Performance of Commercial Crops in Kerala:

A Study of Black Pepper with Focus on Non Price Factors

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Dissertation submitted in partial fulfillment of the requirements for the award of the degree of Master of Philosophy in Economics of the Jawaharlal Nehru University

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MPhil Programme in Applied Economics
2010-2012

CENTRE FOR DEVELOPMENT STUDIES
Trivandrum
June, 2012

I hereby affirm that the work for this Thesis, Performance of Commercial Crops in Kerala: A Study of Black Pepper with Focus on Non Price Factors, being submitted as part of the requirements for award of the degree of Master of Philosophy in Applied Economics of the Jawaharlal Nehru University, was carried out entirely by myself. I also affirm that it was not part of any other programme of study and has not been submitted to any other University for the award of any Degree.

June 2012 Sajitha A

Certified that this study is the bona fide work of Sajitha A, carried out under our supervision at the Centre for Development Studies

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To

All Black Pepper Growers in Kerala

Acknowledgements

The first and most important mention of gratitude must undoubtedly go to my Supervisor Prof. K J Joseph, who guided me throughout this dissertation. Without any rethinking or exaggeration, I can say thanks to Prof. K J Joseph's timely support and help in many of the troubled moments that I have had to face with regard to this study.

I must thank Prof. D Narayana at this point for his valuable comments throughout my dissertation. His pragmatic guidance and support for analyzing secondary data and molding the entire story of the dissertation in this current form is immense. At this moment I sincerely express my gratitude to Narayana sir for his timely help and fruitful discussions.

I am taking this opportunity to say my gratefulness to Prof. Pulapre Balakrishnan, Dr.Vijayamohanan Pillai, Prof. Navaneetham, Dr. Anup Kumar Bhadari, Dr.M. Parameswaran, Prof. Sunil Mani, Dr. Vinoj Abraham, Dr. U S Mishra, Prof. Irudhiya Rajan, Prof. K P Kannan, Prof. A V Jose, Dr. Narayanan Nair, Dr. Chinnappa Gasper, Dr. Aparna Nair, Dr. J Devika, Dr. Praveena Kodoth for their productive classes during Mphil coursework. Moreover I would like to acknowledge Prof. Vasanth Sukathme for his insightful lectures on micro economics and Dr. Nagaraj for Industry classes. I sincerely express my gratitude to all staff at CDS administration, library, and computer centre for their immense help towards me during the last two years. Moreover, it's my great pleasure to say thankfulness to cafeteria staff, especially Reji chechi, for her friendly relationship towards all of us. Saying thanks for all the security chettanmars, and other non official staff at CDS.

Friendship needs no words…

It is a difficult task for me to say thanks to all my dear friends for their lovely support and care given to me during the last two years. Without mentioning about them this acknowledge would be incomplete

First and foremost I undoubtedly thank my dearest P. Kavitha, who was with me in each and every moment of joy n sorrow… though she is a good singer, I made her to think the other way round. This made her to refuse all the opportunities that she got in various occasions to sing (thank god ..). I don't know how to express my friendship towards her.. I can say.. it is Beyond the Words'. The next person whom I want to mention here is Rajeev, who supported me a lot to make the dissertation in this final form. His brotherly advices

and comments on my work helped me to improve the quality.

Nutan, the one who taught me lots of lessons in my life. It helped me to mould my character in a good way…Needless to say, I enjoyed all those cherished moments which I had spent with her. I am saying thanks to Santosh for his friendly help and support towards me throughout the last two years.

I would like to thank Mariamma, Chinju, Saritha, Amritha, Silpa and Raisa for their love, care, help and affection towards me throughout the period of study. Alongside, I am indebted to Soumi, Nikitha, Deepak, Pinak (will never forget his wonderful lectures on 'Open the Social Sciences), Izu, Sameer, Siam, Raju, Rahul and Amit for their friendship.

I need to say thanks to all Phd friends, especially Kiran, Subbu annan, Krishna, Uma, Atish, Sanjay, Vachaspathi, Sravanthi, Bibu, Suparna, Anirban, Imran, Janat, Valathee, Vijay , Rikil, Nirmal ettan, Suma Chechi and Sandhya chechi for thieir friendship.

I must say tonnes of thanks to Neethi chechi, Gini chechi, Shyno and Anoop for their support throughout the dissertation.

I need to acknowledge my NRPPD friends- especially Richika, Shivani, Priyanka, Anil Kuruvila, Siju, Christabel, Anitha mam and also officers at Spices Board Cochin, Idukki (Ranjith, Haripriya, Sholi, Joby) Calicut and Wayanad and Krishi Bhavan Officers at Wayanad for their support towards to me during the last year. Moreover saying thanks to all the respondents at Idukki and Wayanad for providing information to me without any hesitation.

I am extremely thankful to my Amma, Ettan, chechi, Raju ettan and Achamma for their constant support and help. Above all, memories of my own beloved Achan who used to encourage me a lot when he was in this world. His memories are still giving me the strength for facing all kinds of troubles and problems with a smile on my face. Most of all, blessings of Lord Shiva helped me to go through the innumerable crisis over the last two years.

Needless to say, I am solely responsible for all the errors that remain.

Sajitha A

Abstract of the Dissertation

Performance of Commercial Crops in Kerala: A Study of Black Pepper with Focus on Non Price Factors

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2010-12

It is often argued that the performance of agricultural sector is influenced by number factors- both price and non-price. In a context wherein the markets are getting integrated, the role of non price factors appears to assume more significance. Studies on Kerala agriculture have shown that, driven by different factors, the cropping pattern in Kerala has undergone major changes which inter alia included a shift away from food crops to commercial crops. The key question however arises here whether all the commercial crops have been experiencing up upward trend? Are there differences across crops and over time? If there are observed differences between different commercial crops how to account for the same? In this context, the present undertakes an analysis of the performance of commercial crops in Kerala with focus on Black pepper.

The study is based on both primary and secondary data. Secondary data is collected from various government sources to realize the objective at macro level. To understand the regional pattern in the observed trend, the state is divided into three regions- southern, central and northern. Further, analysis has been carried out for the period of last fifty years: that is, 1960-61 to 2009-10. To explore the bearing of non-price factors, primary data has been collected by using a structured interview schedule. The study covered a sample of 180 households which spread across two districts; namely, Idukki and Wayanad; in the state. Both qualitative and quantitative information has been gathered during the field survey.

Analysis of the performance of commercial crops has shown that until 2000, area under most of the commercial crops registered an upward trend. But after 2000, while certain crops (such as rubber and arecanut) continued its upward trend in area, crops such as black pepper, coconut experienced an absolute decline in area (negative growth) under cultivation. Among the crops that recorded decline in area, the highest decline was observed in case of black pepper. Detailed analysis of Black pepper has shown that the decline in the performance of black pepper (in terms of area, production and productivity at state level) has been contributed mainly by the northern region of the state. The study also found that there is no regional difference in the price of black pepper in different markets in the state. Thus, it paves the way to explore the role of non price factors in general and institutions in particular. Our exploration of this issue suggests that failure of institutional support at proper time and lack of coordination among agencies concerned lead the growers to move away from black pepper to other commercial crops. The study observed that Wayanad is more prone to risk in terms of pest attack and climatic disorder as compared to Idukki. Drawing from its findings, the study calls for more intense institutional intervention and highlights the need for better coordination among various agencies to provide the extension services and support at proper time to the pepper growers.

Index of the Chapters

Detailed Index

LIST OF TABLES

List of Figures

CHAPTER 1

INTRODUCTION

The Context

Kerala's development over the last fifty years suggests that it has been experiencing a dual pattern of development[1] at both economic and social fronts (Prakash & Prabhakaran, 2008; Oommen, 2008, Tharakan, 2006; Subramanian, 2006; Kannan, 2005; HDR, 2005; Jeromi, 2005; Ahluwalia, 2002; Tharamangalam, 1998; among others). While the real sectors like agriculture and industry remained sluggish with low productivity levels, the service sector achieved rapid progress (Prakash & Prabhakaran, 2008). This development experience of the state questions a widely held paradigm that first agriculture sector and then industrial sector have to develop in order to improve the living standards of the masses (Issac & Tharakan, 1995). The importance of agriculture in the state's economy has been coming down steadily both in terms of its contribution to State Domestic Product (SDP) and employment from 22 per cent and 37 per cent respectively in 2004-05 to 11.5 per cent and 30 per cent in 2008-09 (Kannan, 2011).

One of the characteristic features of Kerala's agriculture sector is its commercialisation which has had a long history in Kerala economy (Raj, 1985). Several studies on agrarian economy of the state highlighted that, the performance of agricultural sector is influenced by a number factors which could be broadly *clubbed in terms of* price and non-price which in turn resulted in a shift in the cropping pattern away from food crops to commercial crops (Mukhtar *et al*., 1987; Kannan & Pushpangadan 1990; Edison, 1992; Rao & Jeromi, 2000; Singh *et al*., 2002;

[1] Higher human development in terms of high literacy, women's education which equals or even surpasses men's, ideal limited families, lowest child mortality and highest life expectancy rates, coupled with lower percapita income is referred as a paradox of social development and economic backwardness (HDR, 2005)

Golait, 2007; Balakrishnan *et al.,* 2008; UNCTAD, 2010; Giroh, 2010; Kannan, 2011; Viswanathan, 2012; among others). Given this background, in order to understand the scope and potential for sustaining the sources of productivity growth in agriculture, an analysis of the price and non-price factors is in order. In a context wherein by the markets are getting integrated, the role of non price factors appears to assume more significance. Against this back ground, the present study undertakes an analysis of the performance of commercial crops by taking the case of black pepper to understand the role of non price factors in Kerala.

II. Review of Literature

There are a number of studies that have attempted to examine the performance of commercial crops in Kerala under different contexts (George et al., 1989; Kannan and Pushpangadan, 1990; George, 2005; Joseph &Joseph, 2005 among others). While some of these studies analysed the performance of commercial crops in a comparative perspective others focussed on individual crops. However there are differences in the role of factors responsible for the performance of agriculture sector in general and commercial crops in particular. A brief review of available studies regarding the factors has been presented in two sections. First section identifies those studies which supports price as an important factor in the agriculture. In contrary to this, some studies argued the domination of non price factors over price factors behind the performance of agriculture sector.

An examination of trends in area, production, productivity and price behaviour of cardamom cultivation in Kerala by Varghese (2004) revealed that price has played an important role in determining the decision making of cultivators/planters. Another study by Rathod *et al.,* (1978) examined the impact of price on area, production, yield and employment of labour of tea in India for the period of 1953-73. The study revealed that tea planters respond to price was not in terms of acreage but in terms of yield enhancing efforts.

Several studies examined the role of price in the context of shift in cropping pattern. Few of such studies (Ipe & Prabhakaran (1988), Gopinathan &Sundaresan (1990), Unni (1993) and Singh *et al*., (2004) are discussed here.

Ipe & Prabhakaran (1988) examined the price response of Indian natural rubber for the time period of 1953-54 to 1983-84. The study found that increasing prices and yield of natural rubber, fall in the productivity of the competing crop-coconut, pests attacks and diseases and the subsidy scheme for planting rubber have accelerated new plantings and substitution of coconut by rubber. A survey of 5700 households in Thiruvananthapuram and Malappuram districts of Kerala by Gopinathan & Sundarasan (1990) reveals that unprofitable nature of rice cultivation and unfavourable price change of rice compared to other crops led to the decline in the area under cultivation of rice in Kerala. Unni (1993) examined the factors responsible for the shift from rice to coconut cultivation in Kerala during 1960s and 1970s and found that increase in the price level of coconut induce the farmers to shift their cultivation from rice to coconut. Similarly Singh *et al*., (2002) found the importance of price in the production decision of the growers. Role of price in the choice of crop under cultivation and decisions regarding acreage expansion is proved in the case of other crops. In the same way, Gurikar (2007) also found that onion farmers in Karnataka were more responsive to the price factor compared to non-price especially irrigation and rainfall variables.

However, though price has played a role to change the cropping pattern, improving the yield level of crops and changing the production decision of farmers, several studies highlighted the importance of non price factors in the agriculture activity (Madhavan, 1972; Kannan & Pushpangadan, 1988, 1990; Sawant & Achuthan, 1995; Dhindsa & Sharma, 1997; Kanwar, 2004; Gurikar, 2007; UNCTAD, 2010, Giroh, 2010). In general, the vagaries of climatic factors and incidence of pests and diseases will adversely affect the agricultural production in the short-run and the technological advancements cause long-run supply changes. In what follows we shall highlight the findings of different studies on these supply response factors.

Madhavan (1972) estimated the acreage as well as yield response to prices for different cereals and cash crops in Tamil Nadu using Nerlovian lagged adjustment model. The results indicated that the cereal crops responded to variation in yield, while the cash crops were more responsive to variations in prices. Acreage elasticities of commercial crops were higher and hence he suggested the positive price policy to influence the cash crops' acreage and there by production. However, the limited supply of land makes it difficult to increase the acreage in response to price increase and hence the need for increasing the output through increasing the yield rather than the acreage. Similarly study by Deshpande (1994) on supply response of chilli in Karnataka State for the period 1969-70 to 1990-91 also concluded that the increase in the total output of chilli in the state was the result of shifting land from other crops rather than by increasing the yield of the crop. But Sawant & Achuthan (1995) found the importance of yield improvement combined with favourable weather to induce higher growth in output of agriculture than area under cultivation. However, Dhindsa & Sharma (1997) examined the growth behaviour and factors influencing the supply of various pulse crops in Punjab for the time period of 1966-67 to 1991-92. The study found that negative growth in the production of pulses can be mainly attributed to a decline in area and stagnancy in the yield of various pulse crops.

There are numerous studies which discussed the role of other non price factors such as credit, insurance, weather, irrigation, policies made by government, rainfall, public investment, and role of private agencies, use of HYVs, chemical fertilizers and pesticides, R&D and extension services in the agriculture. Some studies are discussed below.

One of the important non price factors in agriculture is the credit (Golait, 2007). Alongside, others viewed that there is a need of some preferred policies to enhance irrigation and encourage the use of fertiliser and HYVs (Kanwar 2004). Moreover, his study found that rainfall appears to be the single most important factor determining area response, and the second most important factor determining yield response. In tune with this study, Jeromi and Rao (2000) also viewed that

development strategy and policies, particularly those focused on agriculture and rural areas, would be a critical factor influencing the agricultural scenario as it actually unfolds in the decades to come. In the same way, Thamarajakshi (1999) argued that though agriculture is basically a private activity in India, the public investment made by government is crucial for creating infrastructure in terms of irrigation, roads, markets, storage facilities, rural electrification and technology development, besides education and health. However, UNCTAD (2010) also stresses the importance of high yielding varieties of seeds, the use of chemical fertilizers and pesticides, irrigation and improved planting and weeding practices to ensure higher yields from the farm land. Similarly, the supply response analysis of pulse crops revealed that the non price factors variables such as irrigation, technological improvements (yield increase), extension of services and marketing facilities rather than price variables were significant in determining the area response of various pulse crops in the state and various sub regions therein (Dhindsa & Sharma, 1997).

While reviewing the agriculture stagnation in Kerala since the mid- seventies, Kannan & Pushpangadan (1988) observed that ill-conceived development of critical factors such as water management and land development are the major factors responsible for the stagnation. As a remedial measure, Kannan & Pushpangadan (1990) suggested that, given the intensity of land-use, cropping pattern, abolition of intermediation through land reforms, existence of a network of agricultural research, extension and credit services and higher level of education among the farming community and their receptiveness to new ideas has its own importance to break out of stagnation.

One of the another important non price factors found in literature is research and extension (Raina, 1992; Giroh, 2010; Joseph *et al.,* 2010; Birthal *et al .,* 2011; among others). The magnitude and direction of the agricultural growth is influenced by the research conducted by the research organisations (Raina, 1992). According to Birthal et, al (2011), agriculture could influence the process of economic growth through its potential to stabilise domestic food production and enhance food

security. The neglect of agriculture can lead to political and economic instability which in turn can reduce the level and efficiency of investment. So the investment in agriculture research and extension is considered to be the main source for the growth of agricultural total factor productivity and to speed up the process of overall economic activity. Like research, extensions of those services to the farmers are also important to increase the productivity. According to World Bank, the term agricultural extension means the process of helping farmers to become aware of and to adopt improved technology from any source to enhance their production efficiency, income and welfare. In the real world, studies discussed that the extension services in agriculture are facing problems. One such study by Giroh (2010) points outs the problem with extension activities in the real world situation. He argued that research institutes have developed various technologies for the improvement of crop production with the expectation that farmers can adopt these technologies and be able to increase the yields. But in the real situation there exists a gap between the yield that farmers get on their farms and the yields obtained by researchers in their stations. This is mainly because of the problem with the extension system. i.e, accuracy of the information will be reduced as information passes through the communication chain of research subject matter specialist extension contact farmers. In the case of natural rubber and cardamom, Joseph and George, (2010) examined the efficiency of Research and Development and Extension purpose. The study found that, though natural rubber has only one research institute for R&D and Extension purpose as compared to cardamom which has multiple actors involved in R&D and Extension, natural rubber is performing in a much better level than cardamom in area, production and yield.

From the above discussion, it is apparent that the supply response of Indian agriculture is influenced by the price, weather, input availability (specifically irrigation, and possibly fertiliser and HYVs), research and extension, in that order.

In the light of above discussion, it is evident that the role of price and non price factors is important for the overall growth of agricultural sector. Therefore, in the context of Kerala where shift has been taken palace in favour of commercial crops,

one pertinent question arises- how to account the role of price and non price factors? Few studies had discussed the role of price behind the existing cropping pattern in the state. Hardly any study we had come across which discussed the role of non price factors in the performance of commercial crops in Kerala. In this study we have also attempted to capture the regional variations in the performance of commercial crops.

III. Objectives of the study

1. To understand the performance of commercial crops in Kerala
2. Analyse the trends in area, production, productivity and price of black pepper in the state with a regional perspective
3. Explore the role of non price factors (especially the institutional arrangements) that influence the cultivation of black pepper.

IV. Analytical Framework

Economic theory rests on and takes as its starting point the assumption that each economic subject tries to maximise his own individual gain, that profit motivation governs the behaviour of producers. Generally in agriculture, the biological nature of the production process makes for a considerable lag between production inputs and outputs which vary from one crop to another. In this situation, the allocation decision of the farmers regarding available limited land resources under various crops which can be seasonal, annual or perennial will have a long-term implication on the income of the farmer. Analytically, it can be governed by a number of factors which may be broadly categorized as those related to market and prices, institutional arrangements and finally the agro climatic conditions. Government investment in infrastructure, research and extension, price and other policies along with strategies for crop, livestock and fisheries production have significantly helped to increase food production and its availability.

In the context where agro- climatic conditions exogenous we are left with the first two set of factors. The factors relating to market and prices include the competitive environment in which the products are marketed and the ultimate price that that the producers receive in the consumers' price. To be more specific, if the market is not competitive and the share of producer in the consumer rupee is negligible leading to unremunerative prices, the farmers may not be induced to allocate more area under such crops. In a sense, the market and prices is governed by the institutional context that involve the processing and post harvesting facilities available to the farmers, regulatory environment and other support infrastructure in the form of research and extension that the farmers need. Thus viewed one could argue that both market and non market forces are highly intertwined. Moreover these factors do vary across different crops. Hence a proper understanding of the factors influencing the performance of agriculture in general would call for detailed analysis of both market (price) and non market (institutional) factors by taking the case of specific crops. The present study has to be seen in this context.

The allocation of any factor of production like land, needless to say, is governed by the perceived return from the investment. This return in turn depends upon price, yield (production/ha) and cost of production and other physical factors. Assuming that the physical factors are constant then we are left with the first three factors. The price of commodities like black pepper, as studies has shown, in the globalised world is determined in the world market and gets transmitted to the local market as they are highly integrated today. Nonetheless the actual farm gate price could be governed also by the farmers. If the markets are not competitive and exploitative, one could visualize a situation where high traders margin where in the share of producers' in consumer rupee is negligible. To the extent that marketing environment is influenced to a great extent by the institutional arrangement for marketing including the policies of the state. It could be argued that institutional factors do play a role in the price. The role of institutional factors becomes more important when it comes to yield and cost of production. In case of yield studies have shown the role of farmers' access to HYVs. Though there are

some instances where HYVs were developed by the farmers themselves, the development of HYV in or country has mostly being done by research institutions promoted by the state and its different agencies. Thus viewed the role of institutional factors in governing the yield of a particular crop is evident when it comes to cost of cultivation, while the price factors in the form of cost of fertilizers and pesticides are important in our country the price of such factors also governed by the state policy. On the whole, despite the withdrawal of the state, one could argue that institutional factors do play an important role in influencing the farmers' decision regarding the allocation of resources.

V. Methodology and Data

The study is based on both primary and secondary data. Secondary data is collected from various government sources to realize the objective at macro level. To examine the cropping pattern and the performance of important commercial crops in Kerala, the study has been using state level time series data on area, production and productivity crops in Kerala from 1980-81 to 2009-10. The study chose 7 important commercial crops such as coconut, rubber, cardamom, pepper, areca nut, tea and coffee which constitute nearly 90 per cent of NSA of the state to examine the performance of commercial crops in the state.

To understand the regional pattern in the observed trend, the state is divided into three regions- southern, central and northern. Further, analysis has been carried out for the period of last fifty years: that is, 1960-61 to 2009-10. Primary data has been collected by using a structured interview schedule. The study covered a sample of 180 households spread across two districts; namely, Idukki and Wayanad; in the state. Both qualitative and quantitative information has been gathered to the purpose of the study.

The study, in addition to the descriptive statistical tools, made use of kinked exponential model to arrive at the trend break in different series and exponential

growth model to estimate the growth rates[2]. To examine the contribution of area and yield to output, the study used the conventional decomposition analysis. To explore the regional variation among black pepper prices across different markets-Cochin and Calicut, cointegration method has been employed. The study also used simple percentages to fulfil the objectives of the study.

VI. Chapter scheme

The first chapter begin with a brief introduction of agricultural sector in Kerala followed by a critical review of selected studies in the field of agriculture sector in general and commercial crops in particular. The research gaps found from the existing studies show the way to set objectives for the study. A conceptual framework has been set in order to carry out the study into next step systematically. This chapter also provided the details regarding methodology and data sources used for the analysis of the study followed by providing the limitations of the study.

In the due course of our analysis of secondary data, we found a number of limitations with the existing data provided by the agencies concerned. In this setting, the second chapter presents a critical evaluation of the different secondary databases currently available on agricultural sector in Kerala and more specifically the commercial crops.

The third chapter examines the performance of commercial crops in Kerala to identify the distinct performance of black pepper vis a vis other crops in the agrarian economy of the state. The distinct performance of black pepper has laid the background for exploring in detail of the regional variations of this particular crop in the state.

The fourth chapter explores inter regional variations of black pepper within the state to find out the nature and pattern of regional differences in the performance of pepper in Kerala. Inter-regional variation in terms of area, production and yield across the three regions during the last five decades found that the declining

[2] Details are given in Chapter 3

performance of black pepper in Kerala in the recent past could be attributed mostly to the poor performance of the northern region. Regional variations observed in the state induced us to explore the role of underlying factors - both price and non price.

The fifth chapter has made an attempt to explore the role of price and non price factors especially institutional arrangements in the case of black pepper across regions. The study found that there is no regional variation in the observed price across regions indicating the role of non-price factors in explaining the inter-regional variation in performance. The role of non-price factors has been examined with the help of a primary survey in two leading black pepper growing districts - Idukki (Central) and Wayanad (north) - and consultation with different stakeholders. The final chapter brings together the major findings of the study and highlights some questions for further research.

