export-production ratio was at the minimum level of 1.1 per cent during 2001-02 and it was maximum at 10.7 per cent during 2016-17. Based on the experience during the price depressing period since 1997, it was felt at the policy making levels that in order to strengthen the bargaining power of the growers against the rubber industry and to safeguard against the manipulative elements in the market it was necessary that the export potential of rubber should be developed (See Table 7.20).

**Table 7.20**  
**Exports of Rubber from India**

Period	Export quantity ('000 tonnes)			Export Production Ratio		
	Annual average	Minimum	Maximum	Average (%)	Minimum (%)	Maximum (%)
1970's	2.64	0	12.3 (76/77)	2.07	0	8.2 (76/77)
1980's	-	--	--	--	--	--
1990's	1.78	0	6.0 (92/93)	0.37	0	1.6 (92/93)
2000's	39.48	7.0 (01/02)	75.9 (16/17)	5.85	1.1 (01/02)	10.7 (16/17)
1980-94	0.93	0	6.0 (92/93)	0.23	0	1.6 (92/93)
1995-17	20.82	0	75.9 (16/17)	2.66	0	10.7 (16/17)

Source: Department of Economics and Statistics, Kerala

### 7.10 WTO Concerns

During the GATT days natural rubber had been classified as a processed product and it had been treated as an industrial raw material. Therefore, the WTO Agreement on Agriculture (AOA) is not applicable to natural rubber. While most of the other plantation crops such as tea, coffee and cardamom are treated as agricultural commodities, natural rubber which is grown as a plantation crop is treated differently. There are significant differences in the maximum permissible tariff rate (bound rate) for industrial goods and agricultural commodities. While the bound tariff in India for rubber as an industrial good is 40 per cent, commodities coming under the agricultural products enjoy special protection by imposing higher tariff rate for example; industrial raw materials such as cotton and sugarcane have a bound tariff rate of 100 per cent since they are treated as agricultural commodities. As pointed out earlier though rubber production is concentrated in Kerala, the industries utilizing rubber as a raw material for manufactures rubber products are located outside the state. While the rubber growers are interested to get higher prices for their rubber output, the manufactures are

interested to get rubber at a cheaper price. With the removal of Quantitative Restrictions on imports, natural rubber can be imported into India and this is the most important impact on WTO on natural rubber production in Kerala. A low bound rate influences the manufactures to resort to imports when the gap between the domestic price and world price widens. These imports are likely to trigger a collapse of domestic price due to excess supply as in the case of price fall during 1997-98 to 2000-01. Although domestic production and the accumulated stock in excess of the desired reserve level was sufficient to meet the consumption requirements during the second half of the 90's, massive imports were permitted and this is attributed to be one of the major factors contributing to the drastic fall in rubber price. While the prices have recovered from the low level of 2001 there is always the fear of substantial fall in international prices as experiences in the past. Therefore, it is important to safeguard against drastic price fluctuations and an effective remedy for this problem is to imports of rubber less attractive by using the provisions available under AOA and WTO regime. This can occur only if natural rubber is re-classified as an agricultural commodity.

The domestic support available for natural rubber in India is mainly aimed at achieving increased production and productivity. About one-third of the expenditure of the Rubber Board was utilized for domestic support measures (Joseph and George, 2002) of which the advalorem rates of actionable subsidies was only 1.18 per cent of the value of output. Under the provisions of the AOA subsidies and countervailing measures investigation can be sustained against products originating in developing countries only if the advalorem subsidisation exceeds three per cent the export subsidy for rubber also may not violate any WTO norms. Developing countries with per capita income below US \$100 are permitted to maintain export subsidies until their share exceeds 3.25 per cent of the global trade of the commodity. India's export promotion scheme of rubber initiated in September 2001 had provided an incentive of Rs. 3.50/kg of sheet rubber, Rs. 4.50/kg were weight for latex and Rs. 5/kg for crumb rubber. Since the maximum exports from India so fare accounted for only about one per cent of the world trade in rubber, this subsidy also one violates any WTO norm. Thus, none of the provisions of Domestic Support and Export Competitions are likely to be violated when rubber is re-classified as an agricultural commodity.



Unlike many other countries rubber cultivation in India is essentially a small farmer activity. It provides livelihood security for over 900 small and marginal farm families, and also supports another 285 thousand workers engaged in rubber production activities within the state. Rubber also contributes about 350 crore rupees to the state income from purchase tax, agricultural income tax and excise duty. The depressed price conditions during the late 90's have led many farmers to neglect cultivation and some of them had faced serious financial difficulties. The area under new planting and replanting of rubber during this period had drastically fallen. In view of the contributions towards the socio-economic stability of Kerala it is important to sustain rubber cultivation in the state. However, this will depend to a great extent on price stability through appropriate measures to regulate imports, providing a level playing field to the rubber growers against the powerful influence of the manufacturers outside the state, measures for export promotion and value addition, and institutional mechanism for income supports of the small and marginal rubber growers. Though the increased imports during 2016-17 on account of a five per cent reduction of export duty has not affected the domestic rubber price, this situation will be different during the declining phase of the world rubber market price.

### **7.11 Conclusion**

This chapter analysed the various aspects of rubber in Kerala. Rubber is mostly concentrated in Kerala. Kerala has 83 per cent of rubber area in India during 2016-17. However, during 2015-16 Kerala accounted for about 92 per cent of the rubber production in India. During the 15 years prior to globalisation the average annual increase in rubber area was 16,561 hectares which has come down to 7,155 during the nine years of post-globalisation period. The average annual growth of the planted area of rubber during the 20 years before globalisation was 11.8 thousand hectares which has slowed down to 3.4 thousand hectares during the post globalisation period. While production of rubber in Kerala had increased at a steady rate over the years, the rate of increase has gradually declined over the years. Yield per hectare of tapped area of rubber increased from 354 kg during 1960-61 to 1635 kg during 2015-16. The percentage increase of yield during 1960-61 to 1975-76 was 116.9 which has come

down to 87.9 during 20 years from 1975-76 and to 13.3 during the post globalisation period. The production growth rate during the post globalisation period was substantially reduced from the previous period. This was influenced by the decline in both area growth rate and yield growth rate.

Rubber prices in Kerala indicated a consistent upward trend over the years with some amount of annual fluctuations. Though the Kerala market prices were not directly linked to the international prices, major fluctuations in international prices due to events such as changes in the automobile demand, South-Asian currency crisis, changes in world natural rubber supply, exchange rate fluctuations, and natural rubber stock level had its impact on the domestic prices. The rubber prices in Kerala were well above the world market prices during the 70's 80's, but the margin has narrowed down from the 90's onwards. During 70's the Kerala price was 21.3 per cent above the world market price and it had increased to 49.7 per cent during the 80's. However, the gap narrowed down to 6.3 per cent during the 90's. During the 15 years prior to globalisation the average price in Kerala was 27.3 per cent above the world market price, but during the ten years of post-globalisation period domestic price of rubber was only 3.4 per cent above the world market price. This implies that there has been a substantial integration of Kerala rubber market with the international market to bring about price parity. The annual variations in the price levels also indicate that the gap between the domestic price and international price has been closed and also the range of annual variations has decreased during the post globalisation period.

The coefficient of variation for both the Kerala market and the world market had decreased during the 90's from the previous decade, but it had gone up during the 90's. The variation was least during the 5 years of this century. The variability in the world market price was more than the Kerala market price. However, the gap between the coefficients of variation for both the markets had declined during the post globalisation period. The price movements in both the markets were in the same direction for 24 years and in the opposite direction for 10 years. The recent past trends indicate that the Kerala prices were only about 90 per cent of the world price for a few months. While Kerala accounted for 90 per cent of the natural rubber production in India, bulk of the

utilisation takes place in the states of outside Kerala, and this gives rise to a likely conflict of interests between the rubber producers in Kerala and the rubber product manufactures outside Kerala on matters related to input tariff.

With the removal of the quantitative restrictions on rubber imports it can be freely imported under OGL. The base customs duty on rubber imports was reduced to 20 per cent with effect from January 2017. Though about half the natural rubber consumption requirements were met from imports, with expansion of domestic production imports had been reduced. The tendency of imports was strong among manufacturers when the domestic prices were substantially above the international prices. However, during the immediate past imports were uneconomic since the international prices were above domestic prices. Further exports had exceeded imports in two years of this century. Malaysia and Thailand were mainly the source for import of rubber to India. Though the exports of rubber from India had been low, efforts are being made to increase the value of rubber exports and it has picked up during the last two years. There is an increased awareness about the need for strengthening the export efforts to avoid the crisis situation prevailed during 2015.

The AoA is not applicable to natural rubber since it is excluded from the list of agricultural commodities. It is considered to be advantageous to a large number of rubber cultivators in Kerala if rubber is reclassified as an agricultural commodity. This will also help to protect the domestic producers against dumping from some of the major producers of natural rubber.



## Chapter 8

### **An Analysis of Various Aspects of Pepper in Kerala**

#### **8.1 Background**

Pepper is one of the most ancient and traditional crops of Kerala whose origin is traced to the natural evergreen forests of the Western Ghats. Black pepper which is considered as the king of spices has played an important role in the Kerala economy for a number of centuries (George, Nair & Pushpangadan, 1989). A Hindu sacred book of the sixth century BC has indicated that pepper was cultivated widely in Kerala. Because of its dominant position in world production of pepper, India was also sometimes referred to as the “Kingdom of Pepper”.

Pepper trade has played an important role in bringing Europeans to Kerala (Koizumi, 1999). Persian caravans had carried pepper from the Malabar coast of Damascus, and then to Greece through sea by Phoenicians. Syrian merchants had access to pepper from Kerala using the sea route. Though Arab spice traders had enjoyed a monopoly of pepper trade from Kerala by keeping the origin of pepper as a secret from the Romans, this had come to an end with the capture of Cairo by the Roman Empire and the discovery of the sea route from the Red sea to Kerala. When the Turks captured Constantinople in 1453 efforts were initiated to discover a direct route to India. With the arrival of Vasco da Gama from Portugal to Calicut in 1498 the Arab-Venetian monopoly of pepper trade had come to an end. It is also believed that the Spanish expedition of Christopher Columbus landing in the western hemisphere was a chance event during the attempt to reach the Malabar Coast through the Cape of Good Hope. In this background this chapter analyses the changes in area, production and yield, export, import, and the price parity of pepper in Kerala.

## 8.2 Area, Production and Yield of Pepper

Kerala has near monopoly of area and production of pepper in India with about 95 per cent coverage of all-India area and production levels. The area under pepper in Kerala was about 99.8 thousand hectares in 1960-61 and during the sixties there was only marginal changes in the area till 1969-70 when the area increased to 118 thousand hectares. During the next five years the area remained somewhat constant before experiencing a decline to 108.2 thousand hectares in 1978-76. The next few years witnessed a slow gradual decline in the area to 103 thousand hectares in 1983-84. There was an upward movement in the area under pepper during the next twelve years when the area increased to 191.6 thousand hectares in 1983-84. There was an upward movement in the area under pepper during the next twelve years when the area increased to 191.6 thousand hectares in 1995-96. While the area remained at this level until 1999-2000 there was a revival in 2000-01, followed by a gradual decline from 2010-11 onwards and reached 85.2 thousand hectares in 2016-17 (see Table 8.1).

Though there had been some annual fluctuations in the area under pepper there was a consistent upward trend in the pepper area in Kerala till 2005-06. During 1960-61 to 1975-76 when the total cropped area in the state had increased rapidly pepper area had gone up only by 8.5 per cent. There was a major increase of 77 per cent in the pepper area between 1975-76 to 1995-96. The increase in area during the late 1980's was triggered by the response to the high price level during this period.

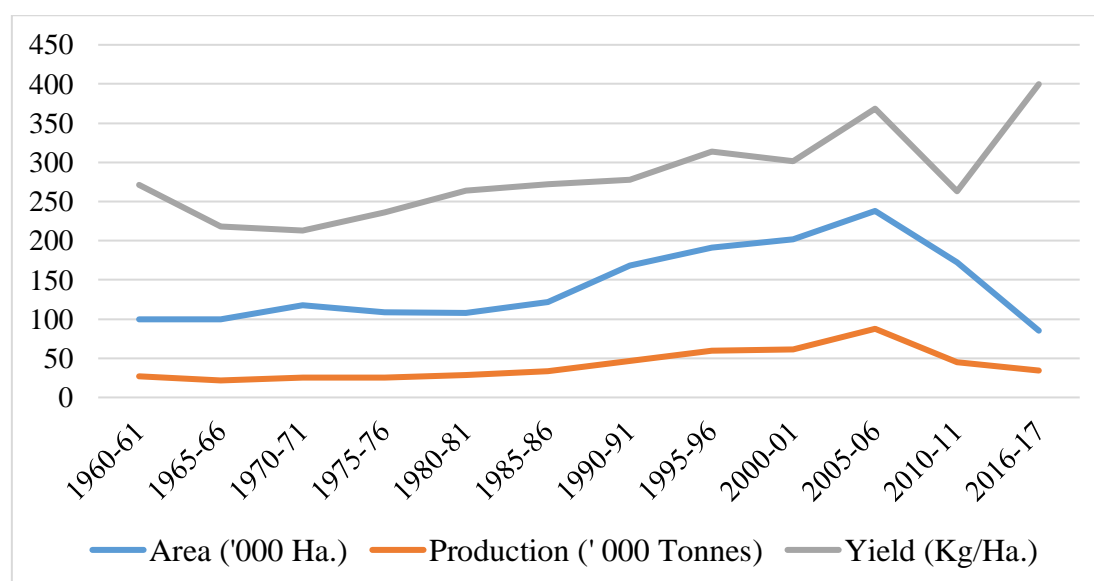
The production of pepper in Kerala was either stagnant or declining during the 60's 70's and up to the mid-80, as seen in the Table 8.1. During this period the 1960-61 production level of 27026 tonnes was exceeded only in five years (1973-74, 1974-75, 1979-80, 1980-81 and 1981-82). The production level had touched an all-time low level of 17350 tonnes during 1984-85 and after that the production level has more than doubled within the next three years. The peak production of 59948 tonnes was reached in 1995-96, and the increase in pepper production is continued up to 2005-06. The major factor contributing to the increased production level has been the farmer's response to the high price prevailed during late 1980's.