Chapter 2

Database on Commercial Crops in Kerala: A Critical Appraisal

I. Introduction

In agrarian economies like India in general and Kerala in particular, agriculture holds an important role in the process of economic development. Accordingly, the development of the agricultural sector is a major concern of government in such economies. Formulation of informed policy making rests heavily upon the availability of needed data for planning and management of this sector (Mohandas, 2002; Nair, 1983). In India though agriculture is a state subject, data collection and its dissemination is undertaken by both the Central and state governments and therefore is included in the concurrent list. This enables both Central as well as the State Governments to formulate and implement the schemes on agricultural statistics[3] to meet the respective needs of planning and decision making.

Information related to crop area and production is important for planning and allocation of resources for the development of agriculture sector. No realistic targets for production of various crops can be fixed in the absence of reliable statistics about the area and yield. Even a proper evaluation of the various developmental programmes taken in this direction is not possible in the absence of reliable statistics. Therefore agricultural statistics has its own importance in the economy. In this setting, this chapter aims at critically examining the existing database on commercial crops in Kerala.

[3] Statistics related to agriculture covers various topics such as agriculture population, rainfall, land holdings, land use pattern, area under crops, production and productivity, irrigation, prices of agriculture commodities, agriculture wages, implements and so on (Nair, 1983).

This chapter is organised as follows, including the introduction. The second section presents the existing data sources in agriculture sector of the state. Also the methods used by various agencies for estimating land use pattern, area, production and productivity of major crops in Kerala is discussed in this section. Section three presents various methodological issues encountered in the existing databases followed by concluding section.

II. Data Collection System in Kerala

The subject of agricultural statistics revolves around crop level statistics on area, production and yield and other related parameters. Since agriculture is a land based economic activity, the Land Use Statistics (LUS) has a primacy in the agricultural statistics and crop area statistics is the major segment of LUS. However, the data base on land use is highly inadequate and it is only to be expected that the policies for conservation and optimum use of land resources would be handicapped (Rao & Jeromi, 2000).

In India, there are two different systems that have been followed to collect statistics with respect to area: reporting and non reporting system. Kerala, along with Orissa and West Bengal, follows the non reporting system. Under this system, the collection of area statistics is mainly through conducting sample surveys due to non availability of separate agencies in these states (Nair, 1983). However, there are two types of official sources, which are involved in the collection of agricultural statistics in Kerala- Directorate of Economics & Statistics (hereafter DES), Government of Kerala and Commodity Boards[4]. The present structure of agricultural database of Kerala is presented in Table 2.1.

[4] DES, established in 1954, is responsible for the collection and compilation of agricultural statistics pertaining to land utilization, rainfall, weather and crop conditions, acreages of all crops (other than plantation crops) and data on, forestry, livestock, market arrivals, prices, costs and other related factors. In case of plantations, the data is collected by Commodity Boards concerned under the central government.

Table 2.1: Source of Agricultural Data[5]

Sl No	Institution/ Department involved in data collection	Type of data Collected
1	Directorate of Economics and Statistics, Ministry of Agriculture	State and district level data on • Land utilisation pattern • Area, production and productivity of major and minor crops cultivated in the country.
2	Department of Economics and Statistics, Kerala	Data on state and district wise of • Land utilisation pattern • Area and production of important crops not covered by commodity boards • Rain fall data • Average farm wholesale prices of important crops • Cost of cultivation • District income of major agricultural crops
3	Commodity Boards (Coffee, Tea, Rubber and Spices)	Area production and productivity of these crops and related data.

Table 2.1 shows the present pattern of agricultural data base in brief. While data on some of the aspects like area production and productivity are available from more than one source, there is hardly any data available on investment, research extension services and other related issues which are immensely important for informed policy making. At present, some of the agricultural crops are cultivated in the land occupied by forest, by encroachment or otherwise. But details of these are not included at present in the annual estimates of area under crops and production (Nair, 1983).

[5] Here we included only those data sources which are used for the present study.

The table further reveals the engagement of multiplicity of actors in the process of data collection and compilation. Some studies have already pointed out that the involvement of multiple agencies in data collection and compilation resulted in non comparability of data due to differences in the method employed, reference period that they have used and the coverage of area (Mohandas, 2005). In this setting, it would be meaningful to make a detailed examination of data collection system in Kerala by different agencies and explore the limitations in the existing data sources. The procedure adopted in the collection of data by these government agencies, especially for the state of Kerala, is discussed in detail, in the next section.

Area Statistics

Area Statistics covers the statistics on the utilization of land under different purposes. DES has sponsored the Establishment of an Agency for Reporting Agricultural Statistics (EARAS) to conduct Area Enumeration Survey which was implemented in Kerala from 1975-76 onwards. Under this, the complete enumeration of all the fields (survey numbers) is conducted every year in a random sample of 20 per cent of villages of the states. In this way within 5 years, the entire state has been covered. Area statistics of most of the commercial crops comes under the purview of DES. But statistics for some commercial crops such as tea, coffee, rubber and cardamom- generally categorized as plantation crops- are collected and compiled by respective commodity boards (UPASI, 1983). However, both DES and commodity boards are engaged in the collection of crop area statistics which is considered to be the backbone of Agricultural Statistical System (CSO, 2001) of commercial crops in Kerala.

Yield Statistics

Yield Statistics is one of the important elements for the estimation of crop production statistics. In the literature, various methods[6] have been discussed for the estimation of yield from the farmers' plots (Diskin, 1997). In Kerala, yield of

[6]Also see Casley & Kumar (1988) for detail explanation.

crops are collected through crop cutting experiments[7] conducted under the General Crop Estimation Survey under EARAS scheme. This experiment is conducted for six major crops namely paddy (during three seasons), tapioca, coconut, areca nut, cashew and pepper and four minor crops in rotation every year. In crop cutting method, direct physical measurement (weighing) by the enumerator of crop(s) taken from one or more selected (ideally randomly) subplots within farmers' fields harvested by or in the presence of project staff (Diskin, 1997).

Production Statistics

Generally, the DES calculates the production statistics simply by multiplying area with yield statistics. Nonetheless, different estimation procedure has been followed for plantation crops. For instance, in the case of tea, there are two main sources for production statistics- Central Excise authority[8] and UPASI[9]. For coffee, until open marketing of coffee was permitted, the coffee growers were under statutory obligation to deliver their entire crop to the Board. Similarly, rubber growers shall submit their monthly return regarding the raw rubber held, produced, acquired or disposed in certain specific forms to the Rubber Board. Nevertheless, production statistics for cardamom is based on the information regarding return of the actual crop harvested during the current season (UPASI, 1983). It should be noted that for pepper there are two types of production statistics - trade and official estimates[10].

[7] Studies such as FAO, 1982; Murphy *et al.*, 1991, recommends crop cutting as the standard method for estimating crop production, whereas studies by Casley& Kumar, 1988; Poate & Casley, 1985; Rozelle, 1991; Verma *et al.,* 1988 examined the accuracy of results provided through crop cutting surveys and concluded that measurements of yield from crop cutting surveys exhibited serious upward biases and had large variances due to heterogeneity of crop conditions within farmer plots (as cited in Diskin, 1997). Along with this the respective field staff does not strictly adhere to the prescribed procedures and thereby the survey estimates are subject to a variety of non- sampling errors. The supervisory check by ICS staff reveals a number of such lapses (http://mospi.nic.inI accessed on 20-2-2011)

[8]Under the Central Excise Rules 1944, each factory producing either black or green tea is required to submit a return in Form R.T. 3 to the Central Excise authority.

[9] It is a vested agency for collection and compilation of production statistics from all the tea estates, whether registered or unregistered with tea board through a standard form regularly for each month (UPASI, 1983)

[10] Estimation of trade includes both domestic consumption and trade; whereas, official estimation is simply the multiplication of area with yield statistics.

Needless to say, data base on agricultural and allied sectors is one of the most comprehensive databases as compared to other sectors in the economy. However the existing data estimates are not free from biases. Some of the major limitations of the data in terms of methodological issues, coverage and information gaps are discussed in the next section.

III. **Limitations of the Existing Database**

While reviewing the data on agricultural statistics, various types of discrepancies have been noted. Few of them are discussed below

Land Use Statistics

Few studies have already noticed some of the weaknesses in the present area statistics. Narayana (1990) argued that, existing agricultural statistics is not taking into account of certain structural characteristics specific to tree crops. In other words, due to long gestation period involved in the perennial crops, the method of analysis for estimating area under seasonal and annual crops would not to be appropriate for the estimation of area under perennial crops. However, it is found that similar methodology is being adopted for the estimation of area under both seasonal & annual crops and also for perennial crops. This might leads to a misleading result in an agricultural economy dominated by tree crops (Narayana, 1990). One such problem is encountered with the estimation of Net Sown Area.

According to DES, Net Sown Area[11] (NSA) represents area sown under first crop during the year. Various studies have used net sown area statistics given by DES to demonstrate the shift in cropping pattern of Kerala from food crops to commercial crops which are perennial in nature (among others, Kannan & Pushpangadan, 1988, Joseph & Joseph, 2005 and George, 2005, among others). But on a closer examination of the available estimation of net sown area, one

[11] Under this category, area sown more than once will be counted one time. In short, it is the combination of area under perennial crops, annual crops and seasonal crops which will be counted as once. Hence NSA actually shows the total area under cultivation of crops in the state

could observe the under estimation of area under annual and perennial crops in state in general and districts in particular (Table 2.2).

Table 2.2: District Wise Area under NSA and Annual and Perennial Crops for the State: 2008-09

Districts	Actual NSA (ha)	Area under Annual and Perennial Crops (ha)*	Difference (ha)
Thiruvananthapuram	135755	134712	1043
Kollam	128402	134750	-6348
Pathanamthitta	82801	88108	-5307
Alappuzha	86423	63394	23029
Kottayam	169435	193840	-24405
Idukki	208547	265870	-57323
Eranakulam	159201	155815	3386
Thrissur	129334	138787	-9453
Palakkad	197204	195224	1980
Malappuram	184157	211372	-27215
Kozhikode	155829	192847	-37018
Wayanad	115238	167734	-52496
Kannur	197304	197617	-313
Kasaragode	139325	127633	11692
Kerala	**2088955**	**2267703**	**-178748**

Source: Computed for Agricultural Statistics 2008-09, Kerala
Note: *It includes sugar crops, spices and condiments, fresh fruits, dry fruit, Tapioca, tubers, oil seeds, fibre, drugs and narcotics, Plantation crops, fodder grass, green manure crops, other crops and trees and medicinal plants.

It may be observed from Table 2.2 that the total area under annual and perennial crops to total NSA has exceeded for most of the districts in particular and Kerala in general. This finding might give us indication of under reporting of actual NSA in the state. For example, it is very high in Idukki and Wayanad where more area has been devoted to the cultivation of perennial crops. A difference of 1.79 lakh hectares has been registered for the state as a whole from actual NSA.

Table 2.3: District Wise Share of Area under Annual and Perennial Crops to Net Sown Area (in Percentages)

Districts	2006-07	2007-08	2008-09
Thiruvananthapuram	97	95	99
Kollam	112	106	105
Pathanamthitta	115	111	106
Alappuzha	91	82	73
Kottayam	118	116	114
Idukki	140	132	127
Eranakulam	107	102	98
Thrissur	112	110	107
Palakkad	99	102	99
Malappuram	123	116	115
Kozhikode	132	128	124
Wayanad	167	153	146
Kannur	112	102	100
Kasaragode	101	99	92
Kerala	**117**	**112**	**109**

Source: Computed from Various Issues of Agricultural Statistics, Kerala

It has been noted that the percentage of area under annual and perennial crops to the actual NSA has come down for all the districts during the course of time (see Table 2.3). We have not come across any rigorous studies in this regard. Here arises one pertinent question: has there any decline in the area under annual and perennial crops over the years, or an increase in NSA for showing this particular trend? This question has been taken up in detail in Chapter 3.

However, Bhalla and Singh (2010) examined the problem of double counting of area under cultivation of mixed crops. In general, the reported data refers to area and output of crops sown singly (pure crops) in a field. Some serious difficulties are encountered in the estimation of area and output of a few crops that are grown as mixed crops. Bhalla has given the example of Uttar Pradesh whereby some oilseeds like rapeseed/mustard, sesamum and castor seed, apart from being sown as pure crops, are also grown as mixed crops along with cereals. The State level estimate of area under mixed crops, rather than being allocated proportionately between the constituent crops, is actually counted in the area and output of both

the (mixed) crops. This leads to double counting. Consequently, the sum of area under all the 44 crops in Uttar Pradesh exceeds the total (gross) cropped area of the state. Similarly, agriculture in Kerala is also characterised by mixed cropping, where most of the perennial crops such as black pepper, cardamom, coffee, arecanut, and coconut and several other crops are cultivated as both mono and mixed crops. As a result, the problem of double counting is bound to have occurred in case of Kerala as well.

Another issue is related to the estimation of cropping intensity of the agricultural land. Normally, it is computed by dividing gross cropped area with net sown area to understand the efficiency of land use in crop production. A limitation of the cropping intensity estimate is that most of the crops grown in the state are perennial crops with life span of several years; Therefore, such crops occupy some area for the whole year, the cropping intensity is taken as one, whereas seasonal crops grown more than one season adds to the cropping intensity; thus, the seasonal, or annual or perennial crop concentrations would influence the estimate of cropping intensity (Sharma, 2010**)**. As a result, in state like Kerala where perennial crops occupy an important place in the cropping pattern[12], cropping intensity provided by DES often yields a misleading result.

Crop Area Estimation

As already mentioned that agrarian economy of the state is moving towards the cultivation of perennial crops such as rubber, coconut, black pepper , arecanut and other crops which have long gestation period varying from 2 to 8 years. In this situation, age wise data (yielding and non-yielding) of crops is important *say* for example, data related to pre bearing, peak bearing and over aged years of the crops according to their gestation period, which may provide us more accurate estimation on the production of the perennial crops.

[12] Elaborated in Chapter 3

Crop Production Estimation

As we have already mentioned the lack of age wise data on perennial crops with respect to production statistics, the other estimation problem is related to the mismatch between two estimates on production statistics. This problem has been encountered especially with black pepper.

Table 2.4: Production Data of Black Pepper in India

Year	Official Estimates (tonnes)	Trade estimates (tonnes)	Difference
2000-01	63,670	79,000	-15330
2001-02	61,460	80,000	-18,540
2002-03	70,000	65,000	5000
2003-04	65,000	62,000	3000

Source: Spice Statistics, 2004

Table 2.4 shows that there is a wide difference between trade and official estimates of black pepper production. Since, black pepper is a storable and non perishable commodity; growers can store their product until the time when price of the produce goes up. As a result it is very difficult to estimate current year's production and also to differentiate current year's production with previous year's production. This may lead to over reporting or under reporting of production, which make the trade estimates a biased one. Moreover, black pepper is a perennial crop with a gestation period of 3 years leads to the over reporting of production data without having enough data on bearing and non bearing stands of black pepper. This, in turn, makes the official estimate a biased one.

Crop Yield Estimation

The varied geographical and climatic conditions in the state often lead to differences in the average yield level of the crops. Crop cutting experiments have been carried out only for a sample of 20 percent of the state at one time. One of the limitations is that, the official agencies did not furnish the information regarding the sample area. This might leads to misleading yield statistics. The problems

associated with the method of crop cutting estimation have already been discussed.

Differences in Data

Three types of disparities in data have been found in the present agricultural statistical system: one, disparity between different data sources; two, disparity between various publications of same source and third, problems within the publications. A close examination of official data on agricultural related activities provided by different agencies reveals significant mismatch between the figures from different sources. The disparity in data becomes more evident when it comes to crop level.

Table 2.5 reveals that there is a mismatch in the estimation of crop wise data in terms of area, production and yield between different data sources. It may be observed from Table 2.5 that area under banana for the year 1996-97 is 73.7 thousand hectares as per DES, MoA (Directorate of Economics and Statistics, Ministry of Agriculture). But as per DES, GoK (Department of Economics and Statistics, Government of Kerala), it is 28.9 thousand hectares during the same period which recorded a difference of 44.8 thousand hectares. Similar differences are observed in case of production and yield as well. Similarly, all the crops have observed the differences in the estimation of area, production and yield upto 2000-01. The point to highlight is that the estimates using different sources prior to 2001 might show some contrasting trends pertaining to area, production and yield which in turn, leads to some perplexing conclusions and ultimately leads to differences in policy outcomes.

Table 2.5: Area, Production and Yield of different crops in Kerala from 1996-97 to 2007-08

Banana						
Year	**Area (000′ ha)**		**Production (000′ tonnes)**		**Yield (kg/ha)**	
	DES, MoA*	DES, GoK**	DES, MoA	DES, GoK	DES, MoA	DES, GoK
1996-97	73.5	28.9	610.6	403.7	8307	13990
2000-01	99.4	45.1	731.7	328	7361	7278
2005-06	61.4	61.4	491.8	491.8	8010	8010
2007-08	59.3	59.3	439.8	439.8	7417	7411
Cardamom						
Year	**Area (000′ ha)**		**Production (000′ tonnes)**		**Yield (kg/ha)**	
	DES, MoA	Spices Board, Cochin	DES, MoA	Spices Board, Cochin	DES, MoA	Spices Board, Cochin
1996-97	43.05	41.3	5.4	4.6	125	149
2000-01	41.3	41.3	7.6	7.6	184	247
2005-06	41.4	41.4	9.8	9.8	237	318
2007-08	39.8	39.8	7	7.03	176	248
Black Pepper						
Year	**Area (000′ ha)**		**Production (000′ tonnes)**		**Yield (kg/ha)**	
	DES, MoA	DES, GoK	DES, MoA	DES, GoK	DES, MoA	DES, GoK
1996-97	172.6	182.9	53.8	56.6	312	309
2000-01	202.13	202.13	60.9	60.9	301	301
2005-06	238	238	87.61	87.6	368	368
2007-08	175.7	175.7	42	42	239	239

Source: *Department of Economics and Statistics, Ministry of Agriculture
**** Department of Economics and Statistics, Government of Kerala**

Another example is given in Table 2.6. This shows the differences in data on rubber cultivation in Kerala in terms of area and production provided by DES, GoK and Rubber Board, Kottayam. The gap is very much visible for area statistics. Even, production data has also encountered mismatch in the data of two sources. Though DES, GoK has collected rubber statistics from Rubber Board, Kottayam, the mismatch observed in the estimation requires a thorough examination. The

same problem has been detected between DES, GoK and Economic Review, Kerala State Planning Board.

Table 2.6: Area, production and productivity of rubber in Kerala from 1980-81 to 2007-08

Year	Area *(ha)	Area (ha)**	Change	Production (in tonnes) *	Production (in tonnes)**	Change
1980-81	253784	237769	16015	140320	140333	-13
1981-82	269621	237769	31852	139435	139435	0
1982-83	287334	256283	31051	152662	152662	0
1983-84	303774	271200	32574	162212	162612	-400
1984-85	323303	311976	11327	172092	172092	0
1985-86	341506	330315	11191	184563	184700	-137
1986-87	356421	347814	8607	202129	202129	0
1987-88	370079	358957	11122	216562	216562	0
1988-89	383562	379666	3896	238414	238414	0
1989-90	396467	396474	-7	275397	275397	0
1990-91	407821	411615	-3794	307521	307521	0
1991-92	419174	425768	-6594	343109	343109	0
1992-93	428864	444096	-15232	368648	368648	0
1993-94	437138	437100	38	408311	408311	0
1994-95	443300	443300	0	442830	442830	0
1995-96	449000	448988	12	474555	474555	0
2000-01	474365	474364	1	579866	579866	0
2002-03	479602	476047	3555	594917	594917	0
2003-04	479602	478402	1200	655135	655134	1
2004-05	485610	480661	4949	690768	690778	-10
2005-06	493800	494400	-600	739225	739225	0
2006-07	502740	502240	500	783275	780405	2870
2007-08p	512045	512045	0	753135	753135	0

Sources: * Rubber Board, ** DES, Kerala.

On the other hand, we have come across differences in data provided by various publications from same source. Some problems within the publications are given below:

1) In Statistics for planning[13], data regarding area under arecanut is missing though, production data is given.
2) Regarding coffee production data in 2004-05 Statistics for Planning, state's production is given as 49508 tonnes under the heading of production at state level. But if we add up the district-level production, it turns out to be only 20553 (6475+2050+12028) tonnes. But it was given as 54300 tonnes under the heading of production of coffee at district level.

Other Problems

Due to differences in the formation of districts at different points of time in Kerala, it is found difficult to obtain district wise time series on agricultural statistics. Also, there have been changes in survey methodology[14] and sample size at different periods (for example, upto 1974-75, 1975-76 to 1986-87 and after wards). Moreover, the sample size is not sufficient to estimate data at lower levels (levels below Block) for major crops and upto block level for minor crops. Likewise all the minor crops are not surveyed in every year (Pillai *et al*., 2009).

IV. Summing Up

An attempt has been made in this chapter to locate different secondary data sources on commercial crops to explore the specific objectives of this study and to highlight their limitations. The major data sources reviewed here are various publications of DES, GoK, DES, MoA and publications of various commodity boards. Various issues related to the –estimation of NSA and cropping intensity of the state were found. Moreover, there is a lack of data for various categories especially the age wise distribution of crops (or yielding area) in the case of perennial crops, which lead to bias in production estimates. Moreover, there

[13] DES publication, once four years

[14] From 1975-76 onwards, Department of Economics and Statistics implemented 'Establishment of an Agency for Reporting Agricultural Statistics (EARAS)' scheme in Kerala to collect area statistics. EARAS scheme was revised in 1987-'88 with a view to prepare district level estimates with breakup for Block/ Municipality/ Corporation. Further, during 1993-'94, the Investigator Zones were re-organized by suiting the villages to Panchayats. From 2000-'01 onwards, the part panchayats were discontinued and each Investigator Zone was formed with full panchayat/ panchayats (Government of Kerala, 2009).

appears to exist certain extent of inconsistency in the data reported by different sources and different publications under same source. On the whole, over estimation, under estimation, non reporting, disparities of data on various aspects of agriculture makes the task of research on commercial crops difficult. Given the imperative of research for informed policy making the need for addressing these issues cannot be overemphasised.

Chapter 3
Performance of Commercial Crops in Kerala

I. Introduction

Agricultural sector in Kerala is somewhat unique and characterised by extreme diversity in its bio-physical resource base and agro-climatic endowments which provides opportunities for raising variety of crops (Mahesh, 1999; George, 2005). Various studies on Kerala agriculture have shown that, driven by different factors, the cropping pattern in Kerala has undergone major changes which *inter alia* included a shift away from food crops to commercial crops (Kannan & Pushpangadan, 1990; Joseph & Joseph, 2005; George, 2005; Kannan, 2011; Viswanathan, 2012). In the context of the central issue being addressed in the present study, that is, the performance black pepper in Kerala, the key question here is; whether or not all the commercial crops have been experiencing upward trend? Is there any differences observed between the performance of commercial crops in terms of area, production and yield in the state? If there are observed differences between different commercial crops, then how to account for the same? In this setting, this chapter seek to examine the performance of commercial crops in Kerala during the last three decades (1980-81 to 2009-10), by keeping all the discrepancies in the existing agricultural data especially related to Net Sown Area (NSA), aside with a view to present the forth coming analysis of black pepper in a perspective.

The reminder of the chapter is as follows. Second section seeks to examine land use and the cropping pattern of the state from 1980-81 to 2009-10. Examination of land utilisation of the state revealed that total cropped area of the state experienced a decline after 2000. Similarly, cropping pattern of the state observed a shift from traditionally cultivated food crops to high valued commercial crops such as coconut, rubber, arecanut, black pepper and several other crops. There is a general consensus that area under commercial crops has registered an upward trend. But this study found a divergent performance of commercial crops in

Kerala agriculture, which is clearly discussed in section three. Section four analysed the growth rates of commercial crops in the state during the last three decades. The last section summarises the main findings.