**Table 8.1**  
**Area, Production and Yield of Pepper in Kerala**

Year	Area		Production		Yield	
	000' Ha	Average Growth	000' Tonnes	Average Growth	Kg/Ha.	Average Growth
1960-61	99.8	9.07	27.03	6.92	271	-1.81
1965-66	99.7	-0.10	21.69	-19.76	218	-19.56
1970-71	117.5	17.85	25.03	15.40	213	-2.29
1975-76	108.3	-7.83	25.58	2.20	236	10.80
1980-81	108.1	-0.18	28.52	11.49	264	11.86
1985-86	121.6	12.49	33.12	16.13	272	3.03
1990-91	168.5	38.58	46.8	41.30	278	2.11
1995-96	190.8	13.25	59.94	28.08	314	13.09
2000-01	202.1	5.92	60.93	1.65	301	-4.03
2005-06	238.0	17.74	87.605	43.78	368	22.11
2010-11	172.2	-27.65	45.267	-48.33	263	-28.58
2016-17	85.2	-50.51	34.065	-24.75	400	52.07

Source: Department of Economics and Statistics, Kerala

**Figure 8.1**  
**Area, Production and Yield of Pepper in Kerala**



Source: Table 8.1

The changes in production levels during five-year intervals after 1960-61 indicates that between 1960-61 to 1965-66, production had declined by about 20 per cent and there was some improvement during 1965-66 to 1970-71 so that 1970-71 production level was about 15 percent above the 1965-66 level. The period 1970-71 to 1975-76 also witnessed a slight decline in production. Production levels increased by more than 40 per cent from 1985-86 to 1990-91 and from 1990-91 to 1995-96. There has been a declining tendency during 1995-96 to 2000-01 and from 2000-01 to 2016-17 except in 2005-06. The graphical representation of the area, production and yield of pepper in Kerala is given in Figure 8.1.

**Figure 8.2**  
**Average Growth of Area, Production and Yield of Pepper in Kerala**



Source: Table 8.1

The yield of pepper in Kerala has continuously declined during the 1960's starting from 271 kg/hectare in 1960-61 to 216 kg/hectare in 1972-73. From 1973-74 onwards the yield of pepper gradually increased to 264 kg/hectare in 1980-81. There had been wide



fluctuations in yield levels during the 1980's ranging between 164 kg/hectare in 1984-85 to 323 kg/hectare in 1989-90. The maximum yield recorded was 376 kg/hectare in 1998-99. The graphical representation of the average growth of area, production and yield of pepper is given in Figure 8.2.

Though the yield levels had remained low in most years the changes during the five-year intervals indicate negative values in five intervals during the 1960-61, 1965-66, 1970-71 2000-01 and 2010-11 periods, and positive during the remaining seven five-year periods. The maximum positive growth of 22.11 per cent occurred during 2005-06. The highest decline in the growth value of -28.58 per cent occurred during 2010-11, followed by -19.56 per cent during 1965-66.

### **8.2.1 Decomposition of Production Changes**

An analysis of the factors influencing the production changes over the years indicates that the negative contribution of yield effect during 1960-61 to 1965-66 accounts for the entire shortfall in production during this interval. During 1965-66 to 1970-71 the area effect was dominant over the negative yield. During 1970-71 to 1975-76 the large positive yield effect could not offset the large negative area effect. During 1975-76 to 1980-81 the yield effect was dominant over the negative area effect. Both area effect and yield effect had contributed to the production increase during three five-year intervals between 1980-81 to 1995-96. However, the dominant negative contributions of yield effect over the positive contributions of the area effect has resulted in the decline in production during 1995-96 to 2000-01 and 2001-02 to 2016-17. While considering the extended intervals it can be observed that the large negative yield effect dominated over the positive area effect during 1960-61 to 1975-76 and 1995-96 to 2016-17. The production increase during 1975-76 to 1995-96 was the outcome of a somewhat balanced contribution from both area effect and yield effect. The area effect and yield effect of pepper is given in Table 8.2.

**Table 8.2**  
**Contributions of Area Effect and Yield Effect**

Period	Area effect (%)	Yield effect (%)
1960-61 to 1965-66	-0.35	-99.50
1965-66 to 1970-71	116.15	-11.93
1970-71 to 1975-76	-666.49	556.78
1975-76 to 1980-81	-18.10	118.23
1980-81 to 1985-86	92.50	4.58
1985-86 to 1990-91	93.49	5.33
1990-91 to 1995-96	29.48	61.88
1995-96 to 2000-01	49.50	-140.90
2000-01 to 2016-17	35.17	-128.76
Extended Periods		
1960-61 to 1975-76	93.8	-179.2
1975-76 to 1995-96	43.3	32.3
1995-96 to 2016-17	46.7	-135.6

Source: Calculated from Department of Economics and Statistics, Kerala

### 8.2.2 Growth Rates

The growth rates of area, production and yield during the period 1974-75 to 1994-95 was higher than the corresponding rates for 1960-61 to 1974-75, but during 1995-96 to 2016-17 these rates had fallen. While the production growth rate was 4.95 per cent per annum during 1975-76 to 1995-96, it had declined to -2.62 per cent during the post globalisation period. Yield growth rate was negative during 1961-1974. The Table 8.3 reveals that the pre-globalisation period was higher growth performance for the area, production and yield of pepper in Kerala.

**Table 8.3****Compound Growth Rates of Area, Production and Yield of Pepper in Kerala**

Periods	Area	Production	Yield
1960-61 to 2016-17	0.77	1.77	0.96
1960-61 to 1974-75	1.60	0.42	-1.10
1975-76 to 1994-95	3.52	4.95	1.42
1995-96 to 2016-17	-3.98	-2.62	1.18

Source: Calculated from Department of Economics and Statistics, Kerala

**Table 8.4****Acceleration Deceleration Growth of Area, Production and Yield of Pepper in Kerala**

Periods	Area	Production	Yield
1960-61 to 2016-17	-8.34***	-1.77**	7.66***
1960-61 to 1974-75	1.24	1.58***	1.48***
1975-76 to 1994-95	2.15***	2.97**	1.59
1995-96 to 2016-17	-1.53***	-1.36**	1.23*

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Calculated from Department of Economics and Statistics, Kerala

Table 8.4 shows the acceleration deceleration growth of the area, production and yield of pepper in Kerala. The overall period shows that both area and production of pepper have deceleration of growth rate while the yield of pepper have an acceleration of growth rate. During the period 1960-61 to 1974-75, the growth rate of production and yield of pepper are positive and have acceleration of growth rate. Area and production of pepper have acceleration of growth during the pre-globalisation period, while both area and production have deceleration of growth rate during the post globalization period. Yield of pepper shows an acceleration of growth rate during the post globalization period. However, the pre globalization period shows a better growth performance.

### 8.3 Farm Prices

The prices received by the farmers indicated some amount of cyclical fluctuations. The average farm price of pepper in 1980-81 was Rs. 12.53/kg and it declined to Rs. 12.04 /kg during the next year. There was a gradual increase in the farm price during the next six years to reach Rs. 52.62 /kg in 1987-88. The next five years witnessed a gradual decline in the prices to Rs. 26.16/kg during 1992-93. The gradual increase from 1992-93 continued till 1996-97 when the price reached Rs. 87.80/kg. The next year witnessed the prices to climb up to double the 1996-97 level and it was followed by moderate increase until 1999-00 when the price reached a peak level of Rs. 205.05/kg. The next two years witnessed a sharp fall in prices to Rs. 124.67/kg during 2000-01 and Rs. 69.42 /kg during 2001-02. Through there was a mild recovery to Rs. 78.14/kg in 2016-17, there was further decline of farm level price to Rs. 68.02/kg during 2016-17 (See Table 8.5).

**Table 8.5**  
**Farm Level Price of Pepper in Kerala (Rs/kg)**

Period	Minimum	Maximum	Average
1980's	12.04 (1982-82)	52.62 (1987-88)	25.26
1990's	26.16 (1992-93)	205.05 (1999-00)	91.52
2000's-17	68.02 (2016-17)	124.67 (2000-17)	85.07
1980-81 to 1995-96			29.77
1975-76 to 1995-96			117.96

Note: Figures in parenthesis indicate the corresponding year

Source: Department of Economics and Statistics, Kerala

Since pepper is mainly an export product, farm level prices are closely linked up with prices realised from export markets. Koizumi (1999) has pointed out that world pepper prices follow a cyclical pattern. When world pepper prices are high, new vines are planted, fertiliser usage goes up and exporters reduce their stock levels. As the newly planted vines start yielding, the increased production levels lead to fall in prices. The time lag between the peak price and the following production peak during the World

War period was estimated to be about 8 years leading to a 16-year price cycle. However, the time lag after the Second World War appears to be shorter and it is estimated that probably pepper prices follow a 12-year cycle.

#### **8.4 Pepper Exports**

Pepper has been a traditional item of India's international trade. The sweet pungency and flavour of pepper have played a major role in establishing the country's relationship with the civilised world. Until the beginning of the nineteenth century, India dominated world production and exports of pepper. By the middle of the 20<sup>th</sup> century India had accounted for about 70 per cent of world area under pepper, 66 per cent of world production and 56 per cent of world exports. However, by the end of the last century India's share in world production has come down to about 20 per cent and its share of world exports was even less.

Kerala accounted for more than 95 per cent of the pepper export from India. In view of the gaps in the data for pepper export from Kerala data for India are used for the analysis. Between 1960-61 and 2016-17 the minimum quantity exported was 15.65 thousand tonnes during 1978-79 and the maximum quantity was 47.70 thousand tonnes during 1996-97. The average exports for the decades, starting with the 1960's, ranged between 21.04 thousand tonnes during the 1960's and 33.78 tonnes during the 1990's. During the twenty years prior to 1995-96 the average quantity was 22.62 thousand tonnes between 1975-76 to 1984-85 and 33.71 thousand tonnes during 1985-86 to 1994-95. During 1995-96 to 2016-17 the average quantity was 29.94 thousand tonnes. World prices of pepper had suddenly gone up in 1985-86 so that the unit value of exports had gone up to Rs. 46/kg from the previous year's level of Rs. 24/kg. The unit value continued to increase during 1986-87 and 1987-88 when the price level reached Rs. 59/kg. Kerala could not increase the exports immediately on account of the sharp decline in production during 1984-85. However, with good harvests for a few years from 1986 onwards pepper exports from Kerala had gone up.

Export earnings between 1960-61 and 2016-17 varied between Rs. 5.89 crores during 1963-64 and Rs 885.3 crores in 1999-00. The high export earnings during the second half of the 90's influenced the average earnings during the 90's. However, from 2000-01 there has been a drastic decline in the export earnings mainly on account of the shortfall in the quantity exported. The reasons attributed for this shortfall include slowing down the exports to the Russian market and the competition from other producing countries. It has been pointed out that Kerala could not take advantage of the emerging market opportunities for want of adequate processing facilities to process pepper for export in the desired form. This is also partly on account of the fact that pepper exports during the 70's and 80's were partially insulated from International competition on account of the large quantities of exports under the bilateral government purchase agreements with the former Soviet Bloc. With the breaking up of the Soviet Block in 1989 Indian exports to this region was considerably reduced. However, because of the superior quality of Indian pepper, India could penetrate to the North American markets, where the sophisticated consumers had appreciated high quality Indian pepper. While in the mid-80's more than 70 per cent of pepper exports had gone to the USSR and East European markets and only 10 per cent going to the American zone, by 2016-17 USA had accounted for about 45 per cent of exports and Canada for about 11 per cent. In fact, this was a return to the situation during the 50's when the American zone accounted for about two-thirds of exports and the share of USSR along with East Europe was only about 11 per cent.

The production changes in the other major producing countries have also influenced the export quantity. This can be clearly illustrated by the situation during 1993-94 when the export quantity had nearly doubled over the exports during 1992-93 on account of the short supply in the international markets due to reduced production in the other important pepper producing countries. However, on account of the premium for quality pepper from Kerala, in spite of the decline of about 23 per cent in the export quantity during 1994-95 from the 1993-94 level, export earnings increased by around 25 per cent.

The high production cost on account of the low yield of pepper in Kerala has also contributed to the poor competitive position in the international markets. It should be remembered that productivity in Kerala is less than about one-tenth of the yield level in the emerging pepper producing countries. The unit value of exports had indicated an upward trend during the 90's, but a declining trend had started during 2000-01 mainly on account of the emergence of Vietnam as a major producer and exporter. The range of export quantities and value of exports had been very wide (See Table 8.6).