II. Land Use and Cropping Pattern

Agriculture scenario of Kerala has witnessed unique and distinct characteristics in the utilisation of land for different purposes. The equatorial moist climatic conditions in the state provide most salubrious environment for the cultivation of tea, coffee, coconut, rubber, cashew, pepper, cardamom etc. Nevertheless, the extent and degree of usefulness of land for different purposes is determined by the differences in the physical factors like topography, climate and soil all over the state. Other factors like density of population, social and economic institutions and the availability of technical knowhow also determine the extent to which physical capabilities of land are utilised.

Keeping in mind the limitations involved in the estimation procedure of land use statistics in the state as discussed in the previous chapter, this section examines the land utilisation and cropping pattern in the state by using available existing statistics from Directorate of Economics and Statistics (DES). Let us begin with land use.

Changes in the Pattern of Land Use

The total geographical area of the state is 3885 thousand hectares which constitutes 1.03 percent of the area of the country. Table 3.1 gives the details of distribution of land in Kerala from 1980-81 to 2009-10. Out of the total geographical area of the state, 27.83 per cent are classified as forest land which includes all forest areas and land classified or administered as forests under any legal enactment dealing with forests, whether state-owned or private. Though the ground realities indicate that the forest area has dwindled on account of various factors such as encroachment, development projects etc., official statistics remain unchanged since land classified as forest retains the same status until fresh surveys and reclassification are implemented (Kerala Development Report, 2005).

Table 3.1: Land Use Pattern in Kerala -1980-81 to 2009-10 (Area in 00'ha)

Category	1980-81	1990-91	2000-01	2009-10	% change in 2009/ 1980
Total Geographical Area	38855 (100)	38855 (100)	38855 (100)	38855 (100)	-
Forest	10815 (27.83)	10815 (27.83)	10815 (27.83)	10815 (27.83)	-
Land put on Non-Agricultural use	2698 (6.94)	2974 (7.65)	3819 (9.83)	3719 (9.57)	37.8
Barren &Uncultivated land	858 (2.21)	583 (1.5)	293 (0.75)	221 (0.57)	-74.2
Permanent Pastures & Grazing land	54 (0.14)	19 (0.05)	1 (0.001)	2 (0.01)	-96.3
Land under Misc. tree crops	639 (1.64)	344 (0.89)	154 (0.4)	44 (0.11)	-93.1
Cultivable waste	1290 (3.32)	946 (2.43)	593 (1.53)	980 (2.52)	-24
Fallow other than current fallow	269 (0.69)	264 (0.68)	340 (0.87)	454 (1.17)	68.8
Current fallow	436 (1.12)	442 (1.14)	779 (20	770 (1.98)	76.6
Net Area Sown	21796 (56.1)	22468 (57.83)	22061 (56.78)	20787 (53.49)	-4.6
Area sown more than once	7052 (18.15)	7732 (20.49)	8156 (20.99)	5900 (15.18)	-16.3
Total Cropped Area	28848 (74.25)	30200 (77.72)	30217 (77.77)	26687 (68.67)	-7.5

Source: Agricultural Statistics, various Issues, Department of Economics and Statistics, Kerala
Note: Figures in parentheses are percentages of total

In view of the high density of population, the pressure for non agricultural uses has been increasing. Its share has increased from 6.94 per cent in 1980-81 to 9.57 per cent in 2009-10. The composition of cultivable land has also undergone important changes. There is an overall decline of 5.58 percent in total cropped area between 1980-81 and 2009-10. During the first two decades total cropped area had increased from 74.25 percent in 1980-81 to 77.77 percent in 2000-01. While the increase during this period was 3.47 percent, most of it (3.42 percent) took place during 1980s itself. During 1990s, only a marginal (0.05 percent) increase was found. However in recent decade, after 2000, it recorded a decline of 9.1 percent and reached 26.68 lakh ha in 2009-10 from 30.2 lakh ha in 2000-01. The increase in

total cropped area was 3.42 per cent from 1980-81 to 1990-91 due to the increases in both Net Sown Area (NSA) and area sown more than once. In the early 1980s, NSA accounted for 56 per cent of the total geographical area. This has increased to nearly 58 per cent in 1990s. However, after that, NSA has registered a marginal decline to around 57 percent in 2000-01 and further down to 54 per cent in 2009-10. But this marginal decline conceals a much greater increase in land put on non agricultural use and in total fallow which is compensated by a decrease in land under miscellaneous crops. Share of area under current fallow and fallow other than current fallow has increased due to unremunerative nature of farming. Cultivable waste land which represents land available for cultivation but not taken for actual cultivation or abandoned after a few years of cultivation for one reason or other (George, 2005) recorded a decline of 1.79 percent between 1980-81 and 2000-01 and then recorded an increase by nearly one percent. The increase in share of area under cultivable waste confirmed the need of the state to take necessary steps to make use of those lands for any purpose. This demonstrated, judicial allocation of available land has to be made cautiously in the Kerala context.

The percentage change of area in 2009-10 over 1980-81 reveals that land under most of the categories except current fallow (76.6 percent) , fallow other than current fallow (68.8 percent) and Land put on Non- Agricultural uses (37.8 percent) had registered a decline during the thirty years (see Table 3.1). Total cropped area had declined by 7.5 percent due to decline in area sown more than once (16.3 per cent) and Net Sown area (4.7 per cent). It is also to be noted that decline in area under food crops is not fully gained by annual and perennial crops.

Structure of Operational holdings[15]

On the basis of the pattern of land distribution, the emerging agrarian structure in India witnessed a phenomenal change in the size of holdings leading to the dominance of marginal and small holdings (Nair & Banerjee, 2011). Various studies on the size and distribution of land holdings during the post-

[15] It is defined as "all land which is used wholly or partly for agricultural production and is operated as one technical unit by one person alone or with others without regard to title, legal form, size or location" (Agricultural Census Website as on 23-04-2012 http://agcensus.nic.in)

independence period revealed the existence of a process of downward mobility in the structure of land holding (Nair & Banerjee, 2011). Similarly, the distribution of land holdings in Kerala also indicated that there exists a significant concentration of holdings among marginal category group (less than 2.5 hectare[16]) over the past three decades (see Table 3.2). This increase has had certainly an indication of the marginalisation of the size of holdings (Deshpande *et al*., 2004). It confirms the increased participation of marginal farmers in the development process (*ibid*, 2004). As compared to other states in India, the average land owned per household was lowest in Kerala (NSSO, Report No: 491, 59th Round 2003; Sharma, 2010) and it showed downward trend over the years (Deshpande *et al*., 2004).

To be specific, in 1980-81, marginal holdings accounted nearly 89 percent of total holdings with a share of 41.6 percent of operated area which increased to 96 percent in 2005-06 with a corresponding increase in the share of operated area (57.6 percent) in the state. This proliferation on marginal holdings is mainly due to the break-up of joint families and a consequent partitioning of households and the activities in land market (Nair & Menon, 2005; Walker & Ryan, 1990). On the other hand, the share of small, semi medium and medium holdings has recorded a steady decline in both land holdings and operated area as we move from 1980-81 to 2005-06 (Table 3.2). Similarly, number of land holdings in large category also recorded a declining trend throughout the reference period (share has come down from 0.3 percent in 1980-81 to 0.032 percent in 2005-06). Conversely, share of large holdings in terms of operated area has marked a marginal increase from 1980-81 to 2005-06. The share has increased from 7.2 percent in 1980-81 to 9.7 percent in 1990-91, with an increase of 2.5 per cent[17] whereas in 2001, share has come down to 7.1 per cent. During this period, Net Sown Area has come down, though Total Cropped Area had made a slight increase (see Table 3.1).

[16] 1Hectare= 2.5 Acres

[17] During the same period, total cropped area of the state has also recorded a tremendous increase (see Table 3.1)

Table 3.2: Distribution of Number of holdings and Operated Area in Kerala

Size of Holdings	Number of Holdings(percent)				Operated Area (percent)			
	1980-81	1990-91	2000-01	2005-06	1980-81	1990-91	2000-01	2005-06
Marginal (below 1 ha)	89.0	92.6	95.2	96.0	41.6	48.8	56.2	57.6
Small (1 to 2 ha)	6.9	5.2	3.4	3.1	22.1	19.5	19.1	18.3
Semi Medium (2 to 4 ha)	3.0	1.8	1.1	1.0	18.4	14.1	12.1	11.5
Medium (4 to 10 ha)	0.9	0.4	0.2	0.2	10.8	6.3	5.4	5.1
Large (above 10 ha)	0.3	0.1	0.0	0.0	7.2	9.7	7.1	7.5

Source: Statistics for Planning, Government of Kerala, Various Issues, Agricultural Census Website as on 4-05-2012 http://agcensus.dacnet.nic.in

Cropping Pattern

The cropping pattern[18] in Kerala has undergone major changes over the last four decades (George, 2005). Change in crop acreage can be take place changes two ways: first, through the expansion in the gross cropped area, and second, due to substitution of low- valued high volume crops with low- volume high valued crops (Deshpande *et al*., 2004). Though acreage expansion has limited scope in the present context (Balakrishnan *et al*., 2008), changes in cropping pattern has been experienced through substitution of low-valued food crops with high valued crops such as rubber and coconut. Moreover, the unique geographical features characterised by steep terrain and undulating topography has precluded the state from extensive cultivation of its staple grain, that is, paddy on the hills and slopes, which have increasingly been utilised for growing commercial crops (Kieniewics, 1989 as cited in Tharakan, 1997). Thus, overtime, the agriculture sector had profusely drifted away from food crop production, mainly paddy to cash crops and this trend had been justified on the grounds that rice, the staple food of Kerala could be freely imported from neighbouring states. This process of intensive commercialization of agriculture continued unrestrained over time, though there have been diligent efforts by the state to strengthen the food production sector, especially, rice through massive and consistent public investment for agricultural

[18] It is a dynamic process and occurs due to changes over space and time with cumulative effects of past and present decisions (Deshpande *et al*., 2004)

and irrigation infrastructure development under the subsequent five year plans (Viswanathan, 2012). As indicated earlier, total cropped area in the state has increased from 28.8 lakh hectares in 1980-81 to 30.22 lakh hectares in 2000-01 and then declined to 26.67 lakh hectares in 2009-10. In the context wherein the total cropped area of the state showed a decline in the recent past, it would be of relevance to examine the performance of various crops in Kerala in terms of area under cultivation.

According to the Department of Economics and Statistics, Kerala, depending upon the duration of cultivation, the crops could be classified as seasonal (less than 6 months) which constitutes paddy, pulses, tapioca, vegetables, sweet potato, tubers, groundnut, ginger, turmeric, cotton, tobacco, onion and sesamum, annual (6 to 12 months) comprising sugarcane, banana, other plantain, pine apple and betel leaves and perennial (more than 3 years) includes coconut, arecanut, cashew, mango, jack, tamarind, pepper, rubber, tea, coffee, cardamom, cloves, nutmeg, cinnamon, cocoa and papaya

Table 3.3: Distribution of area ('000 ha) Occupied by Various Categories of Crops in Kerala and its Share to Total Cropped Area

	1980-81		1990-91		2000-01		2009-10	
Crops	**Area ('000 ha)**	**% to TCA**	**Area ('000 ha)**	**% to TCA**	**Area ('000 ha)**	**% to TCA**	**Area ('000 ha)**	**% to TCA**
Seasonal	1180.4	40.9	826.8	27.2	543.2	18	388.9	14.1
Annual	63.9	2.2	79.1	2.6	114.5	3.8	112.3	4.1
Perennial	1532.1	53.1	2011	66.1	2190.2	72.5	1987.4	72
Other crops*	108.5	3.8	126.2	4.1	173.8	5.8	272.4	9.9
GCA	2884.8	100	3043	100	3021.7	100	2761.1	100

Source: Agricultural Statistics, Government of Kerala, Various Issues

Though Kerala has continued to be a deficit state in food production (Cyriac *et al.*, 2008), the relative share of seasonal crops constituting mainly food grains declined from 40.9 percent of TCA in 1980-81 to 14.1 percent of TCA in 2009-10. In absolute terms also it made a steady decline over the last three decades (see Appendix Table 3A.1). Within seasonal crops, only area under vegetables has had an

expansion, the trend of other crops including rice and tapioca has been in the opposite direction as is seen in the Appendix Table 3A.1.

Area under annual crops has recorded an overall increase from 63.9 thousand ha in 1980-81 to 112.3 thousand ha in 2009-10. After 2000, a marginal decline has been found in area (in absolute terms) of 2318 hectares, but the share to total cropped area has increased from 3.8 percent in 2000-01 to 4.1 percent in 2009-10. Among the three groups, perennial crops dominate the cropping pattern of Kerala accounting for about 72 percent of the total cropped area and 96 percent of the net sown area of the state in 2009-10. These crops are generally categorised as commercial crops characterised by a) the long gestation period between initial input and first output, b) extended period of output flowing from the initial production or investment decision and c) eventually a gradual deterioration of the productive capacity of the plants (French & Jim, 1971, Joseph &Joseph, 2005). This includes both garden land crops comprising mainly coconut, arecanut, pepper, cashew and plantation crops mainly tea, coffee, rubber and cardamom. It may be noted that there was a major shift of cropping pattern in favour of perennial crops from 1980-81 to 2009-10.

Kerala holds near monopoly position in terms of area and production of most of perennial crops such as coconut, rubber, black pepper, arecanut and cardamom in the country. Though perennial crops holds major share of total gross cropped area of the state; it recorded a decline in recent decade from 21.9 lakh hectares in 2000-01 to 19.9 lakh hectares in 2009-10.

From the above analysis it is clear that agriculture sector in Kerala had witnessed a major change in cropping pattern from "more labour intensive food crops to less labour intensive and high value commercial crops" (Joseph & Joseph, 2005). But the performances of the commercial crops were also not impressive in recent decade. This situation seeks attention for a detailed examination of the performance of individual crops in order to bring out the inter crop differences.

III. **Commercial Crops: A Comparative Perspective**

In Kerala, commercial crops have pivotal role in the economy for export trade and it serve a variety of human needs as a sources of food and flavourings, oil and industrial raw materials (Kurian & Peter, 2007). Kerala is historically known for the cultivation of number of export oriented commercial crop production systems with significant trade in spices (mainly pepper and cardamom), coffee, tea and rubber (Joseph & Joseph, 2005; Viswanathan, 2012). In earlier periods, the choice of cropping pattern was guided by agronomic consideration and consumption needs of farmers (Deshpande *et al*., 2004; Mahesh, 1999). With increased market orientation, better profitability of cultivation, falling prices of food crops, increase in the cost of cultivation and seasonal non availability of farm labour, the share of export- oriented commercial crops in total area under cultivation of the state has increased at the expense of food crops (Jeromi, 2005; Deshpande *et al*., 2004). This trend is quite visible from the reduction in the area of food crops and increase in the area under commercial crops.

The major commercial crops which are cultivated in Kerala are coconut, rubber, cashew, coffee, tea and a number of spices such as pepper, cardamom, cinnamon, clove, etc. During 1990s, Kerala had major share in area under cultivation of cashewnut in the country. Unlike certain States such as Maharashtra[19], where cashew was promoted with State Government support, in Kerala, no incentives were given to this crop as in case of other plantation crops. This turned out to be a dissuading factor for farmers to cultivate cashew and lead them to cultivate rubber instead of cashew nut (Yadav, 2010).

Table 3.4 provides the trends in area, production and yield of major commercial crops in Kerala from 1980-81 to 2009-10 (TE). In 1980-81, out of 16167 thousand hectares of NSA, 72 per cent of the area was under seven major commercial crops such as black pepper, cardamom, rubber, coconut, arecanut, tea and coffee. It has increased to 79 per cent in 2007-09. Though area, production and yield of all the

[19] In 2007-08, Maharashtra holds first position in cashewnut cultivation in the country.

crops have increased from 1980-81 to 2009-10, the pattern of movements of different crops has been different. It has been noted that area under black pepper, coconut, coffee, rubber and arecanut has recorded an upward trend till 2000. However some crops such as black pepper and coconut experienced decline in their area under cultivation after 2000 (see Table 3.4).

One interesting point to be noted here is, though area under coconut and arecanut has made an increase in absolute terms during 1980-82 to 1990-92, share to net area sown has come during the same period (Table 3.4). Area under cardamom had registered a decline during the reference period from 54 thousand ha in 1980-82 to 41 thousand ha in 2007-09. Similarly, for production also, some crops such as black pepper, cardamom and tea lagged in their performance after 2000. Among those, black pepper is the highest with a decline of 227 thousand tonnes within 10 years. During the same period , yield level of black pepper also declined from 303 kg/ ha in 2000-02 (TE) to 235 kg/ ha in 2007-09 (TE).

Though cardamom recorded a decline in area and production till 2000s, yield experienced an upward increase throughout the reference period from 49 kg/ha in 1980-82 to 270 kg/ha in 2007-09. This trend is mainly associated with the introduction of njallaini[20] variety in 1992. The yield of tea also declined from 1720 kg/ha in 2000-02 to 1472 kg/ha in 2007-09. This has reflected in the production level of tea, which declined from 835 thousand tonnes in 2000-02 to 538 thousand tonnes in 2007-09. For coffee, the production has made an overall increase but a slight decline has occurred after 2000 as compared to 1990 (Table 3.4). Crops such as rubber, coconut and arecanut have made a tremendous performance in terms of production and yield from 1980-82 to 2007-09, which is evident from Table 3.4.

The trends in area, production and productivty of major commercial corps indicates that until 2000, all the commercial crops under consideration has registered an upward trend. But after 2000, certain crops (such as rubber and

[20] Njallaini is a high yielding variety of cardamom which gives an average yield of 12-15 Kg fresh capsules per plant. It was developed by Shri Sebastian Joseph, a private grower from Idukki district, Kerala.

arecanut) continued its upward trend in area and for that of some other crops such as black pepper and tea experienced an absolute decline in the performance. While coconut experienced an increasing trend in both production and yield except for area in recent decade. At this stage, it is pertinant to examine the growth rates of commercial crops in Kerala for the last 30 years to explore the trends.

Table 3.4 Area, Production and Yield of Major Commercial Crops in Kerala (TE Average)

Crops	1980-82			1990-92			2000-02			2007-09		
	Area (00'ha)	Production (00'tonnes)	Yield (kg/ha)	Area (00'ha)	Production (00'tonnes)	Yield (kg/ha)	Area (00'ha)	Production (00'tonnes)	Yield (kg/ha)	Area (00'ha)	Production (00'tonnes)	Yield (kg/ha)
Pepper	1079 (6.7)	269	249	1767 (7.9)	489	277	2049 (9.3)	622	303	1670 (8)	395	236
Cardamom	543 (3.4)	26	49	436 (1.9)	32	95	413 (1.9)	82	267	410 (2)	78	270
Tea	357 (2.2)	472	1323	346 (1.5)	606	1753	369 (1.7)	635	1720	365 (1.8)	538	1472
Coffee	579 (3.6)	263	454	810 (3.6)	257	316	842 (3.8)	669	794	845 (4.1)	520	615
Rubber	1818 (11.2)	1441	793	2976 (13.2)	3398	1140	3612 (16.5)	5850	1620	4240 (20.3)	7893	1867
Coconut*	6641 (41.1)	31	4616	8700 (38.7)	47	5361	9102 (41.5)	56	6126	7951 (38.1)	57	7178
Arecanut	611 (3.8)	108	177	641 (2.8)	133	207	927 (4.2)	933	1005	988 (4.7)	1190	1205
NSA	16167 (71.9)	-	-	22481 (69.7)			21951 (78.9)			20856 (79)		

Source: Own calculations based on data from Agricultural Statistics, DES, Kerala
Note: * Production in Million nuts, Yield in nuts/ kg
Figures in parentheses shows the share of area to NSA of the state

Growth of Commercial Crops in Kerala

In the field of agriculture, growth rates are widely employed because these have important policy implications (Panse, 1964). The growth rates in agriculture are usually estimated by fitting a semi- log trend equation of the form:

$\text{Log } Y_t = a + bt$ ---------- (1)

Where Y_t is the production or area or productivity or any other time series data for the t-th year. This equation is generally used on the consideration that the change in agricultural output in a given year would depend upon the output in the preceding year (Dandekar, 1980; Minhas, 1966, as cited in Reddy *et al*., 1998). The limitation of this model is that it assumes a uniform growth rate over the entire period under consideration (Reddy *et al*., 1998). Another commonly used growth rate analysis is the compound annual growth rates:

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

where y_t is the observation at time t and r is the compound annual growth rate. Estimates are obtained using "method of least squares". Thus compound annual growth rate (r) is estimated as

r hat = exp (B hat) -1

where B hat is the slope of linearized model fitted to the given data.

Compound Annual Growth rates can be employed to calculate the growth rate for over all time period and also for various sub periods (see Appendix Table 3A.2). Table 3A.2 shows the growth rate of area, production and productivity of the 7 major commercial crops in Kerala from 1980-81 to 2009-10 and also for decade wise three sub periods: 1980-81 to 1989-90 and 1990-91 to 1999-00 and 2000-01 to 2009-10. It is to be noted that, growth rate of area under black pepper has recorded a decline from 4.96 per cent in first sub period to 1.83 per cent in second sub period and then to – 1.81 per cent in third sub period. Similarly production also recorded a decline throughout the three sub periods (see Table 3A.2). During the first sub

period (1980-81 to 1989-90) almost all the crops except tea (-0.49 per cent) registered a positive growth rate in area under cultivation. Coming to production, black pepper (7.38 per cent) and rubber (7.78 per cent) registered the highest growth rate, whereas cardamom (-1.54 per cent) and coffee (-1.13 per cent) experienced negatvie growth rate. Similarly yield growth of cardamom (-3.48 per cent) and coffee (-3.93 per cent) also became negative in the first sub period.

In the second sub period (1990-91 to 1999-00), except for arecanut and tea, growth rate in area of all the crops recorded a decline which is clearly shown in Table 3A.2. For production and yield, arecanut recorded a steady increase from 1.14 per cent and 0.79 per cent in first sub period to 22. 85 per cent and 19.69 per cent in second period. Like wise coffee also registered a steady growth rate in production and yield in the second sub period over first sub period. Black pepper and coconut registered a decline in growth rate both for area, production and yield. In the third sub period (2000-01 to 2009-10), growth rates of all the crops in terms of area, production and yield has recorded a decline (see Table 3A.2).

For estimating Compound Annual Growth Rates, we consider only last and first values. In this situation, it is very difficult to capture the fluctuations in area, prodution and yield of crops within the sub period. Moreover, considering common break point for all the crop will not be correct, because the experiences of the crop regarding the nature and timing of the structural break are found to be varied. The fluctuations occurred in area, production and yield of commercial crops in Kerala from 1980-81 to 2009-10 are found to be vary from one crop to another and also varied among area, production and yield (see Figures Appendix 3A 1 to 3A 7). Figures clearly show that, there observed wide fluctuations in area, production and yield over the years which is vary from one crop to another. In such a situation, it would be meaningless to consider a common sub period and estimates growth rates. This might lead to provide a result which is quite misleading. In this setting where the break dates are unknown, structural break analysis would be useful to estimate growth rates.

Structural Break in Area, Producion and Productvity of Commercial crops in Kerala

Structural Break analysis was formulated by Bai and Perren in 1998. This is a better time series regression model over chow test[21] to test the simple and multiple structural breaks in the time series data. The growth rate of the area, production and productivity is estimated by using the exponential production function

$$\ln Y_t = a + g_t + u$$

Where, Y, g, t and u denote the log of (area, production or productivity), growth rate, time trend, and random disturbance term respectively. The parameters of the above regression model, a and g would vary from one growth regime to another, making it necessary to identify the change point. Therefore we first estimate the break dates of the above model of area, production and productivity and accordingly partition of data to estimate the period wise growth rates. The methodology for estimating the break dates is explained below. The exponential growth rates model containing m +1 growth regimes and m break dates (T_1……Tm) can be written as follows:

$\ln Y_t = a_1 + g_1 t + u_t$, $\quad t = 1, \ldots\ldots\ldots\ldots, T_1$

$\ln Y_t = a_2 + g_2 t + u_t$, $\quad t = T_1 + 1, \ldots\ldots\ldots\ldots , T_2$

.

$\ln Y_t = a_{m+1} + g_{m+1} t + u_t$, $\quad t = T_m + 1, \ldots\ldots\ldots , T.$

Here we adopt the convention that $T_0=0$ and $T_m + 1 = T$ the total number of observations. The number of break points m and the break dates (T_1……..T_m) are treated as unknown and estimated from the data.

The usual method of fitting two separate regressions for the two periods is subject to the limitation that it assumes discontinuity between the two periods and that each of the sub- period growth rates may be at sharp variance with the growth rate for the whole period, which is unrealistic (Lathika and Kumar, 2005). In this state 'Kinked Exponential Model' as suggested by Boyce (1987) is an appropriate and

[21] The problems of this conventional approach have been clearly noted by Hansen (2001) & Balakrishnan and Parameswaran (2007).

reliable method for estimating the period wise growth rates without any discontinuity. A number of researchers (Kannan and Pushpangadan, 1988; Nandamohan and George, 1993, Lathika and Ajith Kumar, 2006; Balakrishnan and Parameswaran, 2007) have employed this model for examining the period-wise growth rates in their study.

Kinked Exponential Model

$$\ln Y = a_1 d_1 + a_2 d_2 + (b_1 d_1 + b_2 d_2)t + u \longrightarrow (1)$$

where d_1 =1 for first period, it varies for different crops

d_1= 0 otherwise

d_2= 1 for second period, otherwise =0

The discontinuity is eliminated by a linear restriction at the break point, K,

$$a_1 + b_1 k = a_2 + b_2 k$$

From the restriction,

$$a_2 = a_1 + b_1 k - b_2 k \longrightarrow (2)$$

and

$$d_2 = 1 - d_1$$

Substituting 2 in 1

$$\ln Y = a_1 d_1 + (a_1 + b_1 k - b_2 k)\, d_2 + (b_1 d_1 + b_2 d_2)t + u$$

$$= a_1 d_1 + a_1 d_2 + (b_1 k)\, d_2 - (b_2 k)\, d_2 + (b_1 d_1 + b_2 d_2)\, t + u$$

$$= a_1 d_1 + a_1 (1 - d_1) + (b_1 k)\, d_2 - (b_2 k)\, d_2 + b_1 d_1 t + b_2 d_2 t + u$$

$$= a_1 d_1 + a_1 (1 - d_1) + b_1 (d_1 t + d_2 k) + b_2 (d_2 t - d_2 k) + u$$

$$\ln Y = a_1 + b_1 (d_1 t + d_2 k) + b_2 (d_2 t - d_2 k) + u \longrightarrow (3)$$

This is called kinked exponential model. This growth rate is used for the period wise estimates of the growth rates throughout the analysis. Obviously b_1 is the first period growth rate and b_2 is the second period growth rate.

Estimated Growth Rates

The growth rates of area, production and yield of seven major commercial corps of the state are presented in Table 3.6. The results of this analysis revealed a mixed trend in respect of growth in the performance of the crops in Kerala.

Table 3.5: Estimated Break Dates

Crops	Area	Production	Yield
Coconut	1994	1991	No Break Points
Arecanut	1999	1994	1994
Pepper	1992	1995	No Break Points
Rubber	1989	1996	1999
Cardamom	1989	1992	1989
Tea	1999	1996	1991
Coffee	1990	No Break Points	No Break Points

Table 3.5 presents the stuructural break years in area, production and yield of major commerical crops in Kerala from 1980-81 to 2009-10. The production and productvity of coffee did not experienced any significant change (break) during the reference period. Similarly, yield of coconut and black pepper has also not registered any break in productivuty during the same period.

The rate of growth in area, production and yield during identified break periods are presented in Table 3.6. During the first break period, black pepper registered highest growth rate in area (5.9 per cent) among other crops followed by rubber (5.5 per cent) and coffee (3.76 per cent). When it comes to porduction, arecanut and rubber recorded a growth rate of 9.9 per cent and 9 per cent during the first break point. From 1980 to 1995 black pepper prodution has grown by 7.36 per cent. It is to be noted that area under Cardamom and Tea recorded a negative growth rate of -0.99 percent and -0.01 per cent during the first break. But yieldof cardamom and tea grew by 5.1 and 4.2 per cent which made production growth more than 2 percent for both the crops.

After the break, that is in period two, the situation has slightly changed. Area growth rate of most of the crops except arecanut had declined in the second half, while for some crops such as coconut experienced negative growth. Among all the commerical crops under consideration, black pepper experienced a highest decline from 5.9 per cent during 1980- 1992 to 0.48 per cent in 1993-2009, recorded a decline of 5.52 per cent exponentially (see Table 3.6). Overall trend shows that black pepper has registered a growth rate of 2.27 per cent from 1980 to 2009 with a growth rate of 2.88 per cent in production and 0.61 per cent in yield.

Table 3.6: Growth rate of Area, Production and Yield of Major Commercial Crops in Kerala

Periods / Crops	Period I *			Period II *			Overall (1980-2009)		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Coconut	2.99	*5.4*	-	-0.62	*1.6*	-	0.89	2.7	1.8
Areacnut	1.9	9.9	8.7	3.3	12.7	9.5	2.36	11.5	9.2
Black Pepper	5.9	7.36	-	0.48	-1.18	-	2.27	2.88	0.61
Rubber	5.5	*9.0*	4.4	2.9	3.8	0.5	3.38	6.5	3.15
Cardamom	-0.99	3.7	5.1	-1.67	6.34	9.3	-1.54	5.48	8.5
Tea	-0.01	2.39	4.2	-1.82	-1.3	-0.63	0.39	0.24	1.37
Coffee	3.76	-	-	0.63	-	-	1.37	4.16	2.79

Source: Computed from Agricultural Statistics, DES, Kerala.

***Break Points:- Area: - Coconut-1994, Arecanut, - 1999; Pepper-1992; Rubber- 1989; Cardamom- 1989; Tea-1999; Coffee- 1990**
Production:- Coconut- 1991; Areacnut-1994; Pepper-1995; Rubber-1996; Cardamom-1992; Tea-1996; Coffee- No break points
Yield:- Coconut, Pepper, Coffee-No Break points; Arecanut-1994; Rubber-1999; Cardamom -1989; Tea-1991

Output Growth: A Decomoposition Analysis

The analysis of growth rate in area, production and yield of the crops will only provide the general pattern of growth and the direction of changes in area and yield. But this does not inform us about the pattern of contribution of area and yield to the production growth (Shadmehri, 2008). An analysis of the behaviour of agricultural production in the past and estimation of its growth rates can provide a basis for future projections of agricultural output (Lakshmi and Pal, 1988; as cited in Shadmehri, 2008). For that it is necessary to examine the sources of output growth. The growth of output of major commercial crops was therefore apporpriated to the various sources by breaking the change in production into three effects; that is, area effect, yield effect and interatcion effect.

To measure the relative contribution of the area and yield on total output change with respect to individual crop, decomposition analysis has been used. Earlier studies by Bastine and Palanisami, 1994; Bhatnagar and Nandal, 1994; Mundinamani *et al*., 1995; Gupta and Saraswat, 1997; Singh and Ranjan, 1998; Siju and Kombairaju, 2001; Kakali and Basu, 2006; Rehman, Ikram Saeed & Abdul Salam, 2011; have used this model to study the growth performance of the crops.

$$\Delta P = A^*\Delta Y + Y^*\Delta A + \Delta A\Delta Y$$

Change in production = Yield Effect + Area effect + Interaction effect

The relative contribution of area, yield and their interaction to change in production of commercial crops are presented in Table 3.7. Irrespective of the break dates, during the first period increase in output of coconut and black pepper was mainly due to increase in area with the respective contribution being 59.9 per cent and 55.03 percent. The yield effect was major driving force for arecanut output growth before 1999. For rubber, both area and yield effects contirbuted more or less in a similar way. In the case of cardamom, both area and yield effect are turned to be negative, whereby impact of area decline is more than yield decline in output.

In the second phase, yield effect was the main source of change in output for almost all the crops such as coconut (231.9 per cent), black pepper (79.97 per cent), cardamom (127.2 per cent) and tea (147 per cent), while the increase in output growth of rubber (69 per cent)was due to area effect. The relative contribution of area, yield and their interaction to change in prouduction of commercial crops over the time period is shown in the last section of Table 3.7. The decomposition analysis shows that growth of production of coconut (65.2 per cent), arecanut (57.84 per cent), cardamom (246.52 per cent) and tea (84.94 per cent) is mainly due to yield effect. Black pepper is the only crop among the selected crops which registered the contribution of area effect (120.05 per cent) on output growth against yield effect, while for coffee, contribution of both area and yield are more or less equal during the last thirty years (see Table 3.7).

Table 3.7: Contribution of Area and Yield on Production of Major Commercial Crops in Kerala

Crops \ Period	Period I*			Period II*			Overall (1980-81 to 2009-10)		
	Area Effect	Yield Effect	Interaction Effect	Area Effect	Yield Effect	Interaction Effect	Area Effect	Yield Effect	Interaction Effect
Coconut	59.9	30.3	9.8	-105.9	231.9	-26.02	22.1	65.2	12.7
Areacnut	27.6	61.8	10.5	-110.7	-7.65	-30.5	6.32	57.84	35.84
Black Pepper	55.03	25.4	19.6	25.02	79.97	-498	120.05	-12.63	-7.41
Rubber	100.05	100.05	-100.05	69	23	8	32.6	25.9	41.5
Cardamom	-197	-168	71	-13.6	127.2	-13.2	-32.8	246.52	-113.68
Tea	-11.8	116.8	-5.05	-57	147	10	13.46	84.94	1.6
Coffee	-	-	-	-	-	-	40.83	40.45	18.73

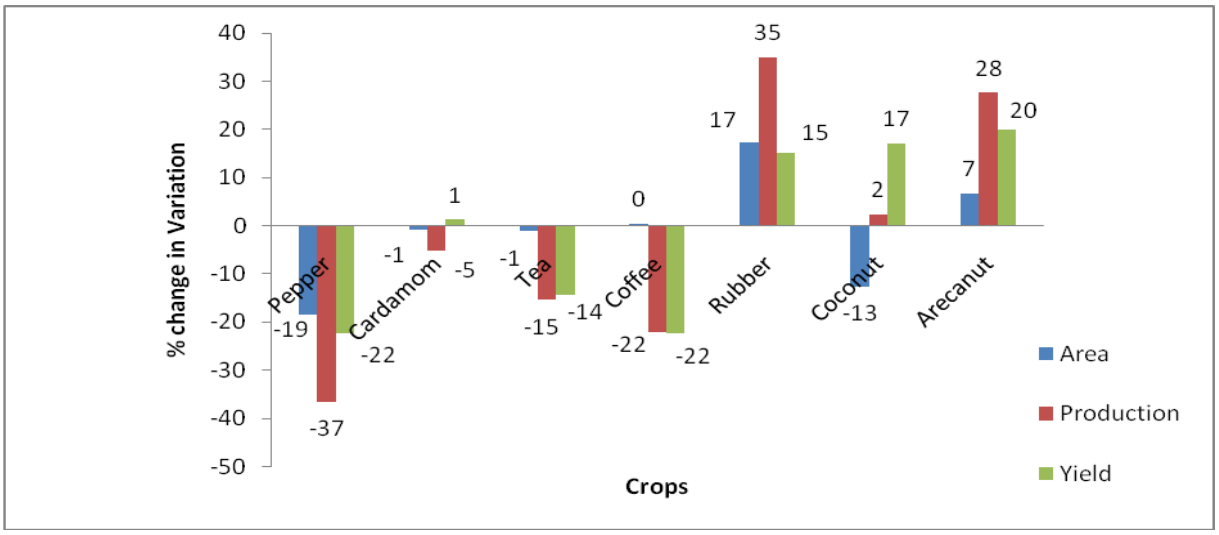
Source: Computed from Agricultural Statistics, DES, Kerala.

***Break Points:- Production:- Coconut- 1991; Areacnut-1994; Black Pepper-1995, Cardamom-1992; Coffee- No break points; Rubber-1996, Tea-1996**

Results from the above analysis on the growth rate of seven important commercial crops in Kerala revealed the distinct performance of black pepper in the state's agrarian economy over the past thirty years. The pace of decline of growth rate experienced by black pepper in terms of area and production in the state is very high as comaperd to other crops. Moreover, growth rate of area under black pepper experienced a decline after the break in 1992 and also decomposition analysis confirm that area effect has contributed more on production than yield (it is more or less stangnant throughout th reference time period). This is evident from the Table 3.7 that as a result of decline in the growth rate of area, growth rate of production become negative. Growth rate reveals that irrespective of the break dates, both area and production has declined substantially.

Fig 3.1 presents the distint trends in the variation of black pepper in terms of area, production and yield against other commercial crops of the economy in the recent decade is shown.

Figure 3.1 Percent variation of variation in Area, Production and Yield of Major Commercial Corps in Kerala in 2007-09 over 2000-02



It may be noted from the Figure 3.1 that percentage variation in the performance of black pepper in terms of area, production and yield in (TE) 2007-09 against (TE) 2000-02 is negative which makes it performance unique as compared to other crops.

IV. Summing Up

The main findings are as follows:

- Though there are some discrepancies in the existing data, total cropped area in general and net sown area of the state in particular has witnessed a declining trend in the recent decade.
- The structure of operational land holdings witnessed marginalisation in the state in par with country.
- Cropping pattern of the state experienced a switch over from traditionally cultivated seasonal crops to annual and perennial crops throughout the reference period of 1980-81 to 2009-10.
- Performance of Commercial crops such as rubber, coconut, cardamom, black pepper, arecanut, tea and coffee in terms of area, production and yield showed that, until 2000, all the commercial crops under consideration had registered an upward trend. But after 2000, certain crops (such as rubber and arecanut) continued its upward trend in area and that of some other crops such as black pepper and tea experienced an absolute decline in performance.
- Analysis on growth rates of commercial crops revealed that pace of decline in area under black pepper is very high as compared to other crops
- The relative contribution of area, yield and interaction effect showed that, irrespective of the break dates, yield effect contributed more towards the production growth after the break that is after 1990s.
- Decomposition analysis revealed that for black pepper, contribution of area effect is more towards production over the last thirty years, though yield dominated in the second half that is after 1995.

- Percentage variation in area, production and yield of the commercial corps in Kerala in (TE) 2007-09 over 2000-02 revealed that black pepper has registered highest decline in both area (-19 per cent) production (-37 per cent) as compared to other crops.

This chapter has thrown light on the performance of commercial crops in Kerala and observed their differential performance in recent years. The performance of black pepper in terms of area, production and yield is found to be distinct from that of other crops. Even though black pepper is a smallholder, homestead farming spice crop which has been cultivated in Kerala from the time immemorial (George, 1989), it recorded highest decline in its performance. The observed unique performance of black pepper calls for further inquiry in terms of its regional variation and underlying factors which forms the focus of following chapters.

APPENDIX 3A

Table 3A.1 Area under Seasonal, Annual and Perennial crops in Kerala and its share to Total Cropped Area from 1980-81 to 2009-10

Crops	1980-81		1990-91		2000-01		2009-10	
	Area in ha	Percentage to TCA	Area in ha	Percentage to TCA	Area in ha	Percentage to TCA	Area in ha	Percentage to TCA
Seasonal Crops								
Paddy	801699	27.79	559450	18.38	347455	11.50	234013	8.48
Pulses	33889	1.17	23385	0.77	6986	0.23	4449	0.16
Tapioca	244990	8.49	146493	4.81	114609	3.79	74856	2.71
Sweet potato	5054	0.18	2603	0.09	816	0.03	399	0.01
Tubers	34509	1.20	33750	1.11	28449	0.94	20975	0.76
Groundnut	9399	0.33	12819	0.42	3677	0.12	1340	0.05
Ginger	12662	0.44	14143	0.46	11612	0.38	5408	0.20
Vegetables	13359	0.46	20735	0.68	19415	0.64	43412	1.57
Turmeric	3270	0.11	2669	0.09	4127	0.14	2438	0.09
cotton	6223	0.22	1073	0.04	3847	0.13	1018	0.04
Tobacco	551	0.02	252	0.01	213	0.01	29	0.00

Sesamum	14752	0.51	9433	0.31	2002	0.07	608	0.02
Total	1180357	40.92	826805	27.17	543208	17.98	388945	14.09
Annual Crops								
Sugarcane	8041	0.28	7625	0.25	3367	0.11	2972	0.11
banana	14318	0.50	22099	0.73	45059	1.49	51275	1.86
Other plantain	34944	1.21	43538	1.43	54353	1.80	47802	1.73
Pine apple	5419	0.19	4724	0.16	10692	0.35	9827	0.36
Betel Leaves	1153	0.04	1074	0.04	990	0.03	447	0.02
Total	63875	2.21	79060	2.60	114461	3.79	112323	4.07
Perennial crops								
Pepper	108073	3.75	168507	5.54	202133	6.69	171489	6.21
Cardamom	54004	1.87	66890	2.20	41288	1.37	41593	1.51
Cashewnut	141277	4.90	115621	3.80	92122	3.05	48972	1.77
Mango	62574	2.17	75480	2.48	90571	3.00	63751	2.31
Cocoa	23387	0.81	11901	0.39	8501	0.28	12113	0.44
Coconut	651370	22.58	870022	28.59	925783	30.64	778618	28.20
Tea	36164	1.25	34616	1.14	36847	1.22	36845	1.33
Coffee	57949	2.01	75057	2.47	84735	2.80	84796	3.07
Rubber	237769	8.24	411615	13.53	474364	15.70	525408	19.03
Arecanut	61242	2.12	64817	2.13	87360	2.89	99188	3.59
Jack	61918	2.15	71002	2.33	93698	3.10	78148	2.83
Tamarind	11017	0.38	14999	0.49	19116	0.63	12708	0.46
Papaya	10627	0.37	12685	0.42	14066	0.47	16840	0.61
Drumstick	14696	0.51	17785	0.58	19632	0.65	16917	0.61

Total	1532067	53.11	2010997	66.09	2190216	72.48	1987386	71.98
Other crops	121900	4.23	146917	4.83	173797	5.75	272440	9.87
Total Cropped Area	2884840	100.00	3043044	100.00	3021682	100.00	2761094	100.00

Source: Various Issues of Agricultural Statistics, DES, Kerala

Table 3A.2 Compound Annual Growth Rates of Area, Production and Yield of Commercial Crops in Kerala from 1980-81 to 2009-10

Crops	1980-81 to 1989-90			1990-91 to 1999-00			2000-01 to 2009-10			1980-81 to 2009-10		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Black Pepper	4.96	7.38	2.31	1.83	0.17	-1.63	-1.81	-3.93	-2.16	1.60	1.38	-0.22
Cardamom	2.00	-1.54	-3.48	-0.61	7.45	8.70	0.08	0.32	0.91	-0.90	3.07	5.29
Tea	-0.49	2.81	3.31	0.06	0.24	0.18	0.00	-1.97	-1.97	0.06	0.45	0.39
Coffee	2.92	-1.13	-3.93	1.28	12.52	11.10	0.01	-3.70	-3.71	1.32	2.65	1.31
Arecanut	0.35	1.14	0.79	2.64	22.85	19.69	1.42	3.20	1.75	1.68	8.55	6.76
Rubber	5.08	7.78	3.08	1.66	7.16	4.56	1.14	4.08	1.08	2.54	6.33	2.88
Coconut	2.76	4.21	1.41	0.68	3.32	2.62	-1.91	0.26	2.21	0.62	2.21	1.58

Source: Computed from Agricultural Statistics, Various Issues, DES, Kerala

Figure: 3A. 1: Area, Production and Yield of Black Pepper in Kerala from 1980-81 to 2009-10

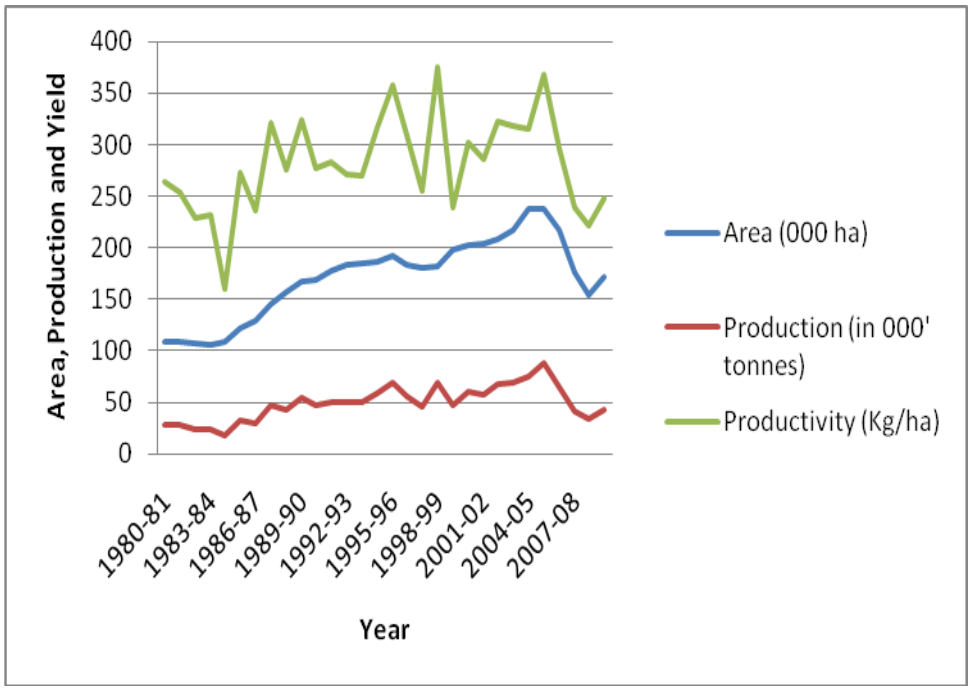


Figure: 3A. 2: Area, Production and Yield of Cardamom in Kerala from 1980-81 to 2009-10.

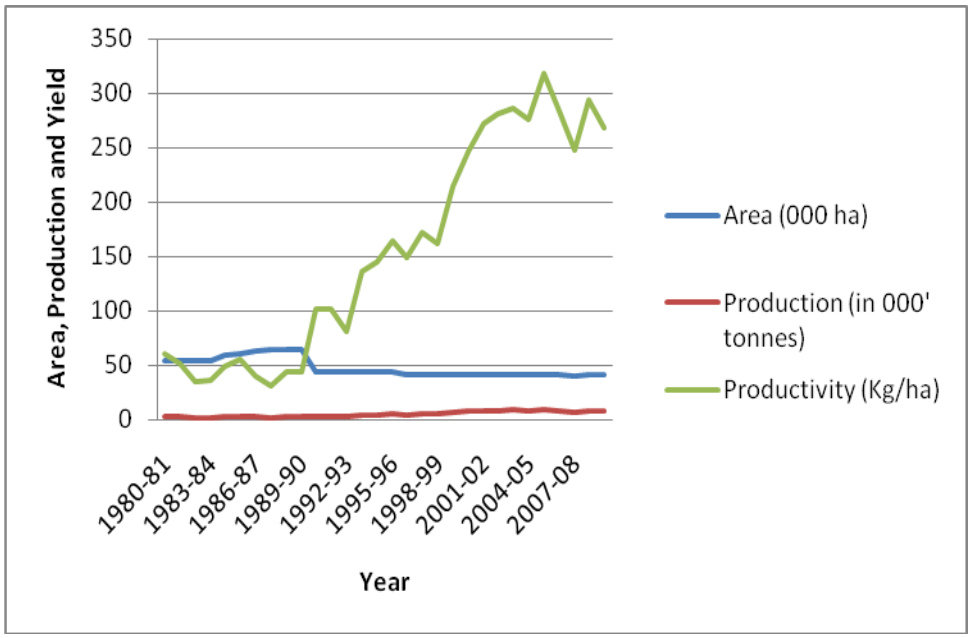


Figure: 3A. 3: Area, Production and Yield of Tea in Kerala from 1980-81 to 2009-10.