**Table 8.6**  
**Export Quantity, Export Value and Average Unit Price of Pepper**

Period	Quantity ('000 tonnes)			Value (Rs. crores)			Av. Unit Price (Rs/kg)
	Minimum	Maximum	Average	Minimum	Maximum	Average	
1960's	17.20	25.06	21.04	5.89	16.10	9.77	4.64
1970's	15.65	31.65	22.10	14.31	49.09	26.13	11.82
1980's	20.61	41.00	30.75	29.39	240.58	114.70	37.30
1990's	20.60	47.70	33.78	72.87	885.30	326.08	96.53
2000's	16.70	24.00	20.39	143.50	326.30	215.16	105.50
1975-85	15.65	15.65	26.31	27.98	60.54	40.00	17.58
1985-95	20.50	43.84	33.71	72.87	213.97	147.39	46.30
1995-17	16.70	47.77	29.94	143.51	885.28	387.62	123.17

Source: Department of Economics and Statistics, Kerala

There had been wide year to year fluctuations in export quantity and export value realised. The annual changes in export quantities from 1950-51 onwards indicate that in 24 years quantities had increased and in 27 years it had decreased. There was no change during one year. The export earnings had indicated both increase and decrease in an equal number of 26 years. The increase in export value was associated with increased export quantity in 15 years and with decreased export quantities in 10 years. The decrease in export value was associated with decreased export quantity in seven years and with increased export quantities in nine years (See Table 8.7).

**Table 8.7**  
**Changes in Exports Quantity and Exports Value of Pepper**

Quantity Change	Value Change		Total
	Positive	Negative	
Positive	15	9	24
Negative	10	17	27
No change	1	-	1
Total	26	26	52

Source: Department of Economics and Statistics, Kerala

### 8.5 Factors Influencing Fluctuations in Exports Earnings

The wide fluctuations in export earnings were the outcome of the fluctuations in the quantity exported and the unit value realised from exports. The annual changes in exports earnings during the period 1975-76 to 2016-17 indicate that there were positive changes in 16 years and negative changes in 12 years. Among the 16 years with positive changes in exports earnings quantity exported had increased in 10 years of which seven years had simultaneously experienced unit value increase. During one-year increased exports earnings was mainly on account of increased unit value since there was no change in quantity exported. During the remaining five years increased exports earnings were associated with reduced exports volume and increased unit value realised. Exports earning had indicated negative changes in 12 years, of which eight years had experienced reduction in both exports' quantity and unit price realised. In two years though export quantity had increased the dominant role of the fall in unit value had resulted in a net reduction in exports earnings. In the remaining two years with reduced exports earnings the reduction in exports quantity dominated over the increased unit value.

During the nine years of post-globalisation period exports earnings had dropped in five years and increased in four years. Among the five years of reduced exports earnings two years had experienced reduction in both exports' quantity and unit value realised. In another two years of reduced exports earnings, reduced quantity was associated with



increased unit value and during the remaining one-year exports earnings declined due to the dominant role played by reduced unit value over increased exports quantity. Among the four years with increased exports earnings both exports quantity and unit value realised had increased in two years and during the remaining two years the contribution of increased unit value could not overcome the reduced contribution of declining exports quantity (See Table 8.8).

**Table 8.8**

**Association of Exports quantity and Unit price changes towards annual changes in Exports Earnings**

a) Years with increased Exports Earnings

Quantity change	Price Change		
	Increase	Decrease	Total
Increase	7	3	10
No change	1	-	1
Decrease	5	-	5
Sub-Total	13	3	16

b) Years with reduced export earnings

Increase	-	2	2
Decrease	2	8	10
Sub-Total	2	10	12
Total	15	13	28

Source: Department of Economics and Statistics, Kerala

The variability in exports earnings, exports quantity and unit value realised was measured by the coefficient of variation which indicates the following tendencies:

1. The variability was least for exports quantity and maximum for exports earnings. The coefficient of variation for unit value remained between the values for exports quantity and exports earnings.

2. Over the years the variability had increased for all three categories. For exports earnings the coefficient of variation increased from 0.295 between 1975-86 and 1984-85 to 0.338 between 1985-86 and 1994-95, and to 0.605 between 1995-96 to 2016-17. During the same periods the coefficients of variations for exports quantity were 0.130, 0.209 and 0.343 and for unit value realised they were 0.211, 0.218 and 0.398. It is obvious that the variability of exports earnings, exports quantity and unit value realised from exports had substantial increase during the post-globalisation period as compared to the pre-globalisation period (See Table 8.9).

**Table 8.9**

**Coefficient of Variation for Exports Earnings, Exports Quantity and Unit Value of Exports**

Period	Exports Earnings	Exports Quantity	Unit Value of Exports
1975-76 to 1984-85	0.295	0.130	0.211
1985-86 to 1994-95	0.338	0.209	0.218
1995-96 to 2016-17	0.605	0.343	0.398

Source: Department of Economics and Statistics, Kerala

### **8.6 Imports of Pepper**

With the liberalisation of imports under the WTO provisions and the imports from Sri Lanka under the Indo-Sri Lankan Free Trade Agreement, imports of pepper to India has been expanding in recent years (Harilal and Joseph, 1999). The quantity of imports increased from 4028 metric tonnes during 2000-01 to 6328 tonnes during 2001-02 and to 15750 tonnes during 2015-16. Sri Lanka, Vietnam and Indonesia were the main countries importing pepper to India. Though imports from Vietnam accounted for only about 16 per cent of the total imports during 2000-01, by 2015-16 Vietnam's share had gone up to about 48 per cent. During these three years imports from Vietnam has increased by more than 10 times while imports from Sri Lanka had increased by 261 per cent. However, Indonesian imports increased only by 37 per cent. In terms of value of imports, the total imports increased by 120 per cent with an increase of 638 per cent for Vietnam, 111 per cent for Sri Lanka and a reduction of 20 percent for Indonesia.

The value of imports indicates that the imports from Vietnam had the minimum unit value and pepper from Sri Lanka had the maximum unit value. During 2015-16 the unit value of imports from Sri Lanka was 33 per cent higher than the unit value of imports from Vietnam (See Table 8.10).

**Table 8.10**  
**Pepper Imports to India (tonnes)**

QUANTITY (metric tonne)	Country	2000-01	2001-02	2016-17
	Sri Lanka	1759	1241	6374
	Vietnam	667	2658	7426
	Indonesia	1189	2010	1632
	Others	413	419	319
	TOTAL	4028	6328	15750
VALUE (Rs. million)	Sri Lanka	279	161	589
	Vietnam	69	220	509
	Indonesia	167	147	133
	Others	53	36	21
	TOTAL	568	564	1252
UNIT VALUE (Rs./kg)	Sri Lanka	159	129	92
	Vietnam	105	83	69
	Indonesia	141	120	82
	Others	128	79	66
	Total	141	111	79

Source: Department of Economics and Statistics, Kerala

### 8.7 WTO Concerns

There are certain aspects of the WTO provisions affecting the pepper community in Kerala. Continued imports to the Indian markets are considered to be a major factor influencing the decline in farm level price of pepper in Kerala. As indicated earlier farm level price had declined from Rs. 205 per kg during 1999-01 to Rs. 68 per kg in 2016-17. There are indications that the downward movement continues to that the farm level

price in 2005 has gone even below this level. The government efforts to guarantee minimum support price to the farmers has not been effective on account of the problems of identifying suitable administrative mechanism for effective implementation. There has been persistent demand for stopping the pepper imports which may not be feasible since under the provisions of the AoA imports to the extent of three percent of the domestic consumption would have to be provided. There are isolated reports of pepper farmers resorting to suicide on account of the increasing debt burden and there is an urgent need to evolve a mechanism for ensuring livelihood support for pepper growers. Apart from the price depressing effects of pepper imports there is also a concern regarding the adverse effects of low-quality pepper entering the Indian markets on the competitive position in the international markets. As pointed out earlier Kerala pepper could fetch a higher price in the international markets on account of its intrinsic quality. There are strong fears that the low-quality pepper imported to India will be exported as Indian pepper, and this will ruin the reputation of Indian pepper.

The sanitary and phytosanitary measures also introduce some amount of concern to the Indian exporters. It is feared that the facilities available in India are inadequate to safeguard against these provisions. The additional cost involved includes increased production costs to meet the SPS standards and conformity costs like certification and control. The access to technical know-how is also restricted and even and even the private sector certification is not properly available. Also, it is feared that based on political considerations some countries might arbitrarily specify standards well above the facilities available in India.

While there is a quantitative limit specified for imports under concessional duty route for tea, there is no similar provision for pepper. This may lead to flooding the Indian market with large quantities of low-priced pepper of inferior quality. Since the provisions relating to import for re-export purposes does not specify any floor level of value addition this provision may also turn out to be against the interests of domestic producers.

There are basic changes in the global demand position for pepper and in order to retain the market share pepper producing countries should be constantly modifying their product profile in accordance with the changing demand pattern. In the absence of appropriate technical knowhow and financial capabilities of export agencies Indian exports may end up being heavily controlled by international commercial giants.

The low level of pepper yield in India is also a matter of serious concern in the context of globalisation. In order to improve the cost competitiveness of Kerala pepper it is important to increase productivity through improvements in plant varieties and cultivation practices. However, farmers may adopt these measures involving long term investment programmes only if they have some assurance regarding the expected future prices. In the context of the instability of pepper prices long term investments can materialise only under some assurance regarding support price for pepper.

## **8.8 Conclusion**

This chapter analyses the various aspects of pepper in Kerala during the pre and post globalisation periods. Kerala accounts for about 95 per cent of the area under pepper in India. Pepper area in Kerala increased from 99.8 thousand hectares during 1960-61 to 118 thousand hectares during 1969-70 and after dropping down to 101 thousand hectares during 1977-78 there was a steady increase to 206 thousand hectares during 2003-04. The period 1960-61 to 1975-76 witnessed 8.5 per cent growth in area, and there was 77 per cent growth during the 20 years starting with 1975-76. During the nine years of post-globalisation period area increased by about eight per cent. Production of pepper during 1960-61 was 27 thousand tonnes which was either stagnant or declining during the 60's and 70's, and it touched an all-time low level of 17.35 thousand tonnes during 1984-85, but it doubled within the next three years. By 2005-06 production had reached a peak level of 87.61 thousand tonnes, but it had dropped to about 34.07 thousand tonnes by 2016-17. While the period 1960-61 to 1975-76 witnessed about nine per cent decline in production, there was an increase of 188 per cent during the next 20 years, and a decline of 17 per cent during the 9 years of post-globalisation period. Yield levels had indicated wide fluctuations ranging between 164kg/ha in 1984-

85 to 376 kg/ha during 1998-99. During the 15 years from 1960-61 yield had decreased by 16.24 per cent and during the next 20 years up 1995-96 there was an increase of 57.7 per cent. During the nine years of post-globalisation period yield had declined by 23.18 per cent from the 1995-96 level of 314 kg/ha. The decline in production during 1960 to 1975 and during 1995 to 2003 was due to the large negative yield effect dominating over the positive area effect. The production increase during the 20 years beginning with 1975-76 was the outcome of a somewhat balanced contribution of both area effect and yield effect.

During the post globalisation period production growth rate was substantially reduced on account of the decline in area growth rate and the negative growth rate of yield. The growth rate of area, production and yield of pepper in Kerala have better performance during the pre-globalisation period.

Farm prices indicated some amount of cyclical fluctuations. During the 80's the average price was Rs 25/kg with a range of Rs 12.0 to Rs 52.6 and during the 90's the average price was 91.5 with a range of 26.2 to Rs 205.1. During the four years of this century the average price was Rs 85.1 with a range of Rs 68.0 to Rs 124.7. Between 1960-61 and 2016-17 pepper exports varied between 15.65 thousand tonnes during 1978-79 and 47.70 thousand tonnes during 1996-97. The average annual exports for ten years prior to globalisation were 33.71 thousand tonnes and during the nine years of post-globalisation period the annual average was 29.94 thousand tonnes. Export earnings between 1960-61 and 2016-17 varied between Rs 5.89 crores during 1963-64 and Rs 885.3 crores during 1999-00. Though the export earnings had been high during the second half of the 90's from 2000-01 there has been a drastic decline in the export earnings on account of the short fall in export quantity. India could not take advantage of the emerging market opportunities on account of inadequate market development during the 70's and 80's, mainly due to the dependence on bilateral government purchase agreements with the former Soviet Union. However, by 2015-16 about 56 per cent of India's pepper was exported to the American zone as against 10 per cent during mid 80's. The high production cost resulting from the low yield of pepper in Kerala has contributed to the poor competitive position in the international markets in spite of the

superior quality. While there was an upward trend in the unit value of exports during the 90's, a declining trend has started during 2000-01 on account of the emergence of Vietnam as a major producer and exporter.

There has been wide year to year fluctuations in export quantity and export value realised. The fluctuations in export earnings were influenced by both the fluctuations in the quantity exported and the unit value realised. The variability was least for export quantity and maximum for export earnings. Over the year's variability has increased for export quantity, unit value and export volume. The coefficient of variations indicates that variability of all these categories had substantial increase during the post globalisation period over the pre-globalisation period.

With the liberalisation of imports under the WTO provisions and the imports from Sri Lanka under the Indo-Sri Lanka Free Trade Agreement imports of pepper to India has been expanding in recent years. The volume of imports has increased from 4020 tonnes during 2000-01 to 15,750 tonnes by 2015-16. During these three years imports from Vietnam had increased by more than 10 times while the imports from Sri Lanka had increased by 2.6 times. While the value of imports from Vietnam had increased by 638 per cent and from Sri Lanka had increased by 111 per cent, there was a reduction by 20 per cent for imports from Indonesia. During 2015-16-unit values of imports from Sri Lanka was 20 per cent higher than the unit value of imports from Vietnam.