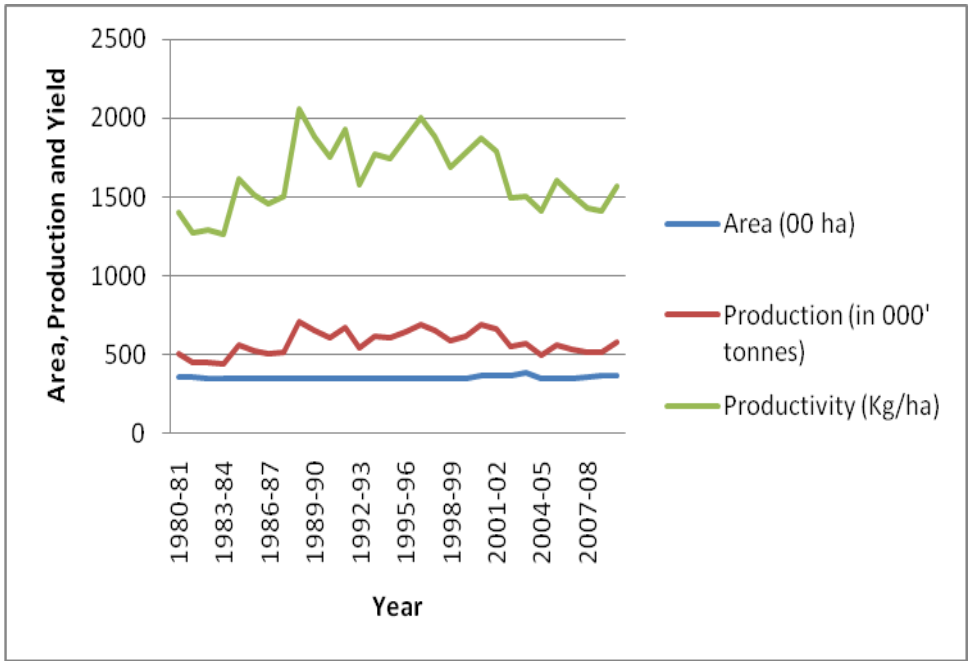


Figure: 3A. 4: Area, Production and Yield of Coffee in Kerala from 1980-81 to 2009-10.

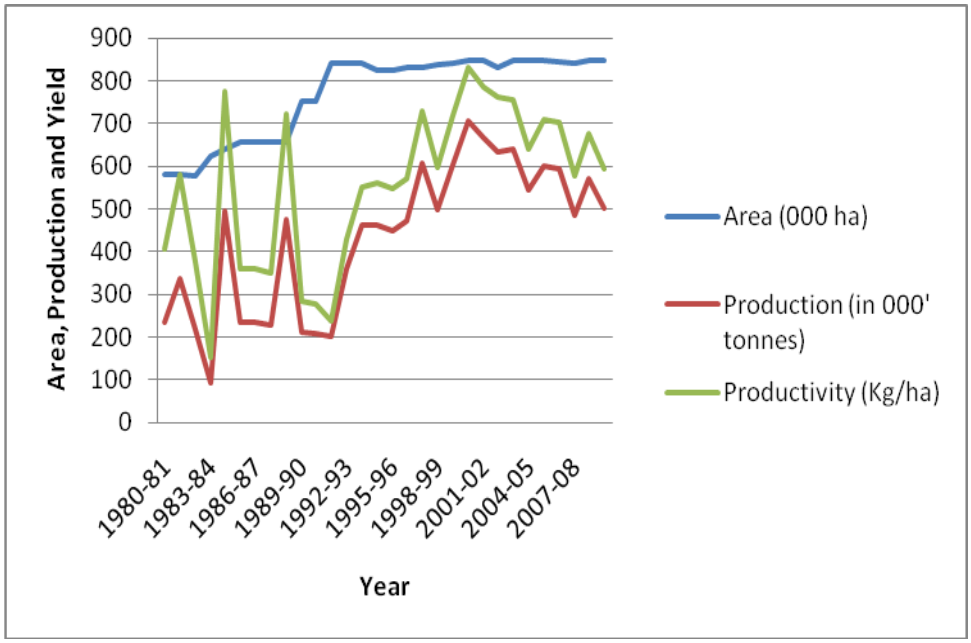


Figure: 3A. 5: Area, Production and Yield of Arecanut in Kerala from 1980-81 to 2009-10

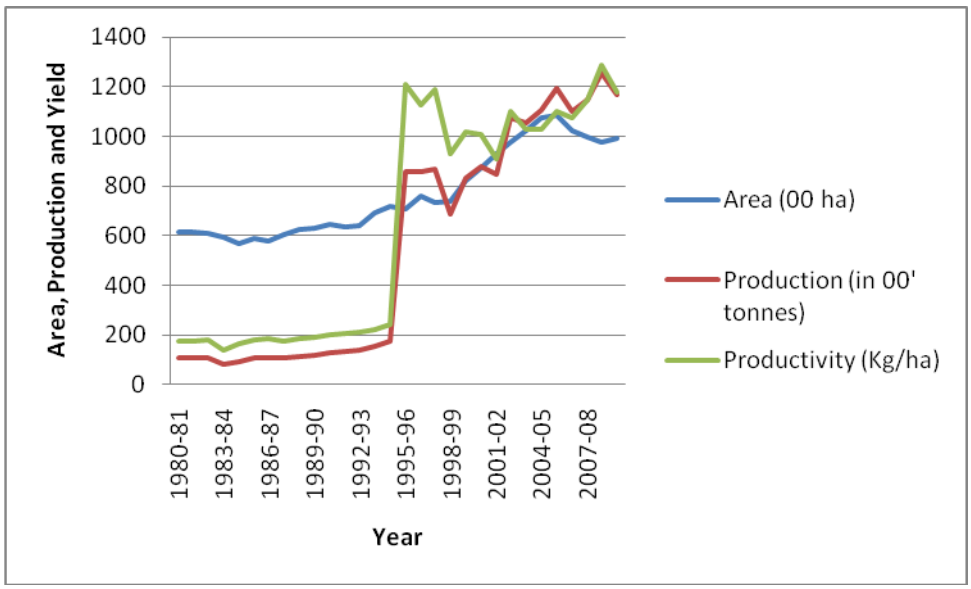


Figure: 3A. 6: Area, Production and Yield of Rubber in Kerala from 1980-81 to 2009-10.

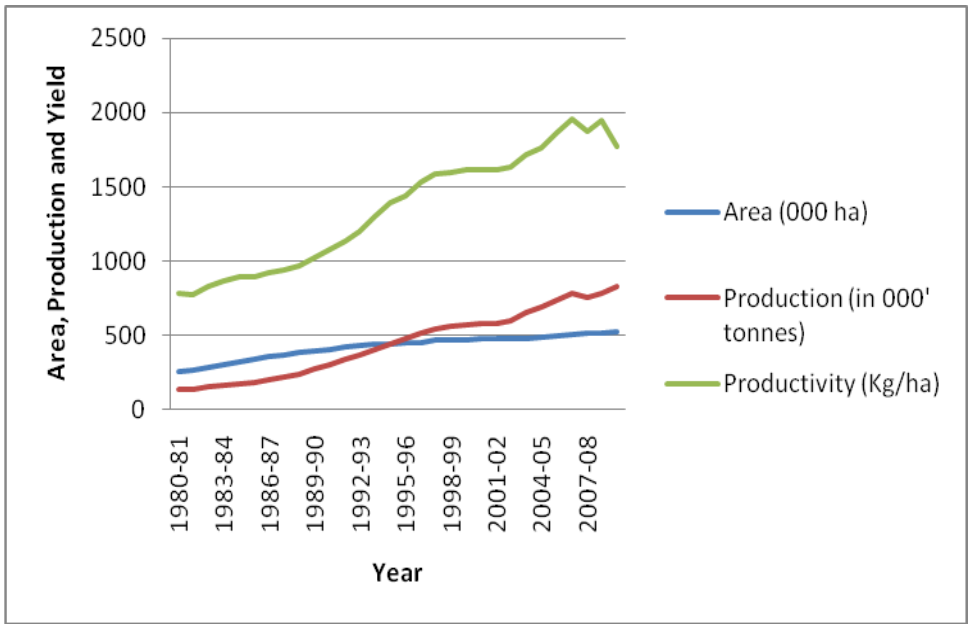
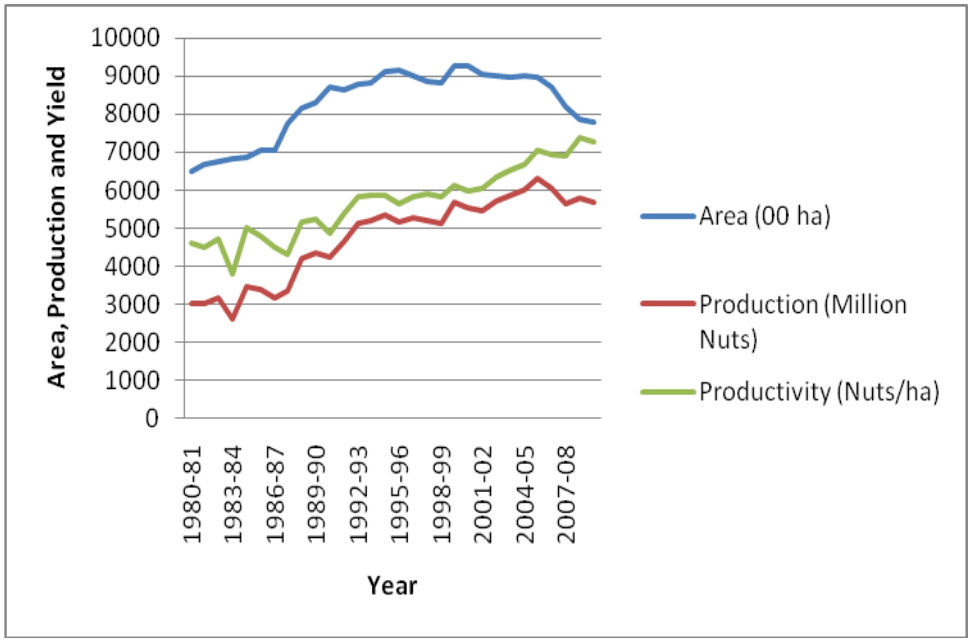


Figure: 3A. 7: Area, Production and Yield of Coconut in Kerala from 1980-81 to 2009-10.



Chapter 4

Performance of Black Pepper in Kerala: An Inter-regional Perspective

Introduction

In the preceding chapter, it was observed that until 2000, the area under cultivation of commercial crops in general showed an increasing trend in Kerala. However, since 2000, the area under cultivation of rubber, coffee and arecanut continued to show an upward trend, whereas that of, black pepper, cardamom and coconut showed a downward trend. Among the crops that displayed the declining trend in area under cultivation, black pepper registered the highest decline. Moreover, downward trend in the area under cultivation was associated with a similar trend in production and yield which made the performance of black pepper distinctly different from other commercial crops. Considering the fact that the cultivation of black pepper is spread over different regions in the state, with a view to have a better understanding of its observed performance we shall now examine the regional variations in area, production and yield of black pepper during the last five decades[22] (1960-61 to 2009-10).

Regional variations play an important role in deciding the performance of different crops due to its several specificities (Chand, *et al* 2011). Studies showed that due to differences in resource endowments, climate, topography and the changes in historical, institutional and socio economic factors, the production performance of agriculture sector has followed an uneven path and divergence in area and yield between different geographic locations exist across the country

[22] The present study has been using decadal wise Triennium Ending average from 1960-61 to 2009-10 to examine the regional trends and pattern of area, production and yield of black pepper in Region. Triennium Ending average is mainly employed to reduced the year to year fluctuation levels

(Chand *et al*., 2009; Chand, 2011). Moreover, policies followed in the country and nature of technology that became available over time has reinforced some of the variations resulting from natural factors. In this situation, information and knowledge on the level of agricultural development within states is a prerequisite to design policy measures for development of backward region (Singh, 2007).

There are a number of studies that analysed agricultural performance across districts in India (Bhalla & Alagh, 1979; Sawant, 1997; Bhalla & Singh, 2001; Singh, 2007; Bhalla & Singh, 2010; Chand *et al*., 2009; Chand, 2011; among others). Chand (2001) observed that the relevance of such studies arise in a context wherein the district wise study could provide a snapshot view of the yield regimes across the whole country, which can be used effectively to delineate various districts for effective and specific interventions. Most of the available studies have focussed on differential performance in terms of yield of crops. This study seeks to explore whether regional variation has occurred in terms of acreage allocation under black pepper cultivation in Kerala. Hardly any study has discussed inter regional variation of black pepper cultivation in the state.

This chapter is organized into five sections, including this introduction. To place the analysis of inter-regional variation in a perspective, we shall begin with an analysis of the performance of black pepper in terms of area, production and yield at national level in comparison with other competing countries, which is analysed in Section 2. The trends reveal that Kerala continues to hold the predominant position in the cultivation of black pepper in the country. Section 3 undertakes an analysis of the trends and patterns in the performance of black pepper across different regions within Kerala. Section 4 briefly analyse the trend in the price of black pepper in important markets for black pepper in the state. The last section summarizes the major findings.

II. Black Pepper Production in Kerala: International and National Context

Black pepper is one of the most ancient and traditional spice crops of India which has been produced and traded worldwide. Black pepper is the native of the Western Ghats Mountains in Southern India. However, with the emergence of competition from other pepper producing countries such as Vietnam, Brazil, Indonesia and Sri Lanka, India is missing out the opportunity to take advantage of the fast- growing international pepper market (Koizumi, 1999). In 1951, 70 per cent of world's pepper cultivation was concentrated in India and this has gone down to 18.7 per cent in 2007. The declining role in the world production has been reflected in export as well. India's share in the world exports has come down from 23 percent in 1951 to 8 per cent in 2007.

Table 4.1 shows data on area, production and yield black pepper in India and other pepper producing countries 2001 and 2010. It has been noted that yield level of black pepper for all the countries have been calculated by dividing production with area[23]. As already mentioned in Chapter 2, without providing enough information on yielding and non yielding data on area under cultivation for perennial crops (age wise data), estimation of yield by using above mentioned procedure will become a biased one.

Though India has earmarked the maximum area of land for black pepper cultivation in the world, it has been showing a declining trend. In 2001, area under pepper cultivation was 2.19 lakh hectares, which accounted for 42 per cent of the world, but it turns down to 1.82 lakh ha in 2010 along with the decline in global share to 38 per cent. Coming to the production of black pepper, India's output level in 2001 was 31.18 per cent of the total world production but the share has reduced to 18.7 per cent in 2010 on account of decline in both area and yield. Table 4.1 shows that Vietnam has replaced India in output on account of their

[23] More clearly, Brazil's production in 2001 was 41000 Million Tonnes and area under cultivation was reported as 39000 hectares. The yield level of Brazil was calculated by dividing production with area.

remarkably higher production per hectare although the total area under cultivation in Vietnam is much lower than that of India. In 2001, Vietnam's share in world production was 6.9 per cent and it increased to 33.21 per cent in 2010.

Table 4.1 Area, Production and Yield of Black Pepper in the Major Producing Countries

Country	2001			2010		
	Area (in ha)	Production (in MT)	Yield (Kg/ha)	Area (in ha)	Production (in MT)	Yield (Kg/ha)
Brazil [24]	39,000 (7.46)	41,000 (16.18)	1051	20,000 (4.2)	32,000 (12.08)	1600
India	2,18,670 (41.8)	79,000 (31.18)	361	1,82,000 (38.19)	49,550 (18.7)	272
Indonesia	1,59,884 (30.57)	27,000 (10.65)	169	1,45,000 (30.43)	40,000 (15.10)	276
Malaysia	13,400 (2.56)	24,300 (9.59)	1813	15,000 (3.15)	16,450 (6.21)	1097
Sri Lanka	30,794 (5.89)	8,308 (3.28)	270	30,714 (6.45)	16,630 (6.28)	541
Vietnam	36,106 (6.9)	59,100 (23.32)	1637	50,000 (10.49)	88,000 (33.21)	1760
Others	25,092 (4.8)	14,695 (5.8)	586	33,800 (7.09)	22,350 (8.43)	661
Total	5,22,946	2,53,403	485	4,76,514	2,64,980	556

Source: International Pepper Community, Jakarta
Note: figures in parentheses are percentages to respective total figures

The yield level of black pepper in India is comparatively low as compared to other pepper producing countries except Indonesia and Sri Lanka. In 2010, Vietnam (1760 kg/ha), Brazil (1600 kg/ha) and Malaysia (1097 kg/ha) has recorded the highest yield among the countries while India recorded the lowest yield (272 kg/ha) (Table 4.1). In this context, it would be insightful to examine the ratio of India's yield to that of other competing countries.

[24] It has been noted that Brazil has recorded a 50 per cent decline in area under black pepper from 39000 ha in 2001 to 20000 hectares in 2010. During the same period India recorded only 16 per cent decline in the area.

Table: 4.2 Ratio of India's Black Pepper Yield to other Competing Countries Yield level.

Country	2001	2010
Brazil	0.34	0.17
Indonesia	2.14	0.99
Malaysia	0.20	0.25
Sri Lanka	1.34	0.50
Vietnam	0.22	0.15
Others	0.62	0.41
Total	0.75	0.49

Source: International Pepper Community, Jakarta

It has been noted that in 2001, India's yield level was two-third of the world's yield level and it has come down to 0.49 times in 2010. As compared to other countries, in 2001, India's yield level was only one third of Brazil and one-fifth of Malaysia and Vietnam. In 2010, the ratio has come down substantially (Table 4.2). In general, though India continues to be in first position in terms of area under cultivation, all the competing countries are having yield level much higher than that of India, this leads to increase the level of pepper production of other countries than India.

Table 4.3 State wise Area, Production and Yield of Black Pepper in India

	2001-02			2007-08		
State	Area (000,ha)	Production (000' MT)	Yield (Kg/Ha)	Area (000,ha)	Production (000' MT)	Yield (Kg/Ha)
Karnataka	12.1 (5.5)	20.76 (26)	1716	16 (8.1)	3.6 (7.6)	225
Kerala	203.96 (92.4)	58.24 (72.8)	286	175.7 (89.2)	42 (89.2)	239
Tamilnadu	4.11 (1.9)	0.91 (1.1)	221	3.1 (1.6)	0.7 (1.5)	226
Andaman& Nichobar	0.45 (0.2)	0.09 (0.1)	200	0.6 (0.3)	0	0
All India[25]	**220.62**	**80**	**363**	**197**	**47.06**	**239**

Source: Spices Board

Table 4.3 reveals that in 2000-01, out of 220.62 thousand hectares in the country, Kerala accounted nearly 92.4 per cent of the area under cultivation with

[25] The differences in data on pepper in terms of area, production and yield provided by two different sources – International Pepper Community (IPC), Jakarta and Spices Board, Cochin could be clearly seen from Table 4.1 and Table 4.3. As per IPC, area under cultivation is 2, 18,670 ha, where Spices Board estimate is 220.62 lakh ha.

production share of 73 per cent. Karnataka accounted for 5.5 per cent of area under cultivation with a production of 26 per cent during the same period. While in 2007-08, Kerala's share to country's total area has reduced to 89 per cent from 92 per cent in 2001-02. However in 2007-08, share of Kerala's production (89 per cent) to India's production marked an increase, though area has recorded a decline in the share (see Table 4.3). For Karnataka; as compared to 2001-02, area under cultivation in 2007-08 has marked an increased but the share in production declined from 26 per cent to 8.1 per cent. This Table 4.3 shows Kerala is contributing more to the all India level black pepper cultivation. Moreover, Government of India report on black pepper says that "black pepper is one of the important crops which provides major source of income and employment for rural households in Kerala- where more than 2.5 lakh farm families are involved in pepper cultivation" (Government of India, 2009).

Further examination on the share of area and production of Kerala in the country showed that share of area under black pepper has come down from 97.7 per cent in 1970-72 (TE) to 89 per cent in 2006-08 (TE). Though state's share in area has declined, share in production is more or less stagnant around 95 per cent throughout the reference period (Table 4.4).

Table 4.4 Share of Kerala in Area and Production of Black Pepper in India

Year (TE)	Area (hectares)			Production (tonnes)		
	India	Kerala	Share	India	Kerala	Share
1970-72	1,19,463	1,16,743	97.7	26,170	24,883	95.1
1980-82	1,10,250	1,07,927	97.9	28,443	26,852	94.4
1990-92	1,82,340	1,76,704	96.9	50,240	48,926	97.4
2000-02	2,18,380	2,04,899	93.8	65,043	62,176	95.6
2006-08	2,04,516	1,82,033	89	48,915	46,729	95.5

Source: Spices Board

In general, it has been noticed that performance of black pepper in terms of area in Brazil, India, Indonesia in particular and world in general has declined, among them Brazil experienced the highest decline. While in terms of production, Brazil, India and Malaysia have recorded the decline in 2010 against 2001. When it

comes to yield, one of the key determinants of international competitiveness, India lags behind all the competing countries.

Furthermore, Kerala holds near monopoly in black pepper cultivation among other Indian states. In this setting, it would be insightful to make a detailed analysis on performance of black pepper in the state to explore the reasons behind the decelerating performance over the past few decades.

III. Intra-State Variation in Area, Production and Yield

As already mentioned in the methodology section of Chapter one, there is a lack of time series data on area, production and yield due to the differences in the formation date of districts. In this context it would be difficult to undertake district wise analysis for a long period of time. To resolve this issue, the present study has undertaken region wise analysis to explore the variations in the performance of black pepper within the state from 1960-61 to 2009-10. Government of Kerala has classified the state into three regional groups on the basis of geographical, historical and cultural similarities- Northern Kerala comprising of five districts (Kasaragod, Kannur, Wayanad, Kozhikode and Malappuram), Central Kerala comprising of four districts (Palakkad, Thrissur, Eranakulam and Idukki) and Southern Kerala comprising of five districts (Kottayam, Pathanamthitta, Alappuzha, Kollam and Thiruvananthapuram).

Trends in Area

Region-wise area under black pepper (in absolute terms) and as a percentage of state's net sown area (which is one of the indicators to understand agricultural development in any state) is presented in Table 4.4.

It is evident that the area under black pepper in the state has been showing fluctuations throughout the reference period. Area under cultivation has increased till 1970-72 to record a marginal increase during the period ending 1980-82. Though, revived thereafter to reach an all time high record of 205 thousand

hectares in 2000-02, seven year since then recorded a drastic decline such that the area under cultivation in 2007-09 is found to be less than that in 1990-92.

Table 4.5 Region Wise Trend in Area (000'ha) under Black Pepper in Kerala.

Regions	1960-62	1970-72	1980-82	1990-92	2000-02	2007-09
Southern Kerala	29.3 (3.65)	33.9 (4.12)	32.8 (6.06)	29.9 (4.44)	33.3 (5.18)	27.9 (4.65)
Central Kerala	11 (1.89)	10.7 (1.69)	24.5 (4.33)	52.9 (7.13)	78.2 (10.56)	86.4 (12.42)
Northern Kerala	59.3 (10.31)	72.2 (10.70)	50.6 (8.78)	93.9 (11.29)	93.4 (11.51)	52.7 (6.67)
Kerala	**99.4** (5.07)	**116.7** (5.48)	**107.9** (6.41)	**176.7** (7.86)	**204.9** (9.33)	**167** (8.01)

Source: Various Issues of Agricultural Statistics, Department of Economics and Statistics, Kerala
Note: Figures in parentheses are the Percentage Share to Net Sown Area.

The table further reveals that the three regions we considered in this study contributed differently to the observed trend at the state level. In case of Central Kerala there was a steady increase in the area under cultivation. To be more specific, the area under cultivation increased from 11 thousand hectares during the first period to over 86 thousand hectares during the last period and recorded an increase of 684.2 per cent during the four decades under consideration. But when it comes to other two regions, we observe a different picture. In case of southern Kerala, the area under cultivation increased during the first two periods but it record a decline of nearly 1.1 thousand hectares during the third period. Though the area lost during the third period was almost recovered during the fourth period, as we move to the final period, there was decline of nearly over five thousand hectares (see Table 4.4).

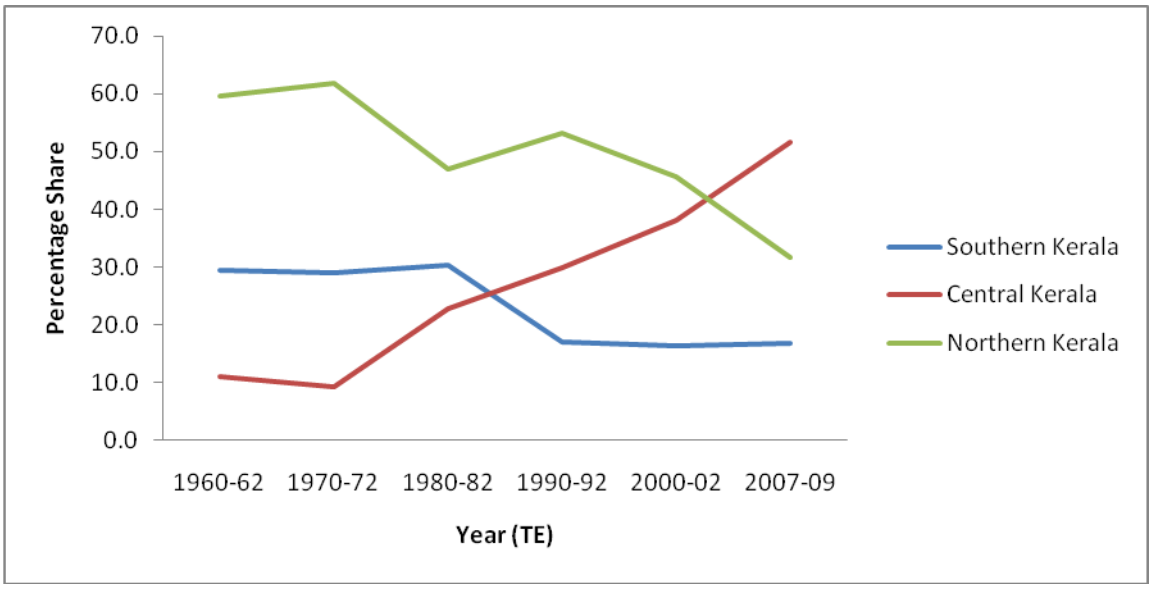
The variation in the area under cultivation in northern Kerala was more pronounced. During the first period, northern Kerala held major share in area under black pepper cultivation that is 59.3 thousand hectares which increased to 72.2 thousand hectares in the second period. While in 1980-82, area recorded marked a decline of 21.6 thousand hectares and reached to 50.6 thousand hectares. But in 1990-92, northern Kerala's area under cultivation has increased to 93.9 thousand hectares and remained at this level till 2000-02. As we move to the

final period, there is a significant decline of area by 40.7 thousand hectares (-43.51 per cent change) and reached 52.7 thousand hectares – even lower than that in 1960-62. Thus the decline in area under cultivation in Kerala is mostly on account of the decline in the northern region and to a limited extent that in the southern region.

If we consider the share of area under black pepper cultivation to the total net sown are for all the regions, Central Kerala has recorded a steady increase from 1.89 per cent in 1960-62 (TE) to 12.42 per cent in 2007-09 (TE). This region has made a substantial progress as compared to other regions of the state. However, northern Kerala has experienced an increase in the share of black pepper during the earlier periods; there was a drastic decline in the share as we move from the fourth to fifth period (from 11.5 per cent to 6.7 per cent). In the case of Southern Kerala, the relative share has made an increase from 3.65 per cent in 1960-62 to 6.06 per cent in 1980-82 (TE), while in the rest of the period; the share has recorded a fluctuation (see Table 4.5). Overall state trend shows that, the share to net sown area has increased from 5.07 per cent in 1960-62 to 9.33 per cent in 2000-02 (TE) and then decline to 8.01 per cent in the fifth period.

From the above discussion it is evident that there occurred wide variations across regions in area under cultivation of black pepper in the state. Moreover, contribution of area by northern region towards state level has recorded a decline since 1990, whereas central Kerala has made a substantial increase in area under cultivation throughout the time period. In this context, it would be insightful to examine the region wise percentage share of area under black pepper to the state from 1960-62 to 2007-09 to get the variation in detail.

Figure 4.1 Shares of Different Regions in Area under Black Pepper in Kerala



Source: Various Issues of Agricultural Statistics, Department of Economics and Statistics, Kerala

Change in the share of different regions in area under black pepper could be clearly observed from Figure 4.1. From 1970-72 (TE) onwards, share of central Kerala in net sown area has increased substantially. Though northern Kerala registered a steep decline after 1990s, this region contributed more to state's area till 2000 as compared to other regions. But the situation has entirely changed after 2000. During this period, area under central Kerala further increased to account for the major share in the state. Though Southern Kerala has made a steep decline between 1980-82 (TE) and 1990-92 (TE), this region recorded more or less stagnant performance after 1990s. But northern and central has recorded a contrasting performance in terms of area allocation throughout the reference period, which is evident from Figure 4.1.

Above examination on regional variation in acreage allocation under black pepper cultivation in the state revealed the regional variation in the area under cultivation during the period under consideration. Though northern Kerala held lion share of area under cultivation of black pepper until 2000, it was replaced by central Kerala after 2000 (which is clearly evident from Figure 4.1). However, area under black pepper in southern Kerala is more or less stagnant throughout the reference period. Moreover after 1990s, the percentage variation clearly

confirmed that central Kerala experienced an increase in area at a decreasing rate; while northern Kerala recorded a steep decline in the area under cultivation. This trend is mainly due to the sharp decline that has occurred in Wayanad district in the recent past (after 2000); while Idukki district in central Kerala has experienced a sharp increase in area under black pepper after 2000 which contributed towards much of the increase observed in the central Kerala (see Appendix Table 4A.1). Having examined the trends and pattern of area under cultivation, let us now proceed to examine the region wise performance of black pepper in terms of production.

Trends in Production

The production of black pepper in Kerala for the year 1960-62 was 26.2 thousand tonnes and increased to 39.5 thousand tonnes in 2007-09. Detailed information on production of black pepper across regions is given in Table 4.6. It is evident from the figure that production in central Kerala in 1960-62 was only 3.5 thousand tonnes, which was a little more than one-third of that in southern (11.2 thousand tonnes) and northern (11.4 thousand tonnes) regions. In the second period, both northern (10.3 thousand tonnes) and central (3.1 thousand tonnes) regions in particular and state in general, exhibited a slight decline in production level as compared to first period. Southern Kerala showed an increase of 5 tonnes in the second period which was decreased by 4.4 thousand tonnes and reached to 7.3 thousand tonnes in 1980-82. The production level in both northern (15.9 thousand tonnes) and central (3.9 thousand tonnes) regions has recorded an increase of 5.6 thousand tonnes and 8 tonnes in 1980-82. As in the fourth period (1990-92), southern region experienced a stagnant performance whereas other two regions have recorded an increase in its production level which shifted the state's production of black pepper upward from 26.9 thousand tonnes in 1980-82 to 48.9 thousand tonnes in 1990-92. However by 2000-02 state's production level has recorded an upward trend and reached 62.2 thousand tonnes. In this period, production in central and southern Kerala has made an increase, while northern Kerala has experienced a slight decline of 1.1 thousand tonnes and reached to 23.6 thousand tonnes from 24.7 thousand tonnes from 1990-92. But in 2007-09, the

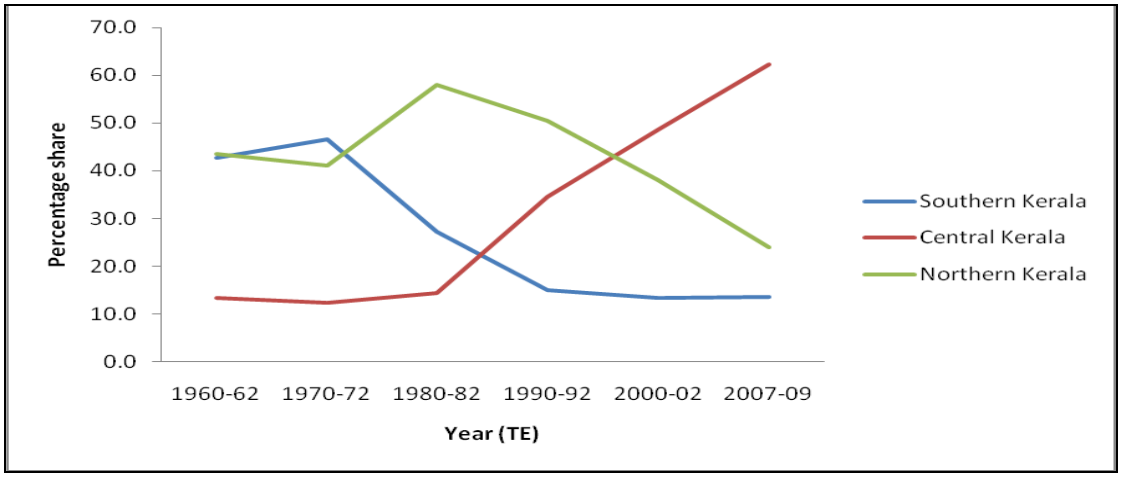
situation has entirely changed. All the regions has showed evidence of decline in level of production of black pepper, which pulled the state's production to 39.5 thousand tonnes in 2007-09 and experienced a decline of 22.7 thousand tonnes within 10 years. Highest decline has been experienced by northern Kerala with a decrease of 14.1 thousand tonnes and reached to 9.5 thousand tonnes in 2007-08. The decline recorded by other two regions in the recent past is evident from Table 4.6.

Table 4.6: Region Wise Trend in Production (000 tonnes) under Black Pepper in Kerala.

Region	1960-62	1970-72	1980-82	1990-92	2000-02	2007-09
Southern Kerala	11.2	11.7	7.3	7.3	8.3	5.4
Central Kerala	3.5	3.1	3.9	16.9	30.2	24.6
Northern Kerala	11.4	10.3	15.6	24.7	23.6	9.5
Kerala	**26.2**	**25.1**	**26.9**	**48.9**	**62.2**	**39.5**

Source: Various Issues of Agricultural Statistics, Department of Economics and Statistics, Kerala

Figure 4.2 Share of Different Regions in Production of Black Pepper in Kerala



Source: Various Issues of Agricultural Statistics, Department of Economics and Statistics, Kerala

It is clear from the Figure 4.2 that the region wise share of black pepper production to total state production.

In a context wherein area as well as production has declined for both northern and southern Kerala in the state, has reduced the state's share in both area and production during 2007-09. The distinct performance showed by central Kerala

that steady increase in area coupled with a decline in production level (in absolute terms) calls for the examination of trends in yield level of black pepper across regions. In this setting, how far the yield levels are responsive to production fall is examined in the coming section.

Table 4.7: Average Yield of Black Pepper in Different Regions in Kerala (kg/ha).

Region	1960-62	1970-72	1980-82	1990-92	2000-02	2007-09
Southern Kerala	383	346	223	245	249	193
Central Kerala	320	287	159	320	384	284
Northern Kerala	192	143	309	263	253	183
Kerala	**263**	**215**	**249**	**277**	**303**	**236**

Source: Own Calculation based on Various Issues of Agricultural Statistics, Department of Economics and Statistics, Kerala

It has been noted that Kerala has recorded a decline in yield from 263 kg/ha in 1960-62 to 249 kg/ha in 1980-82. After 80s, yield started increasing and reached the peak level of 303 kg/ha in 2000-02. While in the final period, average yield of the state has come down and reached to 236 kg/ha which is lower than 1960-62 level. Coming to region wise trend, though regions exhibit a divergent performance in the average yield level till 2000, one could observe a decline in the average yield of black pepper in all the regions after 2000 (Table 4.7).

From the above analyses, we could observe that the three regions performed distinctly from each other in terms of area and production (in absolute terms). The major difference is recorded between central and northern Kerala. In this situation, examination of growth rates registered for area, production and yield of black pepper across regions over the last five decades would provide a better understanding of the pace that registered. Growth rates has been calculated and explained in next section.

IV. Intra-State Variation in Growth

Before getting into the exploration on the pace of growth in area, production and yield of black pepper, it would be helpful to identify to the break points. But the figures on the same show a wide fluctuation throughout the reference period (see

Figures 4A. 1 to 4A. 9). This calls for the analysis to identify the unknown break points in area, production and yield of black pepper across regions and state as a whole from 1960-61 to 2009-10. Table 4.8 presents the structural break years in area, production and yield of black pepper for the period 1960-61 to 2009-10.

Table 4.8: Region wise Estimated Breaks in Area, Production and yield of Black Pepper in Kerala; 1960- 2009

Break	Southern Kerala	Central Kerala	Northern Kerala	Kerala
Area				
1st Break	1972	1972	1972	1986
2nd Break	1999	1985	1986	1999
3rd Break	-	-	1999	-
Production				
1st Break	1975	1986	1989	1986
2nd Break	1999	-	1999	1999
Yield				
1st Break	1984	1986	1986	1986
2nd Break	-	-	1999	-

The Table 4.8 reveals that Kerala has recorded two breaks in area and production on similar years with three phases of growth, while for yield the state experienced only one break point at 1986 with two phases of growth. Among regions, we can see that northern Kerala experienced three breaks in area with four phases of growth, while the rest two regions has recorded two breaks in the area. It is clear from the table that Kerala in general and regions in particular has experienced a break during 1999. Similarly for production also all the regions except central Kerala and for the state as such, break has occurred in 1999. Among the average yield level, northern Kerala has experienced two breaks with three phases of growth. We find a common break in mid 80s for all the regions along with state. The rate of growth in area, production and yield during identified break points are presented in Table 4.9.

Table 4.9 Rate of Growth in Area, Production and Yield during Break Period

Break	Southern Kerala	Central Kerala	Northern Kerala	Kerala
Area				
1st Break	2.27 (1960-1972)	15.8 (1960-1972)	0.2 (1960-1972)	0.86 (1960-1986)
2nd Break	-0.58 (1973-1999)	7.9 1973-1985)	-0.85 (1973-1986)	4.5 (1987-1999)
3rd Break	0.74 (2000-2009)	4.6 (1986-2009)	0.6 (1987-1999)	-1.4 (1999-2009)
4th Break			-6.7 (2000-2009)	
Production				
1st Break	-2.5 (1960-1975)	4.7 (1960-1986)	2.7 (1960-1989)	1.1 (1960-1886)
2nd Break	-0.56 (1976-1999)	-8.1 (1987-2009)	5.7 (1990-1999)	7.1 (1987-1999)
3rd Break	-0.74 (2000-2009)		-10.2 (2000-2009)	-37.3 (2000-2009)
Yield				
1st Break	-4.9 (1960-1984)	-0.95 (1960-1986)	-5.2 (1960-1969)	0.61 (1960-1986)
2nd Break	2.7 (1985-2009)	3.1 (1987-2009)	-7 (1970-1981)	0.75 (1987-2009)
3rd Break			-0.5 (1982-2009)	

Results from the above analysis revealed that growth rate of black pepper in terms of area, production and yield for central and northern Kerala in particular and Kerala in general has declined after 1999. Northern Kerala has recorded a steep decline in area under cultivation after 1999 from 0.6 per cent growth in 1987- 99 to -6.7 per cent growth in 2000 -09. Though the pace of growth rate in central Kerala in terms of area has reduced, it still recorded positive growth rate in area under cultivation. Coming to the growth rate of production, all the regions has recorded negative growth rate in the recent decade. Both central (from 4.7 per cent in 1960-1986 to -8.1 per cent in 1987-2009) and northern (5.7 per cent in 1990-1999 to -10.2 per cent in 2000- 2009) regions has experienced drastic decline in the production growth rate. Coming to the yield growth, southern and central Kerala has experienced a positive growth while northern Kerala recorded a negative growth. But the pace of growth rate has come down from -7 per cent to -0.5 per cent in northern Kerala (see Table 4.9)

Decomposition Analysis

Table 4.10: Contribution of area and yield to change in production on Black Pepper in Kerala

Southern Kerala		Central Kerala		Northern Kerala		Kerala	
Period	**Effect**	**Period**	**Effect**	**Period**	**Effect**	**Period**	**Effect**
1960-75	YE	**1960-86**	AE	**1960-89**	YE	**1960-86**	AE
1976-99	AE	**1987-09**	AE	**1990-99**	AE	**1987-99**	AE
2000-09	YE	Nil	Nil	**2000-09**	AE	**2000-09**	YE , AE

Decomposition analysis of Kerala shows that in the first two break periods (1986 & 1999), area's contribution is more to production than yield, But after 1999, both yield and area effect becomes the dominating force in production changes over area effect, which led to decline the production by 37.3 per cent.

More specifically, decomposition analysis suggests that area has contributed more to production level in central Kerala from 1960-61 to 2009-10 and for northern Kerala from 1990-91 to 2009-10, where black pepper is cultivated more in the state. However for state as a whole and southern Kerala in particular, yield effect is dominating in the recent decade in production.

Southern Kerala recorded a decline in production growth rate throughout the reference period. During the first break (1960-75), production growth rate was negative (-2.5 per cent). In this period, decomposition analysis shows that yield has contributed more to production than area. Growth rate in yield shows a negative value (-4.9 per cent), though area has showed a positive growth rate (2.27 per cent). This result suggest that decline in production level is mainly due to decline in the yield rate. In the second break (1976-99), the pace of decline in production has reduced by 1.96 per cent and started decline by 0.56 annually. During this period, both yield and area experienced negative growth, but area has contributed more to production than yield because pace of yield decline is 4.32 per cent higher than area decline. After the final break point (1999), decomposition effect shows the dominance of yield effect on production than area. This phenomenon is mainly due to positive growth rate of yield (2.7 per cent after 1985) over positive growth rate of area (0.74 per cent after 2000).

Decomposition analysis suggests that area effect has contributed more to production than yield throughout the reference period. It has been noted that central Kerala has recorded a positive growth rate throughout the period from 1960-61 to 2009-10. During the first break (1986), production has increased by 4.7 per cent and there registered the influence of area effect on production than yield. In this period, area has recorded 15.8 per cent growth rate which is higher than yield has experienced a negative growth (-0.95 per cent). But after the break in 1986, production growth rate become negative (-8.1 per cent) due to decline in the pace of area growth rate (see Table 4.9). Though yield registered a positive growth rate during the same period, the pace of decline occurred for area growth rate is very high as compared to the positive growth experienced by yield. But area growth rate has still showed a positive figure which is shown in Table 4.9.

During 1960-89, the production growth (2.7 per cent) was mainly due to yield effect (-5.2 per cent) than area effect. But after 1990, production growth has increased by 5.7 per cent mainly due to the positive growth rate in area (0.6 per cent) (see Table 4.9). In this period, growth rate of yield become negative (-0.5 per cent). In the third break point (after 2000), production has recorded highest decline of 10.2 per cent, which is quite higher as compared to other two regions experience on decline in production. This decline is mainly contributed by area, which has recorded a decline of -6.7 per cent after 2000 that yield (-0.5 per cent).

V. Summing Up

The analysis undertaken in this chapter has shown that in terms of yield, one of the key indicators on international competitiveness, India has been lagging behind all the competing countries. India's competitiveness in black pepper depends almost entirely on the performance of this crop in Kerala because Kerala holds lion share in terms of area and production of black pepper in India. Region wise analysis suggests that central region has performed much better as compared to northern and southern region in the state. Moreover we have seen that northern region experienced a steady decline in both area and production of black pepper since 1980s which was reflected well in the performance of this crop at state level. In this setting it would be of insightful to explore the factors behind the divergent performance across regions: central and northern regions.

Appendix 4A

Table 4A.1 District Wise Area under Black Pepper in Southern Kerala

Year	TVM	Kollam	Pathanamthitta	Alappuzha	Kottayam	Southern Kerala	TE AVG
1960-61	8346	5279	-	1780	14079	29484	29347.67
1961-62	8685	5229	-	1752	14176	29842	
1962-63	8429	4742	-	1631	13915	28717	
1970-71	10233	5783	-	1504	16858	34378	33862
1971-72	10233	5783	-	1504	16689	34209	
1972-73	10233	5783	-	1504	15479	32999	
1980-81	5362	9832	-	4843	12786	32823	32808.67
1981-82	5384	9801	-	4816	12868	32869	
1982-83	5436	10196	-	4816	12286	32734	
1990-91	4154	8101	5409	2316	10912	30892	29909.67
1991-92	4427	7869	4884	2018	10546	29744	
1992-93	4161	8164	5117	1947	9704	29093	
2000-01	5668	10418	5059	2134	8581	31860	33341.33
2001-02	6376	11381	5613	2054	9139	34563	
2002-03	6569	10633	5214	1940	9245	33601	
2007-08	5557	8988	3934	1790	9866	30135	27874.33
2008-09	5683	8527	3612	1357	9573	28752	
2009-10	4902	8138	3598	1387	6711	24736	

Table 4 A: 2 District Wise Area under Black Pepper in Central Kerala

Year	Idukki	Eranakulam	Thrissur	Palakkad	Central Kerala	TE Avg
1960-61		6829	692	3422	10943	11011.33
1961-62		7021	692	3422	11135	
1962-63		6808	728	3420	10956	
1970-71		7940	745	1625	10310	10713.33
1971-72		7940	745	1625	10310	
1972-73	4306	4844	745	1625	11520	
1980-81	12264	6652	4010	1532	24458	24488.67
1981-82	12182	6811	4036	1546	24575	
1982-83	12182	6532	4173	1546	24433	
1990-91	34759	6977	5657	2754	50147	52931.33
1991-92	38070	6725	5747	3024	53566	
1992-93	39163	6963	5596	3359	55081	
2000-01	58209	7312	3938	4916	74375	78202
2001-02	60537	7941	4174	5063	77715	
2002-03	65142	7309	4583	5482	82516	
2007-08	65333	6106	4766	7081	83286	86350.33
2008-09	58290	5317	4829	5661	74097	
2009-10	85739	5273	4898	5758	101668	

Table 4 A: 3 District Wise Area under Black Pepper in Northern Kerala

Year	Malappuram	Kozhikode	Wayanad	Kannur	Kasaragode	Northern Kerala	TE Avg
1960-61		16064		43204		59268	59332
1961-62		16078		42914		58992	
1962-63		16071		43665		59736	
1970-71	3250	18016		51590		72856	72168
1971-72	3250	18016		50558		71824	
1972-73	3250	18016		50558		71824	
1980-81	4030	20184		26578		50792	50630
1981-82	4016	13588	7355	25839		50798	
1982-83	4298	12502	7661	25839		50300	
1990-91	7593	15319	26528	31225	6803	87468	93862.67
1991-92	7934	15638	30543	33570	7131	94816	
1992-93	8785	14690	32613	35654	7562	99304	
2000-01	8253	11939	44908	24569	6229	95898	93355.33
2001-02	8996	12775	40088	23341	6478	91678	
2002-03	9846	12365	40839	22492	6948	92490	
2007-08	7858	9665	25542	12533	6660	62258	52733.33
2008-09	5998	8421	20825	10211	5402	50857	
2009-10	6147	7972	16571	9631	4764	45085	