## Chapter 9

### Summary and Conclusions

#### 9.1 Introduction

Indian agriculture was brought under the purview of global trade regulating agreement with the signing of the World Trade Agreement evolved at the Uruguay Round on April 15, 1994. The World Trade Organisation (WTO) which came into existence on January 1, 1995 is expected to create a fair and equitable system of global trade among the member countries. The agricultural scenario in Kerala indicates a heavy concentration on non-food crops. The predominance of crops which are dependent on the world market conditions and the dominance of perennial crops make agriculture in Kerala distinct from the rest of India. With the acceptance of AoA, the farm prices of agricultural products in Kerala are dependent on markets external to Kerala and this dependence renders them highly vulnerable. This study attempts to analyse the Kerala agricultural scenario during the pre-globalisation and post globalisation periods with respect to three major commodities of Kerala, viz, coconut, rubber and pepper. The following aspects are covered in the analysis.

1. Changes in area, production and productivity
2. Contributions of extensive approach through area expansion and intensive approach through productivity changes towards production changes.
3. Prices received by farmers
4. Market price movements
5. Imports and exports
6. WTO concerns.

## **9.2 World Trade Organisation and Agriculture**

The WTO Agreement on Agriculture (AoA) has three basic components relating to market access (ratification), domestic support and export competition.

### **9.2.1 Market Access**

The market access commitment of the AoA aims to free imports from quantitative restrictions and to introduce upper bounds of tariffs. Targets for reduction in the base tariff on a time bound basis were evolved. When the provisions are fully implemented imports of all agricultural commodities cannot be banned except on grounds of sanitary and phyto sanitary considerations. It was also specified that all sorts of quota restrictions maintained through quotas or import-export licenses should be reviewed unless they are allowed under certain special provisions of AoA.

### **9.2.2 Domestic Support**

Trade distortions by specific measures of domestic agricultural support were classified as Green Box, Blue Box and Amber Box supports on the basis of the lack or extent of trade distortions effected by each measure. The Green Box items were excluded from the purview of domestic support and some of the Blue box items required disciplining. Amber Box items were expected to be disciplined and finally eliminated within ten years.

### **9.2.3 Export Competition**

The provisions relating to export competition mainly refers to export subsidy and ceilings were specified on budgetary outlays and the quantities benefitting from the subsidies.

#### **9.2.4 Implementation Aspects**

Among these three major concerns of market access, domestic support and export competition developing countries are mostly affected by the provisions on market access since they have not been heavily dependent on the other two concerns. Modalities for effective implementation of these provisions were evolved through negotiations by the WTO ministerial meetings. There are many bottlenecks and hardships facing the developing countries to obtain a favourable position in the international markets in competition with the developed countries. Some of the provisions create obstacles for developing countries to effectively compete in the global markets on an even keel. Further many structural problems in developing countries make it difficult to cope up with the competition in the international markets.

In the context of the absence of a level playing field between the developed and developing countries on account of the existing diversities in farming conditions and market characteristics special efforts are considered necessary to safeguard the interests of agriculture in the developing countries.

These efforts include adjustments in the tariff and non-tariff measures including direct and indirect subsidisation of agriculture in the developed countries. It is also relevant to realise that for developing countries issues of agricultural trade are linked up with their economic and social development of a large number of small-scale farmers below or close to the poverty line.

The experience of the past ten years has raised doubts about the realisation of the promise of substantial economic gains for developing countries from increased access to developed country markets. There is a feeling that within the developing countries the bulk of the adjustments are affecting the vulnerable groups such as small and marginal farmers.

### **9.2.5 Indian Scenario**

The Indian agricultural policy in the past has been based on the underlying concern for achieving self-sufficiency in food production and there was very little emphasis on international trade based comparative advantage. Imports were allowed to meet the excess demand and exports were allowed when there was surplus after meeting the domestic demand. The inward orientation focusing on import substitution and industrialisation along with over valuation of exchange rates have not favoured agricultural trade. One of the consequences of the trade and price policy followed in India was that domestic prices were mainly determined by domestic market conditions of supply and demand and they were insulated from the world market.

The macroeconomic stabilisation and structural adjustment policies initiated in the beginning of 1990's focused on correcting disequilibrium in the foreign exchange market in the short run and other reforms including trade and industrial policy in the medium term. These measures were expected to improve the terms of the trade for tradable agriculture and to make it internationally competitive. The WTA agreement and the establishment of WTO have brought new dimensions to agricultural production and trade. It was expected that globalisation in Indian agriculture offered opportunities for deriving large benefits from increased agricultural exports of high value agricultural products.

At the Uruguay round India had agreed to make adjustments in tariff rates of 3373 commodity/commodity groups. Quantitative restrictions on import of agricultural products have been totally eliminated on a phased manner by April 1, 2001.

### **9.2.6 Kerala Scenario**

Among the Indian states, Kerala's agriculture has the maximum impact of WTO provisions on account of the predominantly cash crop oriented cropping pattern by a large number of small and marginal farmers, and a high proportion of trade dependence on the agricultural products. The first half of the 1990's had witnessed buoyancy on

account of both productivity improvements and favourable price situation. However, the crash of commodity prices during the last quarter of 1990's had left the commodity market dependent on agriculture in a depressed situation. Based on the experience of the limited post globalisation period some tentative conclusions on the coconut, rubber and pepper economy of the state are indicated in the respective chapters.

### **9.3 Global Scenario**

The global scenario regarding area, production and productivity of coconut, pepper and rubber is analysed for the pre-globalisation and post globalisation periods.

#### **9.3.1 Coconut**

Coconut Area: Philippines, Indonesia and India accounted for more than 72 per cent of the global area of about 10.8 million hectares. Between 1975 to 2017 global area increased by 46.5 per cent with the increase of 37.5 per cent in Philippines, 89 per cent in Indonesia, 70 per cent in India, – 9 per cent in Sri Lanka and 66 per cent in Thailand. During the 20 years prior to globalisation (1975 to 1995) global area increased by 43.5 per cent and during the 8 years of post-globalisation period area increased only by about two per cent. While India had experienced the highest growth of about 71 percent during the pre-globalisation period it had a negative growth of –0.7 percent during the post globalisation period. Sri Lanka had negative growth in area for both periods. While during the pre-globalisation period India, Indonesia and Thailand had increased their share of the global area, during the post globalisation period Indonesia was the only country with increased share of the global area.

Coconut production: India occupied the third position in terms of global production of coconuts after Philippines and Indonesia. During 1975 to 2017 global production of coconuts increased by 63 per cent with the Indian increase of 119 per cent followed by Indonesia (80 per cent), Philippines (49 per cent), Thailand (69 per cent), and Sri Lanka (–6 per cent). Most of the production increases in India occurred during the pre-globalisation period. While the global production increased by about 59 per cent during

the pre-globalisation period, it was only less than three per cent during the post globalisation period. All the major coconut producing countries had increased production during the pre-globalisation period. Indonesia, India and Sri Lanka had experienced negative growth in coconut production during the post globalisation period.

### **9.3.1.1 Coconut Productivity**

Global coconut yield had increased by about 11 per cent during the pre-globalisation period and by about half a per cent during the post globalisation period. Philippines was the only country with negative growth in yield during the pre-globalisation period, but during the post globalisation period Philippines and Thailand had positive growth in yield with Indonesia, India and Sri Lanka having negative growth in yield.

The range of relative productivity gap in 1975 was between 97 to 113, and it had widened to 87 to 120 in 1995 and again slightly narrowed down to 90 to 112 in 2017. Indonesia had the highest relative productivity index in 1975 and 1995, but in 2017 India had the highest index of 112 with all the other countries below the global average level.

### **9.3.1.2 Area effect and Yield Effect**

During the pre-globalisation period about 75 per cent of the global production increase was accounted by area effect and 18.5 per cent by yield effect. During this period Philippines had the maximum area effect and Sri Lanka had the maximum yield effect. During post globalisation period 79 per cent of the global production increase was due to area effect and 20 per cent to yield effect. While Philippines had both positive contributions of area effect (20 per cent) and yield effect (78 per cent) Indonesia had positive area effect and negative yield effect, and both India and Sri Lanka had negative contributions of area effect and yield effect.

### **9.3.2 Pepper**

India, with about 45 per cent of the global pepper area of 432 thousand hectares has the largest pepper area followed by Indonesia, Vietnam, Sri Lanka and Malaysia. Between 1975 and 2017 the global pepper area increased by 111 per cent, the major portion of which occurred during 1985 to 1990 in response to the price hike during this period. Vietnam had a phenomenal growth in area from a mere 320 hectares in 1975 to 48,800 hectares in 2017. Brazil had recorded substantial increase during 1975 to 1990 and after 10 years of declining area the 2017 area has reached the 1980 level. During the 20 years of pre-globalization period world pepper area increased by 78 percent and during the post globalisation period there was an increase of 20 percent. While most of the pepper producing countries had increased area during the post globalization period India had a slight decrease in the pepper area.

#### **9.3.2.1 Pepper Production**

During 2017 Vietnam was the biggest pepper producer with about 24 per cent of the global production followed by Indonesia (18 per cent), Brazil (17 per cent) and India (16 per cent). Between 1975 and 2017 global pepper production had increased by about 194 per cent (82 per cent during the pre-globalisation period and 66 per cent during the post globalisation period) Malaysia had dropped production by about 52 per cent during the pre-globalisation period, but it has increased production by 106 per cent during the post globalisation period. India is the only major pepper producing country with a negative growth of pepper production during the post globalisation period. The Indian share of global production had increased from 16.4 per cent in 1975 to 26.3 per cent in 1995 before falling to 16.1 per cent in 2017. Vietnam's share in global production increased from 0.2 per cent to 4 per cent during the pre-globalisation period and to 24.1 per cent during the post globalisation period.

### **9.3.2.2 Pepper Yield**

Global pepper yield had increased only by 1.6 per cent during the post globalisation period, but there was a 34.6 per cent increase during the pre-globalisation period. While Brazil and Malaysia had negative growth in yield during the pre-globalization period, India, Indonesia and Sri Lanka had negative yield growth during the post globalisation period. The relative productivity index in 2016 in 2017 was very high for Brazil (319), Malaysia (229) and Vietnam (213) and very low for India (36).

### **9.3.2.3 Area Effect and Yield Effect**

Area effect accounted for 96 per cent of the global production increase during the pre-globalisation period and 33 per cent during the post globalisation period. The contribution of yield effect increased from two per cent during the pre-globalisation period to 56 per cent during the post globalisation period. The contribution of yield effect increased from two percent during the pre-globalisation period to 56 per cent during the post globalisation period.

### **9.3.3 Rubber**

India has the fifth position in terms of global area under rubber, the other major countries being Indonesia, Thailand, Malaysia and China. Between 1975, and 2017 the global area increased by 60 per cent. During this period, the increase in rubber area of Indonesia, Thailand, Malaysia and India had been to the extent of 79 per cent, 89 per cent, – 30 per cent and 134 per cent respectively. While the global area increased by 39 per cent during the pre-globalisation period it was 15 per cent during the post globalisation period. India had the maximum growth.

India has the fifth position in terms of global area under rubber, the other major countries being Indonesia, Thailand, Malaysia and China. Between 1975, and 2017 the global area increased by 60 per cent. During this period the increase in rubber area of Indonesia, Thailand, Malaysia and India had been to the extent of 79 per cent, 89 per



cent, – 30 per cent and 134 per cent respectively. While the global area increased by 39 per cent during the pre-globalization period it was 15 per cent during the post globalisation period. India had the maximum growth percentage during the pre-globalisation period and Thailand had the maximum growth percentage during the post globalisation period. Malaysia had negative growth during both pre- and post-globalisation periods.

### **9.3.3.1 Rubber Production**

During 2017 Thailand was the leading producer of rubber with about 38 per cent of the global production which was an increase from 11 per cent in 1975. While India occupied the fifth position in terms of area, it has the third position in terms of production. Malaysia was the leading rubber producer in 1975, but it had dropped down to the fourth position by 2017. World production of rubber increased by 131 per cent between 1975 and 2017 and it was 92 per cent during the pre-globalisation period, and 19 per cent during the post globalisation period. While during both periods Thailand, India and China had recorded growth rates above the global rate, Indonesia was marginally below this level and Malaysia had negative growth.

### **9.3.3.2 Rubber Yield**

Global yield of rubber increased, by 38.7 per cent during the pre-globalisation period and 4.1 per cent during the post globalisation period. Thailand and India had impressive growth in yield levels during both the periods. While Malaysia had negative growth in yield levels during both the periods, Indonesia had positive growth during the pre-globalisation period and negative growth during the post globalisation period. The productivity level for India remained above the world average during all the years and it was below the world average for Indonesia. Malaysia had yield advantage in 1975, but the relative position deteriorated over the years.

### **9.3.3.3 Area Effect and Yield Effect**

During the pre-globalisation period the contributions of the area effect and yield effect in the global production increase were the same. For both India and Indonesia area effect dominated over the yield effect. However, during the post globalisation period yield effect dominated over area effect in India and large positive area effect had dominated over the large negative yield effect in Indonesia. In Thailand yield effect was the major contributor during the post globalization period.

### **9.3.3.4 Growth Rates**

During the post globalisation period the growth rate of coconut area in all the major producing countries had declined from the growth rates achieved during the pre-globalisation period of 1975 to 1995. While the area growth rate, during the post globalisation period was negative in India, Philippines, Thailand and Sri Lanka, Indonesia had a positive growth rate. Growth rates of production and yield had indicated substantial decline during the post globalisation period in India, Indonesia, Sri Lanka and Thailand. However, Philippines had improved the production growth rate during the post globalisation period due to the substantial improvement in yield growth rate in spite of the negative area growth rate.

In the case of pepper, production growth rate during the post globalisation period had declined in India and Sri Lanka, while all other major producing countries had achieved increased growth rates. Both India and Sri Lanka had experienced declining growth rates in area and yield. Malaysia and Brazil had increased production growth rate along with increased growth rates in both area and yield. Malaysia and Brazil had increased production growth along with increased growth rates in both area and yield. Thailand and Vietnam had achieved increased production growth rate on the strength of increased area growth rate along with reduced yield growth rate. Indonesia's increased production growth rate was influenced by the increased yield growth rate along with reduced area growth rate.

During the post globalisation period rubber production growth had declined in India, Indonesia and Thailand. In India both area growth rate and yield growth rate had declined. While area growth rate increased in Indonesia and Thailand, yield growth had declined. Production growth rate in Malaysia had remained negative both the periods.

#### **9.4 Agricultural Scenario in Kerala**

The dominance of tradable commodities in the cropping pattern of Kerala makes the state's position somewhat heavily oriented to WTO concerns.

##### **9.4.1 Land Utilisation**

Of the total area of 3875 thousand hectares about 28 per cent is classified as forest, though over time there has been sizeable deforestation. Land utilisation pattern from 1960 onwards indicates a steady increase in land put to new agricultural use. Total cropped area increased rapidly between 1960-61 and 1975-76, slowly increased from 1975-76 to 1995-96 and there was a reduction during the post globalisation period. The cropping intensity increased from 122 during 1960-61 to 136 during 1975-76 and it was stagnant afterwards. The size of operations and holdings was extremely small – 93 per cent of the holdings were below one hectare with an average size of 0.18 hectares.

##### **9.4.2 Cropping Pattern**

The cropping pattern in the state has undergone major changes over the last four decades. Rice which occupied 33 per cent of the cropped area during 1960-61 suffered a major decline to about 10 per cent of the cropped area during 2016-17. Tapioca area has also declined from 10 per cent to about four per cent during the same period. The major gains were for coconut (21.3% to 30.4%), rubber (5.2% to 16%), Pepper (4.3% to 7%) and coffee (0.7% to 2.9%).

Among the 12 major crops grown in Kerala 10 had increased the area and two had no change between 1960-61 to 1975-76. However, 1975-76 to 1995-96 six crops had

increased area and the remaining six had reduced area, and during the post globalisation period only five crops had increased area. Rubber, pepper, coffee and plantains had increased area during all the three periods. The changes in the cropping pattern from mid-70 indicate a clear shift away from subsistence-oriented crops (mainly rice and tapioca) to more remunerative tree crops such as rubber and coconut, and also to some of the export-oriented crops such as pepper and coffee.

### **9.4.3 Productivity of Crops**

Between, 1960-61 to 1975-76 coconut, pepper, cashew nut, cardamom and coffee had indicated declining yields. However, during 1975-76 to 1995-96 all the major crops except cashew nut and plantains had recorded increased yield levels. During the post globalisation period rice, pepper, cashew nut and tea had reduced yield levels.

### **9.4.4 Production of Crops**

Coconut, rubber, plantains, cardamom and coffee had maintained increased production levels during all the three periods considered here. Rice production had reached a peak during 1975-76 and there was a continuous reduction afterwards. Cashew nut, had reduced production after 1975-76. Pepper production had increased substantially during 1975 to 1995, but it had dropped subsequently.

### **9.4.5 Area Effect and Yield Effect**

During 1960-61 to 1975-76 rice, tapioca, rubber and plantains had simultaneous increase of area, yield and production. Coconut, cashew, cardamom and coffee had production increase in spite of reduced yield. Pepper production declined in spite of increased area. During 1975-76 to 1995-96 coconut, pepper, rubber, coffee and ginger had simultaneous increase of area, yield and production. Cardamom and plantains had increased production in spite of reduced yield. Tea production increased even though area had declined. Rice and tapioca production had declined due to the influence of reduced area. Cashew nut had simultaneous decline of area, yield and production.

During the post globalisation period, simultaneous increase in area, yield and production had occurred only for rubber, plantains and coffee. Cashew nut and cardamom had increased production due to the influence of increased yield. Ginger and tapioca had reduced production due to the influence of reduced area. Pepper had reduced production due to the influence of reduced yield. Both rice and cashew nut had experienced simultaneous reduction in area, yield and production.

#### **9.4.6 Profitability Index**

The profitability index measured by the ration between the index of prices received by the farmers and the farm cultivation cost decreased continuously from 92 during 1960-61 to 36 during 2016-17 indicting that the farmers were continuously at a disadvantageous position in relation to profitability from agriculture. The traditional price parity index (ratio of prices received and prices paid by the farmers) indicates that there was a slight advantage for farmers between 1960-61 to 1975-76, but during the subsequent periods farmers were at a great disadvantageous position.

#### **9.4.7 Contribution to State Income**

The contribution of agriculture to the state income has been continuously declining over the years from 56 per cent during 1960-61 to 43 per cent during 1975-76 to 26 per cent during 1995-96 and to 13 per cent during 2016-17.

### **9.5 Coconut in Kerala**

India is the third largest country in terms of area and production of coconuts and within India Kerala had the major concentration of coconut area. Coconut is mainly cultivated by small farmers and it provides livelihood support for about 10 million persons. During 1955-56 area under coconut was 647 thousand hectares with a share of about 70 per cent in Kerala and the production was 4226 million nuts with Kerala's share being 73 per cent. By 2016-17 coconut area in India had gone up to 1870 thousand hectares with

Kerala's share reduced to 48.3 per cent and the all India production was 11,986 million nuts with Kerala's share of 47.6 per cent.

### **9.5.1 Area, Production and Yield of Coconut**

During 2016-17 coconut was the dominant crop in the state occupying about 41 percent of the net cropped area and about 30 per cent of the gross cropped area. The area under coconut during 1965-66 was 586 thousand hectares which had increased by 18 per cent by 1975-76 and there was an increase of 32 per cent during the 20 years beginning with 1975-76. However, during the post globalisation period coconut area has declined by close to one per cent.

Coconut production in Kerala during 1965-66 was 3293 million nuts which had increased by about four per cent during 1975-76 and there was an increase of about 50 per cent during the next 20 years. The production of 5484 million nuts during 2016-17 was six per cent above the 1995-96 production level.

Coconut yield in Kerala declined continuously from 1965-'66 to 1980-'81 (from 5613 nuts/ha to 4618 nuts/ha) and subsequently there was an upward movement. The 2016-17 yield was 6052 nuts/ha. Between 1965-66 to 1975-76 yield had dropped by 11.6 per cent and it increased by 13.6 per cent between 1975-76 to 1995-96. During the post globalisation period of 8 years yield increase was 7.3 per cent.

### **9.5.2 Decomposition of Production Changes**

While decomposing the production changes according to area effect and yield effect, it was observed that production increase during 1965 to 1975 was influenced by a strong area effect overcoming the large negative yield effect. Between 1975-76 to 1995-96 both area effect and yield effect had contributed to the production increase with a major share from area effect. However, during the post globalisation period the large positive yield effect had wiped out the negative area effect.

### **9.5.3 Growth Rates**

During the post globalisation period coconut production growth rate had declined mainly on account of the decline in area growth rate even though there was a marginal increase in the yield growth rate.

### **9.5.4 Farm Prices**

Farm level prices of coconut in Kerala have indicated a general upward tendency with some fluctuations. Between 1960-61 and 2016-17 prices had increased in 27 years, decreased in 15 years and remained stable for one year. During the post globalisation period there was a sharp decline in the prices during 2000-'01 along the crash in world edible oil prices. The relative prices of coconut and rice moved in favour of rice for most of the years from 1960-61 to 1976-77 and this position was reversed in 1976-77. The rapid increase of coconut area occurred on account of the shift from rice due to favourable price parity after 1976-77. The decline in coconut price during 2000-01 was so large to make the coconut-rice parity index fall below the 1960-61 level. Though price support for coconut was introduced in 1986 through support price for copra, market prices remained below the support price only in five years of which four years were during the post globalisation period.

### **9.5.5 Coconut Oil Price**

Coconut price movements are closely linked up with the prices of copra and coconut oil. Coconut oil prices in Kerala had indicated substantial annual and seasonal fluctuations. There was a strong linkage between the quantity of oil imports and the domestic price level. The changes in the international market prices were also reflected in the coconut oil price.

In the international arena soybean oil and palm oil production had increased at a much faster rate than coconut oil. The relatively low price of palm oil has influenced substitution of palm oil for coconut oil. During the post globalisation period massive

imports of palm oil had depressed the coconut oil price, which was also reflected in the coconut price.

Removal of quantity restrictions and low levels of applied tariff below the base and bound levels provide a strong possibility of repeating the crisis created for the coconut producers in Kerala during 2000-'01. A number of short term and long-term measures are necessary to protect the income levels of the coconut farmers in Kerala and to ensure livelihood sustainability for them.

## **9.6 Rubber in Kerala**

Natural rubber cultivation in India has been traditionally concentrated in Kerala and the adjoining states of Karnataka and Tamil Nadu. During 1960-61 Kerala had accounted for 94 per cent of the 144 thousand hectares of rubber area in India. With the expansion of area to other states, during 2016-17 Kerala's share of rubber area was 83 per cent of 503 thousand hectares. However, during 2016-17 Kerala accounted for about 92 per cent of the rubber production in India. During 1960-61 rubber estates accounted for about 37 per cent of the rubber area and gradually it was reduced to about 12 per cent during 2016-17. There are more than one million holdings with an average size of half hectare. During 1960-61 there were 547 estates with an average size of 89 hectares and by 2016-17 there were only 299 estates but their average size had gone up to 223 hectares. While the rubber yield from the holdings sector was below the estate sector in the earlier years, by 2016-17 the yield from the holdings sector was about one per cent above the estate sector. During the 15 years prior to globalisation the average annual increase in rubber area was 16,561 hectares which has come down to 7,155 during the nine years of post-globalisation period.

### **9.6.1 Area, Yield and Production**

The total planted area under rubber increased from 135.8 thousand hectares during 1960-61 to 476 thousand hectares during 2016-17. The average annual growth during the 20 years before globalisation was 11.8 thousand hectares which has slowed down to 3.4



thousand hectares during the post globalisation period. While the 20 years prior to globalisation has registered 112 per cent growth in area, the post globalisation period of nine years has registered only six per cent growth in area. During 1960-61 the tapped area was only 48 per cent of the planted area and it has gone up to 76 per cent during 2016-17. While production of rubber in Kerala had increased at a steady rate over the years, the rate of increase has gradually declined over the years. Yield per hectare of tapped area of rubber increased from 354 kg during 1960-61 to 1635 kg during 2016-17. The percentage increase of yield during 1960-61 to 1975-76 was 116.9 which has come down to 87.9 during 20 years from 1975-76 and to 13.3 during the post globalisation period.

### **9.6.2 Decomposition of Production Changes**

While decomposing the production changes according to the contributions of area and yield it was observed that area effect dominated over the yield effect during the 15 years from 1960-61. During the 20 years prior to globalisation both area effect and yield effect had somewhat similar contributions. However, during the post globalisation period yield effect dominated over the area effect.

### **9.6.3 Growth Rates**

The production growth rate during the post globalisation period was substantially reduced from the previous period. This was influenced by the decline in both area growth rate and yield growth rate.

### **9.6.4 Rubber Price**

Rubber price in Kerala had been determined in isolation from international markets through government interventions such as statutory prices, restrictions on imports and exports, and bugger stock operations. The government interventions were expected to control the speculative tendencies in the market and to ensure remunerative prices to

the rubber cultivators. Most of these measures were modified or abolished with the introduction of the WTO regime.

Rubber prices in Kerala indicated a consistent upward trend over the years with some amount of annual fluctuations. Though the Kerala market prices were not directly linked to the international prices, major fluctuations in international prices due to events such as changes in the automobile demand, South-Asian currency crisis, changes in world natural rubber supply, exchange rate fluctuations, and natural rubber stock level had its impact on the domestic prices. The rubber prices in Kerala were well above the world market prices during the 70's 80's, but the margin has narrowed down from the 90's onwards. During 70's the Kerala price was 21.3 per cent above the world market price and it had increased to 49.7 per cent during the 80's. However, the gap narrowed down to 6.3 per cent during the 90's. During the 15 years prior to globalisation the average price in Kerala was 27.3 per cent above the world market price, but during the ten years of post-globalisation period domestic price of rubber was only 3.4 per cent above the world market price. This implies that there has been a substantial integration of Kerala rubber market with the international market to bring about price parity. The annual variations in the price levels also indicate that the gap between the domestic price and international price has been closed and also the range of annual variations has decreased during the post globalisation period.

The coefficient of variation for both the Kerala market and the world market had decreased during the 90's from the previous decade, but it had gone up during the 90's. The variation was least during the 5 years of this century. The variability in the world market price was more than the Kerala market price. However, the gap between the coefficients of variation for both the markets had declined during the post globalisation period. The price movements in both the markets were in the same direction for 24 years and in the opposite direction for 10 years. The recent past trends indicate that the Kerala prices were only about 90 per cent of the world price for a few months.

While Kerala accounted for 90 per cent of the natural rubber production in India, bulk of the utilisation takes place in the states of outside Kerala, and this gives rise to a likely

conflict of interests between the rubber producers in Kerala and the rubber product manufactures outside Kerala on matters related to input tariff.

### **9.6.5 Imports and Exports**

With the removal of the quantitative restrictions on rubber imports it can be freely imported under OGL. The base customs duty on rubber imports was reduced to 20 per cent with effect from January 2017. Though about half the natural rubber consumption requirements were met from imports, with expansion of domestic production imports had been reduced. The tendency of imports was strong among manufacturers when the domestic prices were substantially above the international prices. However, during the immediate past imports were uneconomic since the international prices were above domestic prices. Further exports had exceeded imports in two years of this century. Malaysia and Thailand were mainly the source for import of rubber to India. Though the exports of rubber from India had been low, efforts are being made to increase the value of rubber exports and it has picked up during the last two years. There is an increased awareness about the need for strengthening the export efforts to avoid the crisis situation prevailed during 2015.