Figures

Figure 4A . 1 Area under Black pepper cultivation in Southern Kerala

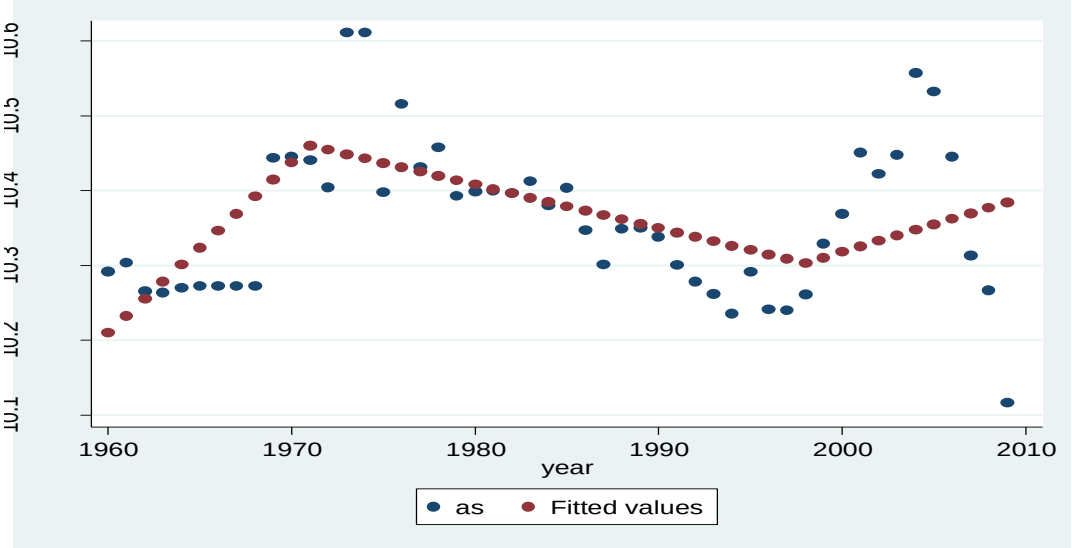


Figure 4A . 2 Production of Black pepper cultivation in Southern Kerala

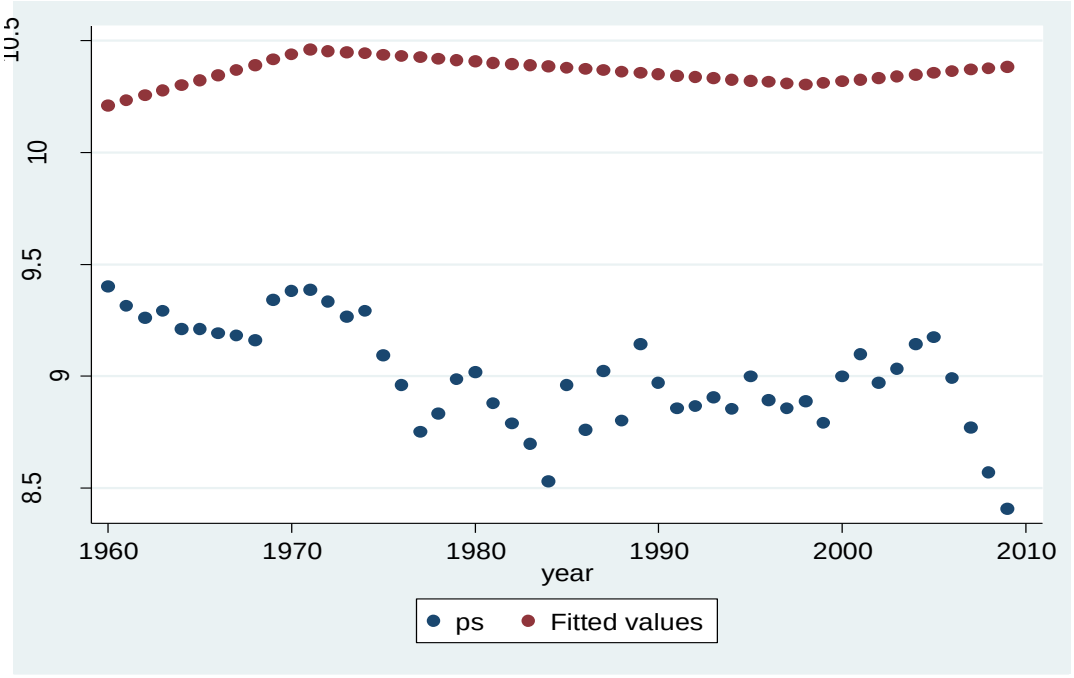


Figure 4A. 3 Average Yield of Black pepper cultivation in Southern Kerala

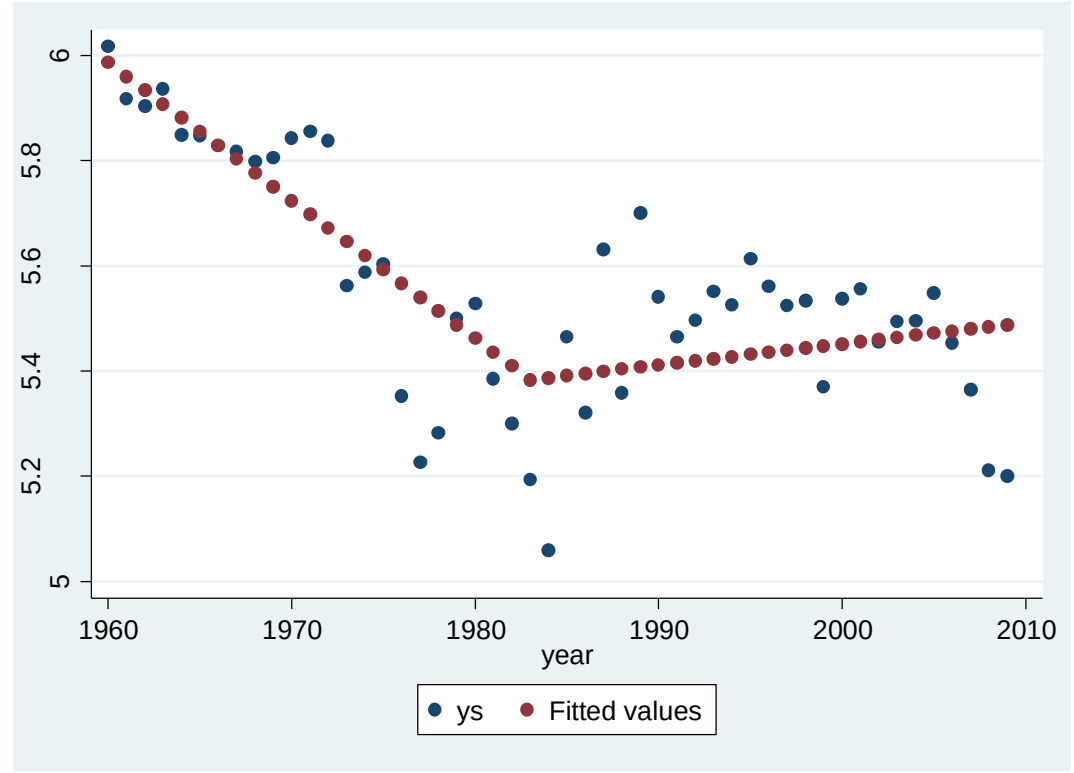


Figure 4A. 4 Area under Black pepper cultivation in Central Kerala

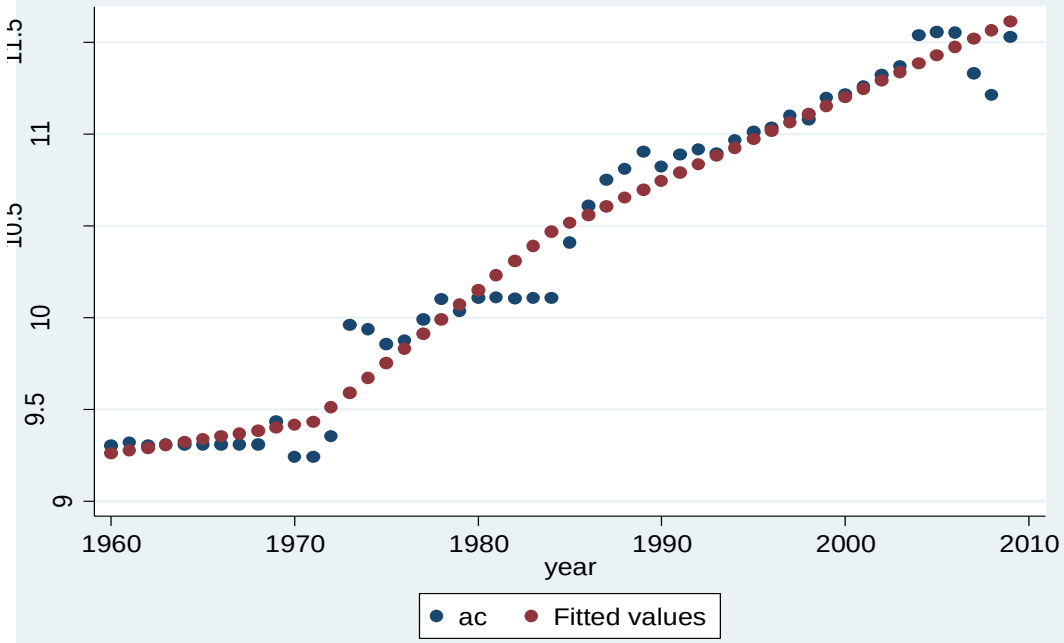


Figure 4A. 5 Production of Black pepper cultivation in central Kerala

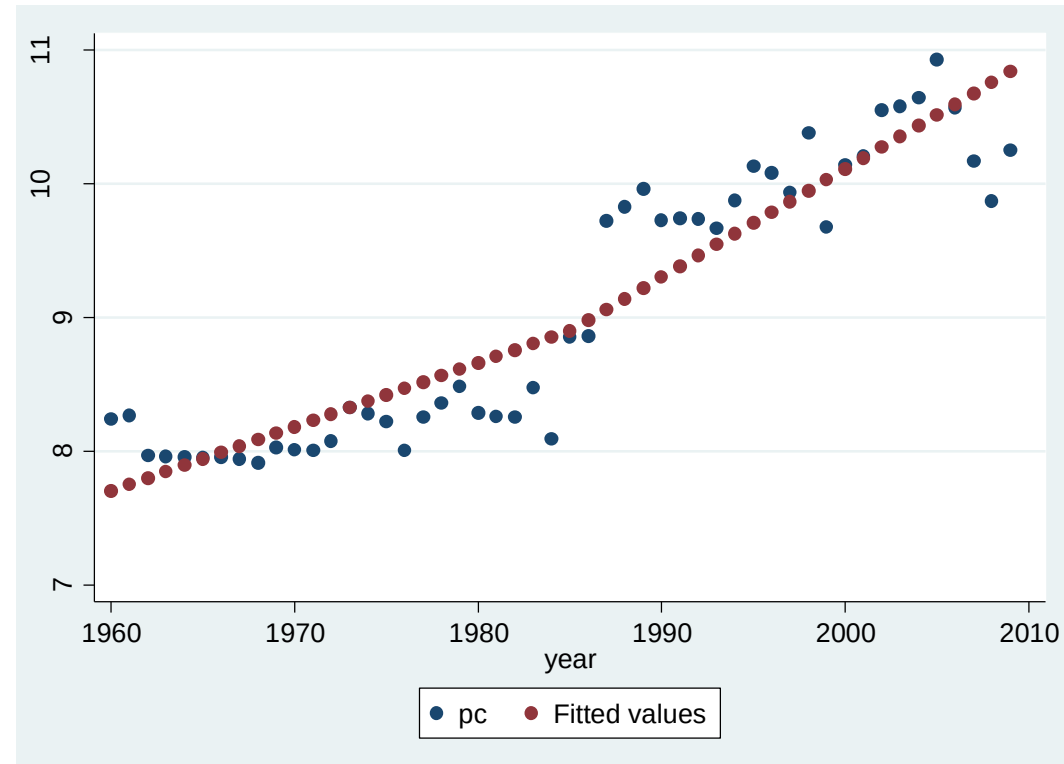


Figure 4A. 6 Average Yield of Black pepper cultivation in central Kerala

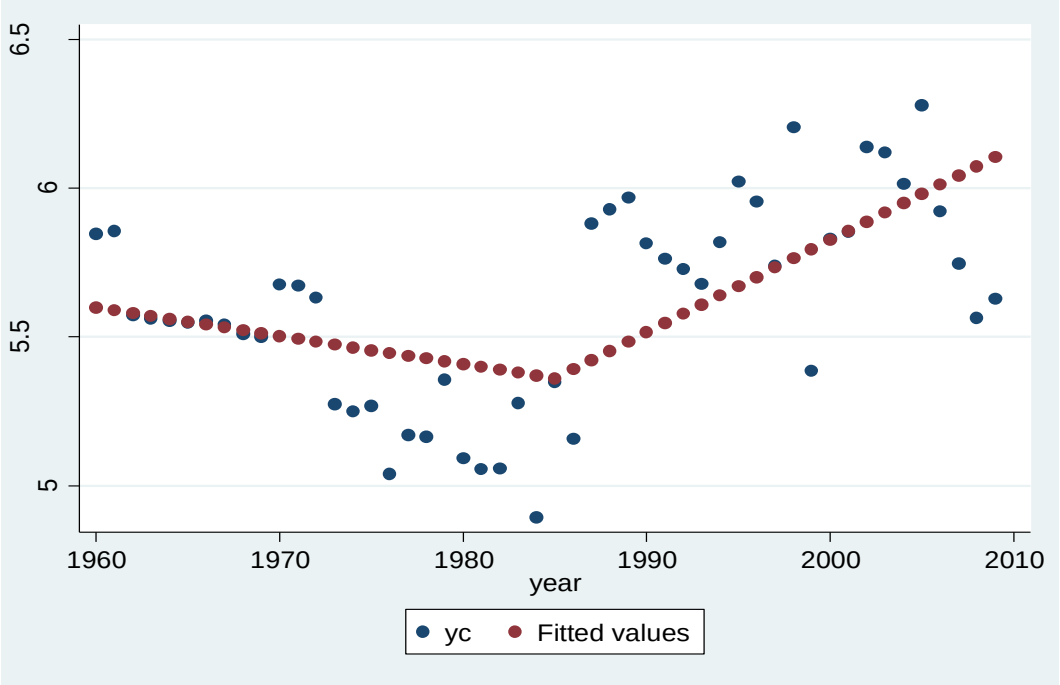


Figure 4A. 7 Area under Black pepper cultivation in Northern Kerala

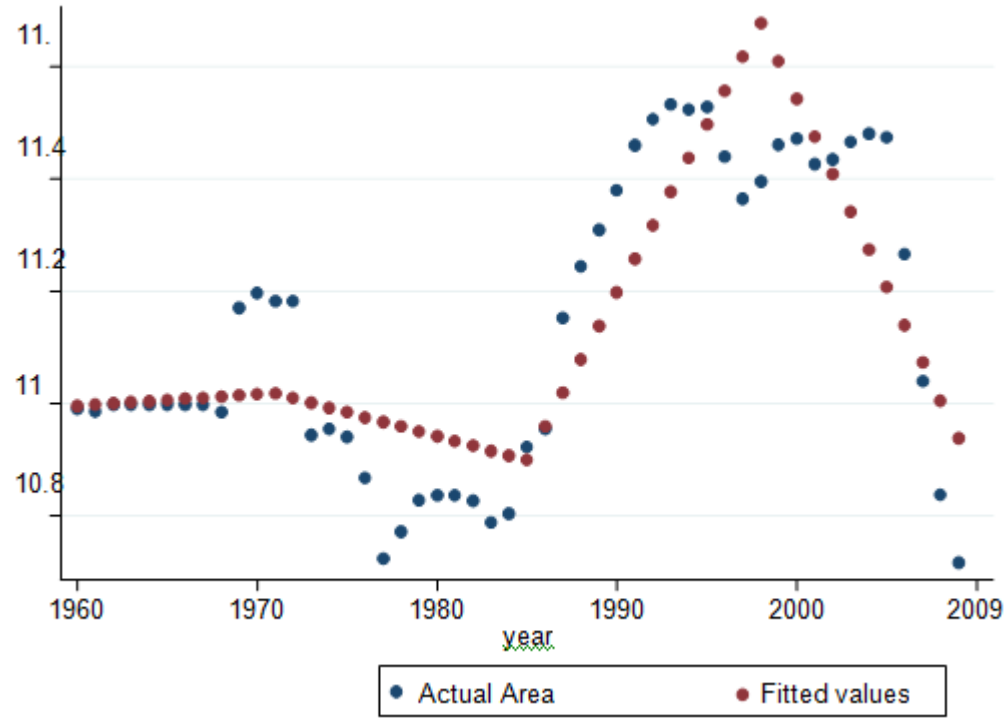


Figure 4A. 8 Production of Black pepper cultivation in Northern Kerala

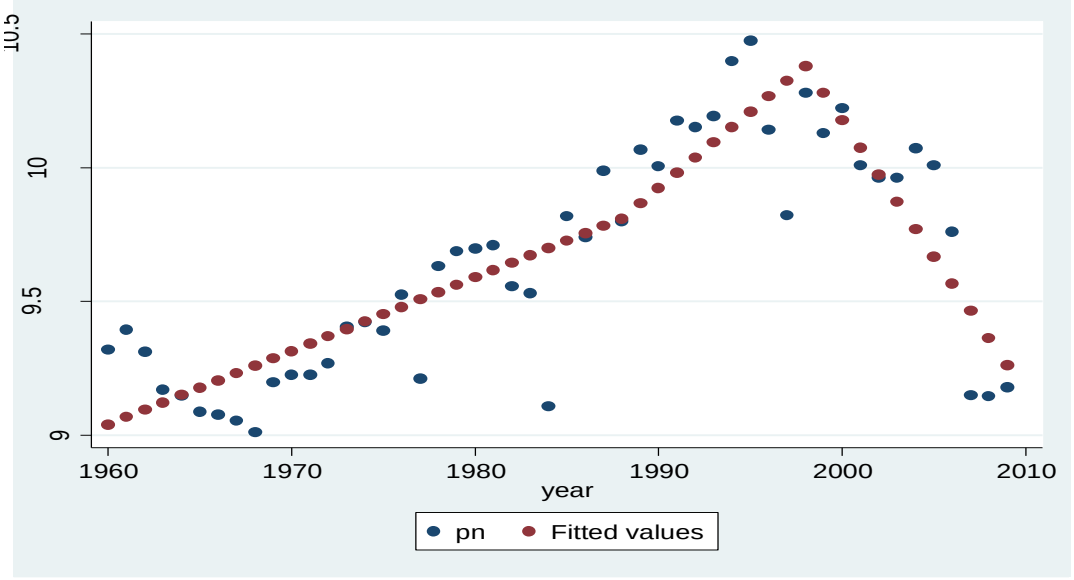
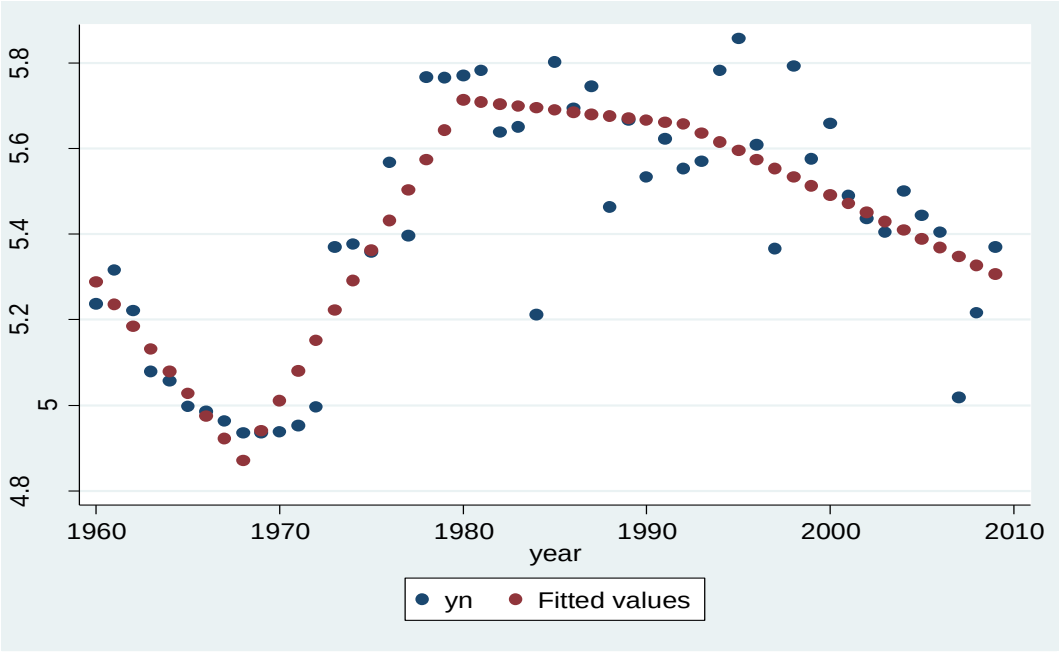


Figure 4A. 9 Average Yield of Black pepper cultivation in Northern Kerala



Chapter 5
Behind the Performance: Price and Non Price Factors

Introduction

From the analyses in the previous chapters, we observed the performance of black pepper in the state which is different from other commercial crops. Moreover the intra state performance of the crop revealed the experience of divergent trend in terms of acreage allocation across northern and central Kerala. More specifically, northern Kerala exhibits a reduction (from 90s) while central Kerala exhibits an upward trend in area under cultivation of black pepper since 1980. This leads to the further exploration of factors responsible for this trend. To understand the problem in detail, the study examines the role of price and non price factors especially institutional arrangements in the case of black pepper.

II. Role of Price

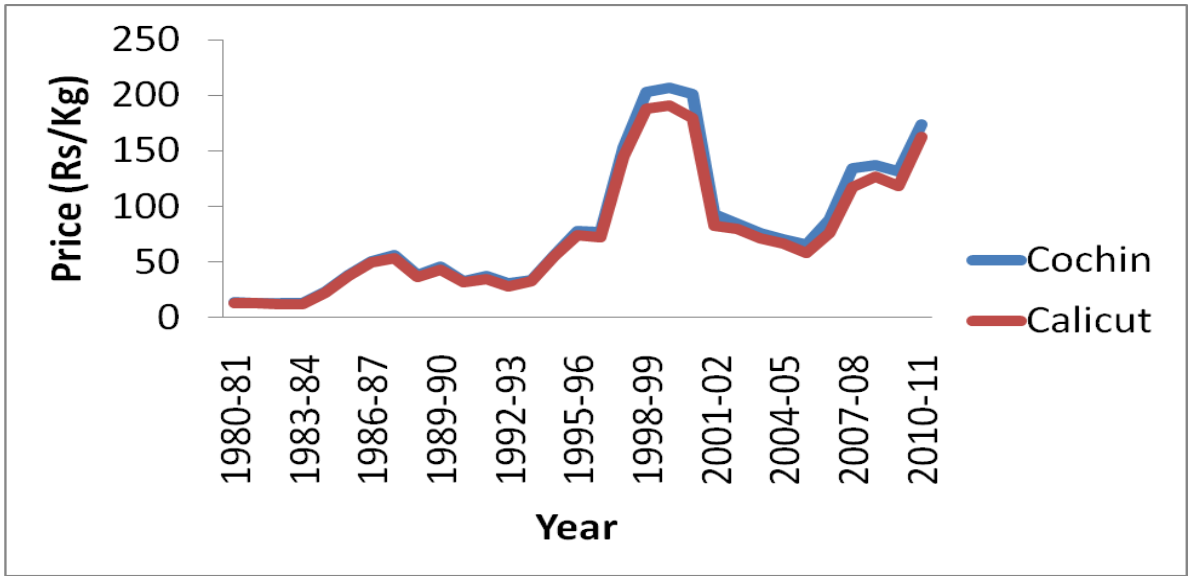
The factors underlying the behaviour of agricultural commodity prices in the state are complex and vary from commodity to commodity ranges from dependence on domestic demand and supply (within Kerala and the country as a whole), world import demand for specific commodities, supply from other competing countries, and the state interventions in the commodity markets (Nair & Menon, 2004). Historically, black pepper is a highly tradable commodity; its domestic price, production as well as profitability are highly influenced by its international prices (Kumar & Singh, 2007). The commodity prices at the farm gate level are known to be susceptible to instability in the international as well as in domestic markets of the countries. Suppose, if a country earns bulk of their foreign exchange earnings out of few primary commodities, then, they have to contend with the problem of short-term instability of primary commodity prices, which is greater than that of prices for non-primary tradable commodities (Maizels, 1987; Kaldor, 1987). However India has diversified the export basket from primary commodities to other manufactures and services (RBI, 2010), and the domestic demand for

primary commodities especially for all the plantation commodities has increased substantially. In this setting, the influence of exogenously determined price strategy and its related price instability has assumed importance whereby these crops become the source of livelihood to the millions of the back ward regions in which their production is concentrated (Joseph, 2010).