### **9.6.6 Safeguards**

The AoA is not applicable to natural rubber since it is excluded from the list of agricultural commodities. It is considered to be advantageous to a large number of rubber cultivators in Kerala if rubber is reclassified as an agricultural commodity. This will also help to protect the domestic producers against dumping from some of the major producers of natural rubber.

## **9.7 Peppers in Kerala**

Pepper which is considered as the king of spices is one of the most ancient and traditional crops of Kerala and it has played an important role in the Kerala economy

for many years. Pepper trade was responsible for bringing Europeans, Persians and Arabs to Kerala.

### **9.7.1 Area, Production and Yield of Pepper**

Kerala accounts for about 95 per cent of the area under pepper in India. Pepper area in Kerala increased from 99.8 thousand hectares during 1960-'61 to 118 thousand hectares during 1969-'70 and after dropping down to 101 thousand hectares during 1977-'78 there was a steady increase to 207 thousand hectares during 2016-'17. The period 1960-'61 to 1975-'76 witnessed 8.5 per cent growth in area, and there was 77 per cent growth during the 20 years starting with 1975-'76. During the nine years of post-globalisation period area increased by about eight per cent. Production of pepper during 1960-'61 was 27 thousand tonnes which was either stagnant or declining during the 60's and 70's, and it touched an all-time low level of 17.35 thousand tonnes during 1985-'85, but it doubled within the next three years. By 1995-'96 production had reached a peak level of 68.6 thousand tonnes, but it had dropped to about 55.9 thousand tonnes by 2016-'17. While the period 1960-'61 to 1975-'96 witnessed about nine per cent decline in production, there was an increase of 188 per cent during the next 20 years, and a decline of 17 per cent during the 9 years of post-globalisation period. Yield levels had indicated wide fluctuations ranging between 164kg/ha in 1984-'85 to 375 kg/ha during 1998-'99. During the 15 years from 1960-'61 yield had decreased by 16.24 per cent and during the next 20 years up 1995-'96 there was an increase of 57.7 per cent. During the nine years of post-globalisation period yield had declined by 23.18 per cent from the 1995-'96 level of 358 kg/ha.

### **9.7.2 Decomposition of Production Changes**

The decline in production during 1960 to 1975 and during 1995 to 2017 was due to the large negative yield effect dominating over the positive area effect. The production increase during the 20 years beginning with 1975-'76 was the outcome of a somewhat balanced contribution of both area effect and yield effect.

### **9.7.3 Growth Rates**

During the post globalisation period production growth rate was substantially reduced on account of the decline in area growth rate and the negative growth rate of yield.

### **9.7.4 Farm Prices**

Farm prices indicated some amount of cyclical fluctuations. During the 80's the average price was Rs 25/kg with a range of Rs 12.0 to Rs 52.6 and during the 90's the average price was 91.5 with a range of 26.2 to Rs 205.1. During the four years of this century the average price was Rs 85.1 with a range of Rs 68.0 to Rs 124.7.

### **9.7.5 Pepper Exports**

Between 1960-61 and 2016-17 pepper exports varied between 15.65 thousand tonnes during 1978-79 and 47.70 thousand tonnes during 1996-97. The average annual exports for ten years prior to globalisation were 33.71 thousand tonnes and during the nine years of post-globalisation period the annual average was 29.94 thousand tonnes. Export earnings between 1960-61 and 2016-17 varied between Rs 5.89 crores during 1963-'64 and Rs 885.3 crores during 1999-00. Though the export earnings had been high during the second half of the 90's from 2000-01 there has been a drastic decline in the export earnings on account of the short fall in export quantity. India could not take advantage of the emerging market opportunities on account of inadequate market development during the 70's and 80's, mainly due to the dependence on bilateral government purchase agreements with the former Soviet Union. However, by 2016-17 about 56 per cent of India's pepper was exported to the American zone as against 10 per cent during mid 80's. The high production cost resulting from the low yield of pepper in Kerala has contributed to the poor competitive position in the international markets in spite of the superior quality. While there was an upward trend in the unit value of exports during the 90's, a declining trend has started during 2000-01 on account of the emergence of Vietnam as a major producer and exporter.

There has been wide year to year fluctuations in export quantity and export value realised. The fluctuations in export earnings were influenced by both the fluctuations in the quantity exported and the unit value realised. The variability was least for export quantity and maximum for export earnings. Over the year's variability has increased for export quantity, unit value and export volume. The coefficient of variations indicates that variability of all these categories had substantial increase during the post globalisation period over the pre-globalisation period.

### **9.7.6 Pepper Imports**

With the liberalisation of imports under the WTO provisions and the imports from Sri Lanka under the Indo-Sri Lanka Free Trade Agreement imports of pepper to India has been expanding in recent years. The volume of imports has increased from 4020 tonnes during 2000-01 to 15,750 tonnes by 2016-17. During these three years imports from Vietnam had increased by more than 10 times while the imports from Sri Lanka had increased by 2.6 times. While the value of imports from Vietnam had increased by 638 per cent and from Sri Lanka had increased by 111 per cent, there was a reduction by 20 per cent for imports from Indonesia. During 2016-17 unit values of imports from Sri Lanka was 20 per cent higher than the unit value of imports from Vietnam.

### **9.8 Policy Implications**

A few specific conclusions on the WTO concerns relating to coconut, rubber and pepper are already included in the respective Chapters and in order to minimise repetition only certain conclusions of a general nature are included here. While it may be too early to derive firm conclusion on the impact of WTO based on the experience of a limited period, it is still possible to identify some tendencies and to apply mid-course corrections wherever necessary.

On the basis of the experience so far it can be inferred that the expectation of substantial benefits to the Kerala economy from expanded trade of coconut, rubber and pepper resulting from globalisation of agriculture has not materialised, probably with the

exception of some quantities of rubber exported during the last two years. At the same time there has been disturbing tendencies in terms of increased imports of pepper, palm oil and soybean oil for substituting with coconut oil, and rubber. Though there has been some integration of Kerala markets of these commodities with the international markets, the domestic farmers could not derive substantial gains of farm increase. While the rising prices of coconut and rubber in the international markets during the last two years have contributed towards a recovery of farm income from the crisis situation in the beginning of this century, pepper producers are still in distress. There is also a danger that the high volatility of international market conditions will attract further hardships to the coconut and rubber producers during the periods of downward trend in prices. Therefore, it is important that adequate measures are initiated to take advantage of the opportunities open to Kerala on account of the changing international scenario and to provide appropriate safeguards to ensure the livelihood security of a large number of small farmers of Kerala engaged in the production of these commodities.

One of the most important concerns relating to expanded trade in coconut and pepper is the product profile offered. The traditional product profile is fast changing and new products with high value are rapidly entering the market. In the absence of product diversification to these high value items there is little scope for realising better income opportunities for domestic farmers. However, diversification to value added products would require access to new technology, technical knowhow, quality control and effective entrepreneurial skills for market penetration. All these can be developed only through the active cooperation of the concerned government agencies with the public and private enterprises.

The major competitors for coconut, rubber and pepper from Kerala in the international markets include one or more countries of Vietnam, Philippines, Indonesia, Malaysia and Sri Lanka. India's special relations with these countries make it a sensitive issue to evolve suitable safeguards to the farmers in Kerala. The political reality is such that in order to honour the national commitments through bilateral and multinational agreements, Kerala farmers producing the bulk of coconut, rubber and pepper in India

are called upon to make huge sacrifices for which there should be compensating policies and programmes of income generation through supporting measures for product diversification and value addition of these commodities.

Marketing support is crucial in the areas of post-harvest technology and export promotion. In order to compete effectively in the international markets, the products should conform to certain acceptable quality standards which can be maintained only through careful post-harvest operations using modern processing facilities. The changing profile of supply and demand in the major exporting and importing countries and the response of individual countries to the changing marketing environment should be made available to all those who are directly and indirectly involved in export marketing operation of the major commodities. Timely availability of market intelligence is an important aspect for successful operations in international markets.

One of the key elements affecting the export competitiveness of all these three commodities is the relatively higher cost of production of these commodities influenced by the low productivity. The perennial nature of these crops introduces certain rigidities in terms of adjustments of production conditions according to changes in the market conditions. Since coconut, rubber and pepper plants have long life, often measures such as replanting with superior varieties and improved management (including irrigation where applicable), will be adopted by the farmers only under assured returns for the investment. The experience of replanting incentives provided by the Rubber Board indicates that there is good scope for improving the productivity of pepper and coconut through similar measures for organised replanting of aged plants and rehabilitation of diseased plants.

The sharp fall in prices of the major commodities during the early years of the current century had created a crisis in the state's agricultural sector. In addition to the fall in international market prices the imports under liberalised trade regime has been responsible for the crisis situation. The integration of domestic markets with international markets and the high variability in international prices are matters of grave concern for income stability of the farming community in Kerala. While the situation



may improve with effective steps towards product diversification and marketing support, there will be a long-time lag in materialising this scenario. Therefore, suitable short-term measures are necessary to safeguard the interests of domestic agriculture in Kerala. Two significant measures in this direction are related to import duty adjustments and creation of a Price Stabilisation Fund. The present applied tariff rates are well below the basic duty and the bound duty, and the applied rates can be suitably modified to regulate imports. Export subsidy offered for rubber was effective in export promotion and extension of this provision to other commodities is worth following. A Price Stabilisation Fund with contributions from producers during high price periods and from trade and government sources can be effective to compensate the farmers during crisis periods. Further crop insurance schemes can protect the farmers from loss of income due to short fall in crop production levels.

There is a need to evolve suitable measures to avoid misuse of the re-export provisions. Since there are certain notions regarding the quality of goods originating from specific locations, in the absence of proper certification of origin, inferior quality items from other countries enter the Indian market and they are re-exported as Indian goods. This is likely to spoil the image of a high-quality product from Kerala, especially for pepper. A stipulation regarding minimum value addition can be used as a control measure to regulate the flow of good under this provision.

Reclassification of rubber as an agricultural commodity could be taken up in order to help the rubber cultivators. This is important especially in the context of a large number of small-scale rubber producers involved in rubber production and it is consistent with the treatment of other plantation crops of tea and coffee. If there is any difficulty in pursuing this option due to strategic reasons of the Government of India, there should be some mechanism to compensate the rubber producers for their loss of income during the periods when prices fall below the desirable levels.

In view of the dynamic nature of the international markets, it is important to monitor the changes systematically and to evolve new strategies consistent with the changing environment. For this purpose, there should be a permanent mechanism at the state

level with both administrative and advisory responsibilities. It should be the responsibility of this set up to evolve policies and programmes to take advantage of the opportunities offered by the WTO and to meet the emerging challenges from time to time.

## **9.9 Suggestions**

The following are the sum of the suggestions based on the following:

1. Presently rubber, pepper and coconut cultivation in India is confined to only a few states like Kerala, Karnataka, Andhra Pradesh and Tamil Nadu. As a prominent tropical plant, it is necessary to increase the area and production of rubber, pepper and coconut by identifying potential areas suitable for it and choosing the apt variety for cultivating in each area according to the geographical peculiarities, and by adopting appropriate cultivation process suitable for each area.
2. The improvement in productivity can be achieved only through the harmonious effort of farmers, agricultural experts and government which is much needed in India for the suitable growth of rubber, pepper and coconut cultivation
3. In Kerala, the possibility of increasing production and productivity by the expansion of area is limited due to high fragmentation of land as well as acute shortage in availability of agricultural land. The probability can be improved by increasing the present plant density to the recommended level and extending the intercrop cultivation to the coconut plantations as well as by cultivating the crop as a pure crop. Along with this, following a scientific practice of cultivation as recommended by Kerala Agricultural University may help to improve the yield per hectare in the state.
4. For containing rubber, pepper and coconut cultivation and obtaining a stable income to farmer it is inevitable to enhance export of rubber, pepper and coconut from India. In order to utilize the export potential of the crop, Government of India must initiate and support various export market enhancement programs and promotional measures especially to explicit the

Geographical Indicator (GI) status of rubber board, pepper board and coconut board

5. Apart from the various supportive programs for enhancing the export there should be adequate mechanism that ensures international quality standard in the exporting of fresh pepper, processed rubber and coconut oil from India. The government should initiate programs that intervene in the production, pre-harvesting and post harvesting management to maintain the quality.
6. The working of AEZs (agricultural export zones) for rubber, pepper and coconut exporting is to be rejuvenated and there should be infrastructure development in the form of cold storage under public, private or co-operative sector. Providing incentives and financial assistance to exporters will surely boost up the export of pepper, rubber and coconut from present scenario to the unexploited markets the USA and European countries
7. India has the potential to export the processed rubber, pepper and coconut. In order to exploit the markets of European countries and USA, suitable policy measures must be taken up by the government through industries department. Similarly, there should be measures to monitor the processing technology in order to maintain the international quality standard of the products
8. Efforts must be made by the government of Kerala, to set-up small scale processing units, to ensure stable price to the farmer
9. The floor price mechanism to protect the cultivation from incurring loss due to unexpected fall in price should be revamped and adequate provisions should be made to intervene the market without any procedural delay when a steep fall in prices occurs



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## APPENDICES

### 4 Global Area, Production and Yield of Coconut

#### Appendix 4.1: Analysis of Global Area of Coconut for Total Period

Variables	Philippines	Indonesia	India	Sri Lanka	Thailand
t	0.005*** (0.001)	0.016*** (0.000)	0.019*** (0.001)	-0.002*** (0.001)	-0.005*** (0.001)
t <sup>2</sup>	-0.025 (0.191)	-0.320*** (0.080)	-0.442*** (0.091)	0.008 (0.022)	-0.348*** (0.020)
Constant	7.962*** (0.021)	7.465*** (0.010)	7.024*** (0.018)	6.084*** (0.016)	5.908*** (0.020)
Observations	43	43	43	43	43
R-squared	0.563	0.981	0.960	0.784	0.923

#### Appendix 4.2: Analysis of Global Area of Coconut During Pre-Globalisation

Variables	Philippines	Indonesia	India	Sri Lanka	Thailand
t	0.011*** (0.002)	0.024*** (0.001)	0.026*** (0.001)	-0.004*** (0.001)	0.033*** (0.002)
t <sup>2</sup>	-0.012*** (0.000)	0.494 (0.431)	1.847*** (0.225)	0.365*** (0.069)	-0.348*** (0.099)
Constant	7.981*** (0.019)	7.344*** (0.013)	6.834*** (0.013)	6.078*** (0.010)	5.357*** (0.024)
Observations	20	20	20	20	20
R-squared	0.853	0.968	0.979	0.730	0.948

### Appendix 4.3: Analysis of Global Area of Coconut During Post-Globalisation

Variables	Philippines	Indonesia	India	Sri Lanka	Thailand
t	0.008*** (0.001)	0.011*** (0.001)	0.007*** (0.001)	-0.004*** (0.001)	-0.029*** (0.001)
t <sup>2</sup>	0.166 (0.298)	0.746* (0.365)	0.342 (0.349)	0.269** (0.099)	0.043 (0.033)
Constant	8.016*** (0.008)	7.800*** (0.012)	7.475*** (0.017)	6.060*** (0.022)	5.906*** (0.011)
Observations	23	23	23	23	23
R-squared	0.919	0.906	0.698	0.543	0.908

### Appendix 4.4: Analysis of Global Production of Coconut for Total Period

Variables	Philippines	Indonesia	India	Sri Lanka	Thailand
t	0.005*** (0.001)	0.016*** (0.000)	0.019*** (0.001)	-0.002*** (0.001)	-0.005*** (0.001)
t <sup>2</sup>	0.137 (1.505)	-2.838*** (0.947)	-2.170** (0.882)	0.657** (0.246)	-2.023*** (0.255)
Constant	7.962*** (0.021)	7.465*** (0.010)	7.024*** (0.018)	6.084*** (0.016)	5.908*** (0.020)
Observations	43	43	43	43	43
R-squared	0.563	0.981	0.960	0.784	0.923

**Appendix 4.5: Analysis of Global Production of Coconut During Pre-Globalisation**

Variables	Philippines	Indonesia	India	Sri Lanka	Thailand
t	0.005 (0.006)	0.032*** (0.002)	0.042*** (0.002)	0.003 (0.005)	0.037*** (0.005)
t <sup>2</sup>	0.003** (0.001)	0.001** (0.000)	0.003*** (0.000)	-0.000 (0.001)	-0.000 (0.001)
Constant	9.022*** (0.075)	8.841*** (0.021)	8.052*** (0.025)	7.440*** (0.065)	6.636*** (0.057)
Observations	20	20	20	20	20
R-squared	0.561	0.958	0.972	0.625	0.801

**Appendix 4.6: Analysis of Global Production of Coconut During Post-Globalisation**

Variables	Philippines	Indonesia	India	Sri Lanka	Thailand
t	0.009*** (0.002)	0.014*** (0.002)	0.014*** (0.002)	0.013*** (0.003)	-0.028*** (0.004)
t <sup>2</sup>	-0.014*** (2.461)	-0.015*** (2.660)	0.002** (2.344)	0.002*** (1.041)	-0.035*** (1.172)
Constant	9.498*** (0.023)	9.595*** (0.025)	9.000*** (0.032)	7.462*** (0.043)	7.776*** (0.064)
Observations	23	23	23	23	23
R-squared	0.723	0.830	0.707	0.608	0.817

#### Appendix 4.7: Analysis of Global Yield of Coconut for Total Period

Variables	Philippines	Indonesia	India	Sri Lanka	Thailand
t	0.005*** (0.001)	0.016*** (0.000)	0.019*** (0.001)	-0.002*** (0.001)	-0.005*** (0.001)
t <sup>2</sup>	0.082 (0.62087)	-0.081** (0.38424)	-0.068 (0.44057)	0.153*** (0.54863)	-0.180 (1.08036)
Constant	7.962*** (0.021)	7.465*** (0.010)	7.024*** (0.018)	6.084*** (0.016)	5.908*** (0.020)
Observations	43	43	43	43	43
R-squared	0.563	0.981	0.960	0.784	0.923

#### Appendix 4.8: Analysis of Global Yield of Coconut During Pre-Globalisation

Variables	Philippines	Indonesia	India	Sri Lanka	Thailand
t	-0.006 (0.00591)	0.008*** (0.00212)	0.016*** (0.00171)	0.007 (0.00545)	0.003 (0.00361)
t <sup>2</sup>	0.174*** (3.27292)	0.414** (1.96272)	0.996*** (1.38205)	-0.414 (4.33845)	0.482* (2.43481)
Constant	7.94911*** (0.07414)	8.40432*** (0.02661)	8.12590*** (0.02152)	8.26845*** (0.06840)	8.18755*** (0.04534)
Observations	20	20	20	20	20
R-squared	0.57799	0.58930	0.90723	0.62329	0.74356

#### Appendix 4.9: Analysis of Global Yield of Coconut During Post-Globalisation

Variables	Philippines	Indonesia	India	Sri Lanka	Thailand
t	0.00103 (0.00136)	0.00360** (0.00142)	0.00646*** (0.00219)	0.01701*** (0.00251)	0.00101 (0.00409)
t <sup>2</sup>	-0.458*** (0.94612)	-0.736*** (1.47125)	0.269 (1.87330)	0.432* (2.12813)	-0.239*** (4.10051)
Constant	8.38937*** (0.02128)	8.70268*** (0.02221)	8.43246*** (0.03421)	8.31001*** (0.03915)	8.77662*** (0.06384)
Observations	23	23	23	23	23
R-squared	0.53507	0.61953	0.55551	0.71096	0.65880

#### Global Area, Production and Productivity of Pepper

##### Appendix 4.10: Analysis of Global Area of Pepper for Total Period

Variables	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
t	0.014*** (0.002)	0.040*** (0.002)	0.128*** (0.004)	0.046*** (0.001)	0.009** (0.004)	0.009*** (0.002)
t <sup>2</sup>	-0.211*** (0.00023)	0.640 (0.00024)	0.652*** (0.00037)	-0.149*** (0.00042)	-0.104 (0.00069)	0.576** (0.00023)
Constant	11.888** (0.057)	10.511** (0.053)	6.574*** (0.116)	9.066*** (0.028)	9.839*** (0.104)	9.083*** (0.068)
Observation	43	43	43	43	43	43
R-squared	0.727	0.924	0.963	0.983	0.781	0.510

#### Appendix 4.11: Analysis of Global Area of Pepper During Pre-Globalisation

variables	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
t	0.033*** (0.003)	0.032*** (0.004)	0.197*** (0.016)	0.068*** (0.003)	0.048*** (0.007)	-0.009 (0.009)
t <sup>2</sup>	0.413*** (0.001)	0.631 (0.001)	-0.064 (0.003)	0.421*** (0.001)	-0.576 (0.001)	-0.768 (0.002)
Constant	11.339*** (0.041)	10.595*** (0.045)	5.726*** (0.207)	8.635*** (0.038)	9.575*** (0.089)	9.328*** (0.118)
Observations	20	20	20	20	20	20
R-squared	0.894	0.839	0.894	0.970	0.740	0.657

#### Appendix 4.12: Analysis of Global Area of Pepper During Post-Globalisation

Variables	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
t	-0.020*** (0.004)	0.045*** (0.004)	0.104*** (0.005)	0.023*** (0.001)	0.022*** (0.008)	0.014*** (0.005)
t <sup>2</sup>	-0.694*** (0.001)	-0.382*** (0.001)	0.772** (0.001)	0.233*** (0.000)	-0.756** (0.001)	0.558 (0.001)
Constant	12.558*** (0.059)	11.423*** (0.056)	9.256*** (0.077)	10.102*** (0.015)	9.861*** (0.118)	9.279*** (0.073)
Observations	23	23	23	23	23	23
R-squared	0.761	0.907	0.958	0.965	0.543	0.496

#### Appendix 4.13: Analysis of Global Production of Pepper for Total Period

Variables	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
t	0.024*** (0.003)	0.024*** (0.002)	0.167*** (0.004)	0.056*** (0.001)	0.009** (0.004)	-0.003 (0.002)
t <sup>2</sup>	-0.694*** (0.021)	-0.382*** (0.022)	0.772*** (0.034)	0.233*** (0.039)	-0.756** (0.063)	0.551 (0.021)
Constant	10.374*** (0.077)	10.563*** (0.050)	6.321*** (0.129)	8.291*** (0.041)	10.554*** (0.120)	9.952*** (0.070)
Observations	43	43	43	43	43	43
R-squared	0.711	0.838	0.973	0.976	0.703	0.466

#### Appendix 4.14: Analysis of Global Production of Pepper During Pre-Globalisation

Variables	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
t	0.040** (0.008)	0.042*** (0.006)	0.220** (0.017)	0.073*** (0.002)	0.021* (0.011)	-0.035*** (0.010)
t <sup>2</sup>	0.455** (0.001)	-0.139 (0.001)	0.176** (0.003)	0.044** (0.000)	-0.013 (0.002)	0.313 (0.002)
Constant	9.874** (0.098)	10.346** (0.080)	5.204** (0.216)	7.849*** (0.031)	10.623** (0.137)	10.386** (0.130)
Observation	20	20	20	20	20	20
R-squared	0.693	0.722	0.911	0.983	0.455	0.422

**Appendix 4.15: Analysis of Global Production of Pepper During Post-Globalisation**

Variables	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
t	-0.007 (-0.006)	0.021*** (-0.003)	0.108*** (-0.007)	0.030*** (-0.002)	0.029*** (-0.009)	0.022*** (-0.004)
t <sup>2</sup>	0.131** (-0.001)	-0.079 (-0.001)	0.427*** (-0.001)	0.396*** (0.014)	-0.146*** (-0.002)	0.830* (-0.001)
Constant	11.098*** (-0.092)	11.081*** (-0.048)	10.264*** (-0.115)	9.552*** (-0.031)	10.656*** (-0.140)	9.750*** (-0.058)
Observations	23	23	23	23	23	23
R-squared	0.765	0.745	0.922	0.924	0.506	0.635

**Appendix 4.16: Analysis of Global Yield of Pepper for Total Period**

Variables	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
t	0.010** (0.002)	-0.016*** (0.002)	0.039** (0.004)	0.010*** (0.001)	-0.000 (0.002)	-0.012*** (0.002)
t <sup>2</sup>	0.140** (0.065)	-0.399*** (0.109)	-0.106* (0.554)	0.047 (0.045)	0.134** (0.368)	0.198*** (0.506)
Constant	5.392** (0.068)	6.959*** (0.053)	6.655** (0.106)	6.132*** (0.028)	7.622** (0.059)	7.776*** (0.071)
Observation	43	43	43	43	43	43
R-squared	0.435	0.694	0.743	0.731	0.414	0.481



#### Appendix 4.17: Analysis of Global Yield of Pepper During Pre-Globalisation

Variables	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
t	0.013** (0.006)	-0.025*** (0.004)	0.004 (0.005)	0.008*** (0.001)	0.007** (0.003)	0.008* (0.005)
t <sup>2</sup>	0.181 (0.256)	-0.115 (0.691)	0.741*** (1.452)	0.945*** (0.320)	0.204 (2.859)	0.842* (4.275)
Constant	5.447*** (0.094)	6.565*** (0.066)	7.916*** (0.078)	6.357*** (0.022)	7.703*** (0.041)	7.378*** (0.075)
Observations	23	23	23	23	23	23
R-squared	0.455	0.661	0.445	0.632	0.441	0.535

#### Appendix 4.18: Analysis of Global Yield of Pepper During Post-Globalisation

Variables	India	Indonesia	Vietnam	Sri Lanka	Brazil	Malaysia
t	0.013** (0.006)	-0.025*** (0.004)	0.004 (0.005)	0.008*** (0.001)	0.007** (0.003)	0.008* (0.005)
t <sup>2</sup>	0.128*** (0.316)	0.917** (0.403)	-0.473** (2.213)	0.246 (0.151)	-0.278** (1.030)	0.119 (1.609)
Constant	5.447*** (0.094)	6.565*** (0.066)	7.916*** (0.078)	6.357*** (0.022)	7.703*** (0.041)	7.378*** (0.075)
Observations	23	23	23	23	23	23
R-squared	0.455	0.661	0.245	0.632	0.441	0.535

## Global Area, Production and Productivity of Rubber

### Appendix 4.19: Analysis of Global Area of Rubber for Total Period

Variables	India	Indonesia	China	Malaysia	Thailand
t	0.027*** (0.001)	0.024*** (0.001)	0.022*** (0.001)	-0.014*** (0.001)	0.021*** (0.001)
t <sup>2</sup>	-0.011*** (0.025)	0.107*** (0.151)	0.229*** (0.036)	-0.494*** (0.121)	0.192*** (0.215)
Constant	5.260*** (0.023)	7.175*** (0.018)	5.505*** (0.023)	7.631*** (0.026)	6.770*** (0.037)
Observations	43	43	43	43	43
R-squared	0.968	0.973	0.953	0.864	0.885

### Appendix 4.20: Analysis of Global Area of Rubber During Pre-Globalisation

Variables	India	Indonesia	China	Malaysia	Thailand
t	0.035*** (0.001)	0.015*** (0.001)	0.025*** (0.001)	-0.002 (0.002)	0.009*** (0.003)
t <sup>2</sup>	0.056*** (0.055)	0.147*** (0.324)	0.040*** (0.087)	0.259*** (0.573)	-0.349*** (0.639)
Constant	5.007*** (0.015)	7.275*** (0.012)	5.508*** (0.017)	7.393*** (0.022)	7.142*** (0.034)
Observations	20	20	20	20	20
R-squared	0.983	0.941	0.960	0.560	0.679

#### Appendix 4.21: Analysis of Global Area of Rubber During Post-Globalisation

Variables	India	Indonesia	China	Malaysia	Thailand
t	0.011*** (0.001)	0.027*** (0.002)	0.031*** (0.001)	-0.023*** (0.001)	0.042*** (0.002)
t <sup>2</sup>	-0.376*** (0.054)	-0.058 (0.902)	0.068*** (0.126)	0.144*** (0.257)	0.487*** (0.627)
Constant	5.971*** (0.011)	7.681*** (0.028)	5.820*** (0.020)	7.373*** (0.022)	6.958*** (0.024)
Observations	23	23	23	23	23
R-squared	0.938	0.919	0.967	0.935	0.975

#### Appendix 4.22: Analysis of Global Production of Rubber for Total Period

Variables	India	Indonesia	China	Malaysia	Thailand
t	0.056*** (0.002)	0.036*** (0.001)	0.056*** (0.001)	-0.019*** (0.002)	0.062*** (0.001)
t <sup>2</sup>	0.012* (0.061)	0.159*** (0.162)	0.015*** (0.040)	0.012 (0.165)	0.156*** (0.195)
Constant	4.894*** (0.044)	6.547*** (0.025)	4.742*** (0.027)	7.458*** (0.049)	6.127*** (0.032)
Observations	43	43	43	43	43
R-squared	0.971	0.976	0.980	0.759	0.987

**Appendix 4.23: Analysis of Global Production of Rubber During Pre-Globalisation**

Variables	India	Indonesia	China	Malaysia	Thailand
t	0.058*** (0.002)	0.030*** (0.002)	0.086*** (0.002)	-0.014*** (0.002)	0.084*** (0.004)
t <sup>2</sup>	0.104*** (0.076)	0.120*** (0.294)	0.031*** (0.071)	-0.295*** (0.605)	0.233*** (0.740)
Constant	4.607*** (0.024)	6.644*** (0.019)	4.314*** (0.023)	7.496*** (0.028)	5.753*** (0.055)
Observations	20	20	20	20	20
R-squared	0.985	0.962	0.992	0.835	0.958

**Appendix 4.24: Analysis of Global Production of Rubber During Post-Globalisation**

Variables	India	Indonesia	China	Malaysia	Thailand
t	0.030*** (0.001)	0.044*** (0.003)	0.035*** (0.002)	-0.013*** (0.004)	0.045*** (0.002)
t <sup>2</sup>	-0.060*** (0.164)	0.123 (1.003)	0.051* (0.249)	-0.201** (0.712)	0.179 (1.224)
Constant	6.313*** (0.020)	7.198*** (0.044)	5.954*** (0.035)	7.086*** (0.068)	7.468*** (0.034)
Observations	23	23	23	23	23
R-squared	0.966	0.923	0.924	0.473	0.955

**Appendix 4.25: Analysis of Global Yield of Rubber for Total Period**

Variables	India	Indonesia	China	Malaysia	Thailand
t	0.029*** (0.001)	0.012*** (0.001)	0.034*** (0.001)	-0.005** (0.002)	0.042*** (0.002)
t <sup>2</sup>	0.018* (0.094)	0.012* (0.072)	-0.066*** (0.091)	0.026* (0.154)	-0.121*** (0.163)
Constant	6.541*** (0.024)	6.279*** (0.030)	6.148*** (0.027)	6.734*** (0.063)	6.264*** (0.046)
Observations	43	43	43	43	43
R-squared	0.967	0.757	0.975	0.790	0.953

**Appendix 4.26: Analysis of Global Yield of Rubber During Pre-Globalisation**

Variables	India	Indonesia	China	Malaysia	Thailand
t	0.023*** (0.001)	0.016*** (0.001)	0.062*** (0.002)	-0.012*** (0.003)	0.075*** (0.005)
t <sup>2</sup>	0.130*** (0.192)	0.001 (0.172)	-0.053* (0.273)	-0.310*** (0.434)	0.336*** (0.416)
Constant	6.508*** (0.016)	6.275*** (0.019)	5.719*** (0.030)	7.010*** (0.034)	5.518*** (0.057)
Observations	20	20	20	20	20
R-squared	0.959	0.868	0.975	0.843	0.950

#### Appendix 4.27: Analysis of Global Yield of Rubber During Post-Globalisation

Variables	India	Indonesia	China	Malaysia	Thailand
t	0.019*** (0.001)	0.017*** (0.003)	0.004** (0.002)	0.010** (0.004)	0.003*** (0.001)
t <sup>2</sup>	-0.023 (0.309)	0.026 (0.436)	-0.067* (0.343)	-0.241*** (0.549)	-0.326*** (0.323)
Constant	7.250*** (0.016)	6.425*** (0.050)	7.042*** (0.027)	6.620*** (0.067)	7.418*** (0.018)
Observations	23	23	23	23	23
R-squared	0.944	0.597	0.306	0.551	0.859

### 6 Area, Production and Yield of Coconut in Kerala

#### Appendix 6.1: Analysis of Area, Production and Yield of Coconut in Kerala for Total Period

Variables	Area	Production	Yield
t	0.0075*** (0.0007)	0.0185*** (0.0026)	0.0071*** (0.0006)
t <sup>2</sup>	-0.023*** (0.0374)	0.072* (0.3827)	0.053*** (0.2120)
Constant	6.4963*** (0.0260)	7.8390*** (0.0992)	8.3082*** (0.0213)
Observations	57	57	57
R-squared	0.7623	0.4861	0.8760

**Appendix 6.2: Analysis of Area, Production and Yield of Coconut in Kerala  
During Pre-Globalisation 1**

Variables	Area	Production	Yield
t	0.0329*** (0.0015)	0.0739** (0.0282)	-0.0164*** (0.0016)
t <sup>2</sup>	-0.043 (0.2680)	-0.085** (8.9701)	0.073 (2.2538)
Constant	6.2048*** (0.0157)	7.7709*** (0.2910)	8.7707*** (0.0160)
Observations	15	15	15
R-squared	0.9754	0.5162	0.9034

**Appendix 6.3: Analysis of Area, Production and Yield of Coconut in Kerala  
During Pre-Globalisation 2**

Variables	Area	Production	Yield
t	0.0158*** (0.0014)	0.0251*** (0.0030)	0.0087*** (0.0026)
t <sup>2</sup>	0.0014*** (0.0003)	0.0034*** (0.0006)	0.0020*** (0.0005)
Constant	6.3993*** (0.0172)	7.8220*** (0.0379)	8.3344*** (0.0325)
Observations	20	20	20
R-squared	0.9196	0.8810	0.6689

**Appendix 6.4: Analysis of Area, Production and Yield of Coconut in Kerala During Post-Globalisation**

Variables	Area	Production	Yield
t	-0.0142*** (0.0011)	0.0065** (0.0030)	0.0215*** (0.0020)
t <sup>2</sup>	0.002 (0.0002)	0.097 (0.0005)	0.076** (0.0004)
Constant	6.9118*** (0.0146)	8.5770*** (0.0418)	8.5652*** (0.0284)
Observations	22	22	22
R-squared	0.9058	0.2916	0.8678

**7 Area, Production and Yield of Rubber in Kerala**

**Appendix 7.1: Analysis of Area, Production and Yield of Rubber in Kerala for Total Period**

Variables	Area	Production	Yield
t	0.0299*** (0.0007)	0.0597*** (0.0014)	0.0298*** (0.0008)
t <sup>2</sup>	-0.0161*** (0.0000)	-0.0115*** (0.0001)	-0.0124*** (0.0001)
Constant	11.6075*** (0.0263)	10.8574*** (0.0549)	6.1575*** (0.0322)
Observations	57	57	57
R-squared	0.9741	0.9712	0.9602



**Appendix 7.2: Analysis of Area, Production and Yield of Rubber in Kerala During Pre-Globalisation 1**

Variables	Area	Production	Yield
t	0.0622*** (0.0024)	0.1250*** (0.0019)	0.0629*** (0.0026)
t <sup>2</sup>	-0.0253*** (0.0006)	-0.0292*** (0.0005)	-0.0112 (0.0007)
Constant	11.1591*** (0.0248)	9.9974*** (0.0191)	5.7451*** (0.0272)
Observations	15	15	15
R-squared	0.9828	0.9974	0.9794

**7.3 Analysis of Area, Production and Yield of Rubber in Kerala During Pre-Globalisation 2**

Variables	Area	Production	Yield
t	0.0357*** (0.0016)	0.0650*** (0.0016)	0.0293*** (0.0013)
t <sup>2</sup>	0.0176*** (0.0003)	0.0236*** (0.0003)	0.0118*** (0.0002)
Constant	11.8635*** (0.0198)	11.4142*** (0.0204)	6.4579*** (0.0161)
Observations	20	20	20
R-squared	0.9733	0.9915	0.9753

**Appendix 7.4: Analysis of Area, Production and Yield of Rubber in Kerala During Post-Globalisation**

Variables	Area	Production	Yield
t	0.0045** (0.0017)	0.0112*** (0.0035)	0.0067*** (0.0019)
t <sup>2</sup>	-0.0144*** (0.0003)	-0.0114*** (0.0006)	-0.0112*** (0.0003)
Constant	12.8465*** (0.0241)	13.3805*** (0.0480)	7.4417*** (0.0270)
Observations	22	22	22
R-squared	0.7029	0.7188	0.6863

**8 Area, Production and Yield of Pepper in Kerala**

**Appendix 8.1: Analysis of Area, Production and Yield of Pepper in Kerala for Total Period**

Variables	Area	Production	Yield
t	0.0077*** (0.0020)	0.0175*** (0.0022)	0.0096*** (0.0013)
t <sup>2</sup>	-0.0830*** (0.0194)	-0.0177** (0.0066)	0.0766*** (0.0265)
Constant	4.8389*** (0.0752)	3.1867*** (0.0840)	5.2731*** (0.0490)
Observations	57	57	57
R-squared	0.4210	0.5688	0.5285

**Appendix 8.2: Analysis of Area, Production and Yield of Pepper in Kerala  
During Pre-Globalisation 1**

Variables	Area	Production	Yield
t	0.0159*** (0.0026)	0.0042 (0.0031)	-0.0111*** (0.0014)
t <sup>2</sup>	0.0124 (0.0007)	0.0158*** (0.0008)	0.0148*** (0.0004)
Constant	4.5171*** (0.0266)	3.0504*** (0.0316)	5.4350*** (0.0142)
Observations	15	15	15
R-squared	0.7745	0.7755	0.9402

**Appendix 8.3: Analysis of Area, Production and Yield of Pepper in Kerala  
During Pre-Globalisation 2**

Variables	Area	Production	Yield
t	0.0346*** (0.0027)	0.0483*** (0.0072)	0.0117** (0.0054)
t <sup>2</sup>	0.0215*** (0.0005)	0.0297** (0.0014)	0.0159 (0.0010)
Constant	4.4406*** (0.0339)	2.8972*** (0.0907)	5.3996*** (0.0681)
Observations	20	20	20
R-squared	0.9244	0.7692	0.2732

**Appendix 8.4: Analysis of Area, Production and Yield of Pepper in Kerala  
During Post-Globalisation**

Variables	Area	Production	Yield
t	-0.0406*** (0.0057)	-0.0266*** (0.0068)	0.0140* (0.0069)
t <sup>2</sup>	-0.0153*** (0.0010)	-0.0136** (0.0012)	0.0123* (0.0012)
Constant	5.7250*** (0.0788)	4.3418*** (0.0948)	5.5246*** (0.0963)
Observations	22	22	22
R-squared	0.8344	0.5761	0.5255

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## LIST OF PUBLICATIONS

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5. K Subhash , M Meera Bai “Women Entrepreneurs in Fruit and Vegetable processing Industry in Kerala, Journal of Women Empowerment and Technology ,Vol 4 No.3 ISS 2394-4420, January-june 2017.
6. K Subhash , M Meera Bai “Biotechnological Intervention for enhancing the Health status of tribal women in Wayanad, Kerala”, Indian Journal of social development, Serial Publication New Delhi, Vol. 6 No 2 ISSN 0972-3692. June-December 2011.





K. Subhash

# Agrarian Distress and Changing Rural Livelihoods in Kerala

A Case of Wayanad District



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## **CLIMATE CHANGE IMPACT SHARING: AN INTERNATIONAL EQUITY DEBATE**

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### **Abstract**

*Global warming and climate change are the buzz word in this era of globalization. When development progresses at the cost of poor nations, conservation and management of environment resources are at risk. The present study argues that since major contributors of climate change are developed countries and the consequences are to be met by everyone, especially the poorer nations who are the worst victims of the climate change impacts, greater share of responsibility like emission reduction, compensation, technology transfer should be shouldered by developed nations, as underdeveloped and developing countries still need to move more.*

***Key Words: GHG Mitigation; Climate Change Impacts; Equity***

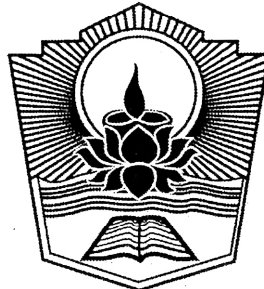
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