In this context where markets are getting integrated with world market, Anoopkumar (2012) examined the commodity price instability of three major plantation crops (natural rubber, black pepper and coffee) in India to explore inter and intra price instability. The study has found that inter year instability has been explained mainly by the multi-year cyclicality arising in response to the cycles in production and intra year instability has been explained mainly by the seasonality of production with wide inter crop variations. Moreover, the study found that those crops which have high domestic demand and integrated highly with global market have experienced greater price instability in monthly as well as annual average prices in the open trade regime as compared to closed regime with widening cycles in amplitude and duration. Additionally, growers of these plantation crops, which are perennial in nature, would face a problem with the gestation period. For perennial crops such as black pepper, gestation period leads to make a time lag between production decisions and acreage allocation which makes delay and inappropriate response by producers to price signals (Bastine *et al.*, 2010). However it has been noted in the previous analysis, that acreage allocation under black pepper has experienced intra state variation. In this setting it would be insightful to explore whether any regional variations has occurred for the price of this crop apart from price instability.

To explore this issue at hand, secondary data on average market whole sale prices of black pepper for Cochin and Calicut has been collected from various issues of spice statistics from 1980-81 to 2010-11.

Figure 5.1: Average Whole Sale Price of Black Pepper in two leading Markets in Kerala (1980-2010)



Source: Spice Statistics, Various Issues, Spices Board

Figure 5.1 shows that price in both the markets are moved more or less same pattern, though it recorded wide fluctuations over the years. To capture the regional variations occurred among prices, the Co-integration test suggested by Engle and Granger (1987) and Johansen and Juselius (1988) are employed to see if long run relationship exists between the price series. Before checking for co-integrating relationship between the price series, it is essential to test if both the series are non stationery and are of the same order of integration. The Augmented Dickey Fuller (ADF) tests for presence of unit root reveal that both the price series are stationery at first difference (see Table 5.1). Thus both are integrated of order 1 and this allows us to go for cointegration analysis.

Table 5.1: Augmented Dickey Fuller Test

	Constant	Constant, Linear Trend	None
Calicut	-1.1473	-2.557027	0.122256 (0.7138)
	0.683	0.3008	
Cochin	-1.1486	-2.637188	0.099471 (0.7067)
	0.6829	0.2679	
First Difference			
Calicut			-3.8614
			0.0004
Cochin			-3.88405
			(0.0061)

Table 5.2 Engle-Granger regression

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.389400	0.0194

As per the Engle- Granger method, we need to regress one series on the other and test if the resulting residual series in the regression turns out to be stationery.

The ADF unit root test shows that the residual series is stationary which takes us to conclude that the price series are co integrated. But from this method we cannot know the number of co integrating vectors. For this, we apply the Johansen and Juselius test for cointegration.

Table 5.3 Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.520809	27.56593	25.87211	0.0305
At most 1	0.220296	6.967563	12.51798	0.3479

Table 5.4 Unrestricted Cointegration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.520809	20.59837	19.38704	0.0332
At most 1	0.220296	6.967563	12.51798	0.3479

The trace test and Maximum Eigen Value test under the JJ method, we reject the null hypothesis of "zero" co-integrating vector and this proves that there exists long run relationship between the price series. Thus, it paves the way to explore the role of non price factors in general and institutions in particular.

III. Non Price Factors- An Exploration

It has been widely discussed in the literature that output can be varied by the influence of several non price factors. These factors includes irrigation, availability of credit, agricultural insurance, network of research and extension services, supply of inputs (both local and HYVs), provision of storage and marketing facilities, research and developmental activities, training provided by the extension officers, climatic change and pest and disease attacks (Mansur & Muhtar, 1987; Rao & Jeromi, 2000; Balakrishnan *et al.,* 2008; Aydinalp & Creese, 2008; among others). These are some of the non price factors where the role of institutional arrangements can be traced out. An in detail explanation of each factor is given below:

Credit

Credit is one of the critical non-land inputs, which has two dimensions from the view point of its contribution to the augmentation of agricultural growth. The demand for credit arises due to lack of simultaneity between the realisation of income and act of expenditure; lumpiness of investment in fixed capital formation; and stochastic surges in capital needs and saving that accompany technological innovations (Golait, 2007). Various commercial and nationalised banks are engaged in providing credit to the farmers.

Irrigation

Irrigation is one of the major inputs which required for the cultivation of crops. It is also capable of increasing cropping intensity by the adoption of bio-chemical technology (or modern farming technology) thereby increases the overall production of the crops.

Agricultural Insurance

In the context of increasing commercialisation and globalisation, the scope and relevance of agricultural insurance are not widely understood in India. Crop insurance, which is generally restricted to field crops, is generally considered synonymous with agricultural insurance. However, agricultural insurance covers a wide spectrum of activities like horticulture, plantations, livestock, poultry, aquaculture, sericulture, etc. Further, it extends to the entire production process including post-harvest storage, processing and transportation of produce to the final markets (UNCTAD, 1994). In a country like India, where agricultural production has been subjected to vagaries of weather and large-scale damages due to attack of pests and diseases, agricultural insurance has assumed to play an important role in providing the support to siphon off risk and uncertainty in the crop sector for sustainable growth.

Network of Research and Extension Services

One of the major research aims of different institutions is to develop high yielding, good quality varieties with tolerance to disease and pests. These are agencies includes public sector extension, represented mainly by the State Department of Agriculture (DoA), Non-Governmental Organisations (NGOs), input agencies, mass media, research institutions or farmers associations are engaged in providing information for the majority of farmers.

Institutional setup for Black pepper

Black pepper is one of the important spice crops in the country where multiple actors from both central and state government are playing their own role to enhance the performance of black pepper cultivation. Concerted efforts were made by Spices Board under Ministry of Commerce, Indian Institute of Spices Research, Calicut, All India Coordinated Research Project on Spices, National Bureau of

Plant genetic Resources, Regional Station, Thrissur, and state agricultural universities like Kerala, Tamil Nadu University of agricultural sciences, Bangalore to conduct research and development activities and providing various extension services for the betterment of this crop.

Black pepper has not been under the purview of spices board till 2007. State government alone had taken decisions regarding this crop in all the aspects related to this crop. Owing to the drastic decline occurred in terms of area and production of the crop, as an agency concerned about the plight of Indian Pepper Industry, the Government of India has introduced number of programmes to increase the production and yield of pepper. Under National Horticulture Mission (NHM), Kerala State had been provided with funds for implementing the following schemes in pepper.

1) Production of Planting material – Model nursery (public) and small nursery (private & public)
2) Replanting / rejuvenation programme in black pepper
3) Area expansion in black pepper
4) Adoption of Organic farming in pepper
5) Implementation of IPM in pepper gardens
6) Technology dissemination programmes

In order to supplement the above programmes, the Directorate of Arecanut and Spices Development (DASD) directly implements NHM programmes on production of nucleus planting material, seed processing and infrastructure, technology dissemination through frontline demonstration of organic pepper and national level seminars/workshops through various State Agricultural University centers and ICAR institutes. Regarding the high yielding varieties of black pepper, research Institutes has developed sixteen improved varieties so far[26].

[26] Details of improved varieties of HYVs of black pepper is clearly given in Cultural Practices , spices board.

To strengthen the cultivation of black pepper cultivation in major pepper production districts (Idukki and Wayanad) of the state, National Horticulture Mission (NHM) under Ministry of Agriculture, Government of India sanctioned a pepper rejuvenation programme in Idukki District which is being implemented by Spices Board from 2009-10 onwards. Under this programme Rs 120 crores has been sanctioned to Spices Board as subsidy under NHM to be utilized over a period of five years. It is proposed to rejuvenate 60,000 ha of old and senile pepper gardens in Idukki district within five years. Under this programme, financial assistance is provided for production of planting material by establishing small nurseries, rejuvenation of pepper gardens, construction of vermi-compost units, promotion of IPM, HRD programme and infrastructure development. Similarly in Wayanad, Spices Board started a replanting / rehabilitation programme in pepper with a financial outlay of Rs 48 crores using the funds available from the Ministry of Commerce.

It has been noticed that there are multiple actors, which are quite active in providing various kinds of support for black pepper. We noted two major findings from the previous analysis: first, variation in acreage allocation of the crop across regions; and second, negative growth experienced in the production of black pepper. In this light, the following section examines how far the institutional arrangements made by the vested agencies reached effectively at the grass root level.

IV. Role of Non-Price Factors: Findings from the Field

This section first presents a description of the study areas- Idukki and Wayanad and then discusses the methodology by explaining the sampling framework, the survey instrument used and the method of analysis employed.

A Brief Description of Idukki and Wayanad

Idukki is one of the mountainous Districts of Kerala, came into being on 26th January 1972. With a total geographical area of 5,019 square kilometres (13 percent of the total area of the state) the District of Idukki falls mainly on upland

area. Topographically, Idukki district is divided into two divisions. No part of the district lies in low land. The average rainfall receives in the district is 2867.9 mm and the temperature varies between 27^0 C and 21^0 C. The soils of this district are classified into laterite, forest and hilly soils. The major crops grown in the district are cardamom, black pepper, tea, coffee coconut.

Out of the four taluks in the district viz. Devikulam, Udumbanchola, Peerumedu and Thodupuzha, present study has chose two panchayats from Udumbanchola taluks- Nedumkandam and Erattayar.

Wayanad district came into existence on 1st November, 1980 as the 12th district of the state. The district has an area of 2131 sq.kms, which account for 5.48 percent of the state total. Being a hilly district, vast area of Wayanad consists of forests (36.48 per cent). Nearly 51.04 per cent of the total area of the district is is under cultivation. The agro- climatic conditions of Wayanad are as follows: a) the average rainfall that the district receives during the year is 1938 .9 mm b) During the cold season temperature falls below 15^0 Celsius, but in summer season a temperature of 29^0 Celsius and more is often recorded. From October to the end of February the atmosphere become dry, cool and salubrious. The seasonal crops that require heavy rainfall and perennial crops that require prolonged rainfall can have a healthy growth in the district. The high altitude in the district is suitable for the cultivation of perennial plantation crops and spices. The major plantation crops include coffee, tea, black pepper, cardamom and rubber.

Among three taluks, Sulthan Bathery, Mananthavady and Kalpetta, the study has chosen two panchayats- Pulpally and Mullankolly from Sulthan Bathery taluk for further analysis.

Sampling Framework and Survey Instrument

To explore the role of non price factors in the performance of black pepper in the state, a total sample of 180 households were selected from both Idukki and Wayanad. By using proportionate stratified random sampling method, the study

selected 100 growers from Wayanad and 80 growers from Idukki. A structured interview schedule has been used to collect primary data from the field. This schedule generated information on socio economic condition of growers, production conditions, marketing aspects and research and extension by the state. The survey was conducted during the month of January and February 2012.

As per NSSO definition, farmers can be broadly classified as Marginal (≤ 1 hectare[27]), Small (1 to 2 hectares), Semi Medium (2 to 4 hectares), Medium (4 to 10 hectares) and Large (≥ 10 hectares). Statistics from Krishibhavans in both Idukki and Wayanad districts shows that majority of the pepper growers are belongs to marginal and small categories. Table 5.5 shows the information on number of pepper growers which is selected for further analysis.

Table 5.5 Classification of black pepper growers according to land holdings

Category	Idukki	Wayanad	Total
Marginal Farmers	37 (46.2)	64 (64)	101 (56)
Small Farmers	31 (38.8)	32 (32)	63 (35)
Semi Medium Farmers	12 (15)	4 (4)	16 (9)
Total	**80**	**100**	**180**

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages

It is evident from Table 5.5 that, out of 180 sample pepper growers, majority of them (56 per cent) belongs to the category of marginal holders having land less than 2.5 acres, whereas 35 per cent belongs to small farmers category and rest 9 per cent under semi medium category. This study does not come across with farmers having land holdings more than 10 acres. As per government rule, government will provide subsidies and other supportive measures only for those farmers having land less than 5 acres. However, to capture the role of the institutional arrangements in the case of black pepper, this study has selected majority of the growers from small and marginal holders and to understand the situation

[27] 1 Hectare= 2.5 acres. Since the land holdings of farmers is very less, in this situation measurement of land holdings in terms of acres would provide more clear result than hectare. As a result, the present study taken into account of the unit 'acre' instead of 'hectare'.

of growers who does not avail any support from government, this study includes farmers who has holdings of land more than 5 acres.

Household Characteristics

It is evident from the Table 5.6 that, average age of the head of the household in both the study areas was around 55 years. It is clear that most of the black pepper growers are having nearly 10 years of schooling in both the districts. Moreover the average land holdings of total 180 growers were around 3.09 acres; of which Idukki district have average area of land of 3.53 acres which is found to be higher than in Wayanad (2.64 acres). Regarding the experience in the cultivation of black pepper, it is on an average of nearly 38 years among the sample growers. Average family size of the growers is approximately 4 members (Table 5.6).

Table 5.6 Household characteristics of the Black Pepper growers in the study area (in Averages)

Category	Idukki	Wayanad	Total
Age (in years)	53	57	55
Education (Years of Schooling)	10	9	9.5
Land Holding (in acres)	3.53	2.64	3.09
Experience in Black Pepper Cultivation (years)	35	40	37.5
Family Size (in number)	4	4	4

Source: Sample Survey, 2012

Socio Economic Characteristics of Sample

Since it is important to get an understanding of the profile of the sample before proceeding with the analysis, the socio economic characteristics of the growers in Idukki and Wayanad are analysed on the basis of the attributes such as age, religion, caste, marital status, educational status, and choice of occupation. When the age of the 180 sample black pepper growers is considered, most of the growers (57 per cent) belong to the age group between 51 and 65 (Appendix Table 5A.1) with a minimum age of 32 and maximum of 87 in Idukki and 38 and 85 in Wayanad. Gender wise classification of the head of the

family who is taking decisions regarding farming activity revealed the male domination (94 per cent) with most of them (91 per cent) included in the married. Regarding the education level, we can see that 48 per cent of the 180 sample growers have educational qualification upto SSLC and 27 per cent with an education less than Primary or less (see Appendix 5A. 4). This might be the reason why 83 per cent of the 180 sample black pepper growers are depending on farming for their livelihood activity. Along with this, 63.9 per cent of the growers are engaged in animal husbandry for ensuring subsistent income and for the making available of cow dung which is best manure for black pepper.

Regarding the experience in the cultivation of black pepper, one could observe from the survey that 74 per cent of the growers are having experience in the cultivation more that 25 years and less than 45 years. Moreover, 17.2 per cent of the growers have experience more than 45 years (see Appendix table 5A.7).

Production Conditions

This section analyse the cultural practices followed by black pepper growers, yield levels and production conditions in both Idukki and Wayanad.

Land Holding Pattern

The sample black pepper growers (180) have an operated land holdings of 546.3 acres constituting of 264 acres in Wayanad and 283 acres in Idukki. Out of 264 acres in Wayanad, nearly 45 per cent each of area holdings belongs to marginal and small growers, whereas semi medium growers hold 11 per cent of the land (Table 5.7). As compared to Wayanad, share of area under marginal growers in Idukki is less (24 per cent of the total sample area). In Idukki, 33 per cent of total land is belongs to semi medium growers. Moreover, 43 per cent of land belongs to small growers in the district.

However the average size of holdings among all the categories of growers in both the districts is more or less the same. It should be noted from the Table 5.7 that the average land holding size of marginal growers is around 1.8 acres, while for small growers the average size is 3.7 acres in Wayanad and 3.4 acres in Idukki. Among semi medium growers, Idukki district have a slight highest value that is 7.8 acres and for Wayanad it is 7.4 acres.

Table 5 . 7 Land Holding Pattern of the Sample Black Pepper growers

Size	Wayanad		Idukki		
	Area holdings (in acres)	Average Holding Size	Area holdings (in acres)	Average Holding size	Total Area
Marginal	116.9 (44.45)	1.8	67.7 (24)	1.8	184.6
Small	117.4 (44.52)	3.7	121.5 (43)	3.4	238.9
Semi Medium	29.5 (11.2)	7.4	93.5 (33)	7.8	123
Total	263.7	2.6	282.6	13	546.3

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages

The Table 5.7 gives information on the total land holdings in the study areas and the average size of holdings. Since black pepper is a perennial crop, the estimation of area is on the basis of number of vines per acre.

Area under Black pepper

As per National Horticulture Mission guidelines, area under black pepper has been calculated on the basis of number standards per hectare. For mixed crops, 216 standards[28] have been counted as one acre whereas for mono crops, the number of stands per acre is 500.

[28] Standard is the supporting thing – either trees or any artificial support which helps black pepper to grow. Normally two vines will be grown together in one standard.

Table 5.8: Distribution of Land According to Number of Black Pepper Standards

Category	Wayanad		Idukki		
	Standardised* Area	Average Area	Standardised* Area	Average Area	Total
Marginal	88.5 (44)	1.2	145.9 (34)	4	225.2 (37.6)
Small	90.3	2.8	204.6	6	274.3 (45.8)
Semi Medium	24.1	6.1	74.8	6.2	98.9 (16.5)
Total	202.9	2	425.3	6.2	598.4

Source: Sample Survey, 2012
Note: Area has been estimated by following this method: For mixed crops, we divided total number of stands by 216 and for mono crops, we divided total number of stands by 500

It has been noted from the Table 5.8 that area under black pepper in terms of 216 vines per acre for mixed cropping and 500 vines for mono cropping reveals that area under black pepper in Idukki is very high as compared to Wayanad. Total area under black pepper cultivation in Wayanad is only 202 acres, whereas in Idukki it is 425.3 acres. As we observed from Table 5.7 that total area holdings in Idukki is only 282.6 acres, but when it is converted into black pepper standard area, it recorded a two fold increase. But in Wayanad, area under black pepper (202.9 acres) is very less as compared with total actual land holdings (263.7 acres). This shows that the intensity of cultivating black pepper in Idukki is more when compared to Wayanad. This might be one of the reasons to increase the area under black pepper in Idukki as compared to Wayanad (Table 5.8). Moreover, there is the pronounced prominence of mixed cropping (99 per cent) of black pepper along with other perennial crops in Wayanad, while in Idukki we found some evidence of practising mono cropping system (17.5 per cent of the Idukki sample growers) (Appendix 5A.8). The major crop combination in Wayanad arecanut (91 per cent), coffee (92 per cent), coconut (88 per cent), banana (63 per cent), rubber (68 per cent), paddy (11 per cent), vegetables (2 per cent) and cardamom (5 per cent), (Appendix 5A.9) whereas in choice of cropping pattern by the sample black

pepper growers in Idukki is cardamom (36 per cent), arecanut (17 per cent), coffee (31 per cent), coconut (47 per cent), banana (36 per cent), cocoa (16 per cent), rubber (15 per cent), vegetables (18 per cent) and vanila (8 per cent) (see Appendix 5A. 10).

Age wise distribution of Plants

It has been noted from Table 5.9 that the percentage of standards under both pre bearing (less than 4 years) and peak bearing (4 to 20 years) are more or less same for all the categories in Wayanad (Table 5.9). The percentage of sample growers having over aged stands is negligible. One interesting point here is that within age group, the percentage of sample growers who cultivate local varieties is slightly higher than high yielding varieties developed by state agricultural universities in their research institutes. A possible exception has seen in peak bearing category of small growers which includes 31 per cent has cultivated HYVs against 28 percent of local varieties.

Table 5: 9 Distribution of Sample Growers According to Age Structure of Plants in Wayanad

Category	Pre Bearing*		Peak Bearing**		Over Aged***	
	Local	HYV	Local	HYV	Local	HYV
Marginal	61(61)	58(58)	62(62)	60(60)	0	1(1)
Small	27(27)	30(30)	28(28)	31(31)	2(2)	3(3)
Semi Medium	4(4)	2(2)	3(3)	2(2)	1(1)	0
Nil	8(8)	10(10)	7(7)	7(7)	97(97)	96(96)
Total	100	100	100	100	100	100

Source: Sample Survey, 2012
Note: Figures in Parentheses are percentages
***Less than 3 years,** 4 to 20 years, *** Above 20 years**

While in Idukki, the situation has entirely changed. Most of the growers in the study area prefer to choose HYV than local varieties. It has to been noted that nearly 23.8 per cent of the marginal growers prefer to cultivate HYVs of black pepper, whereas only 17.5 per cent prefer local varieties. Similarly for other two categories also, the per cent of growers who prefer HYVs against local can be seen

from the Table 5.10. Coming to the peak bearing category, one could observe the similar pattern of more HYVs of black pepper than local varieties. It shows that among marginal growers nearly 35 per cent of the sample growers has HYV pepper standard of the age between 4 to 20 years. Data on the percentage of small growers regarding the choice of local and HYV suggests that out of 80 sample growers, 27.5 per cent of growers prefer each varieties. Among semi medium growers, it can be noted that the percentage of growers who has cultivated local varieties (37.5 per cent) in their farm is high as compared to the percentage of HYVs (28.8 per cent). We can see from the table 5.10 that the percentage of over aged standards (above 20 years) is comparatively less for both the districts. There also one could observe that the percentage of HYVs among pepper standards is slightly higher than local varieties (see Table 5.10).

Table 5. 10: Distribution of Sample Growers According to Age Structure of the Black Pepper Standards

Category	Pre bearing		Peak Bearing		Over Aged	
	Local	**HYV**	**Local**	**HYV**	**Local**	**HYV**
Marginal	14 (17.5)	19 (23.8)	20 (25)	28 (35)	4 (5)	7 (8.8)
Small	17(21.25)	18 (22.5)	22 (27.5)	22 (27.5)	4 (5)	5 (6.3)
Semi Medium	6 (7.5)	7 (8.8)	8 (10)	7 (8.8)	4 (5)	2 (2.5)
Nil	43 (53.8)	36 (45)	30 (37.5)	23 (28.8)	68 (85)	66 (82.5)
Total	80	80	80	80	80	80

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages

On the whole it is clear from the sample; in Wayanad most of the sample black pepper growers have preference for local varieties over HYVs, whereas in Idukki most of the growers are cultivating HYVs. As seen from the farm level that, high yielding varieties required strong standards to climb and grow than local varieties. In this context the next section examines the type of standards available in both the districts for black pepper cultivation.

The choice of varieties between local and HYVs depends on the type of supporting standard available for the black pepper to grow. The type of standards required for local and HYVs are different. Normally HYVs requires strong stand than local varieties. The choice of pepper stands in Wayanad is given in Table 5.11

Table 5.11 Distribution of Sample growers According to their standard preference in Wayanad (in percentages)

Standard	Marginal	Small	Semi Medium
Murukke	12.5	9.38	25
Silver oak	57.81	75	75
Konna	12.5	6.25	0
Sheema Konna	96.88	87.5	75
Bamboo	3.13	21.88	0
Arecanut	32.81	40.63	25
Muringa	93.75	93.75	100
Others	56.25	75	25

Source: Sample Survey, 2012

It has been noted that 96 per cent of marginal growers, 87.5 per cent of small growers and 75 per cent of semi medium growers are using Sheema konna as the standard followed by Muringa, silver oak and other trees includes jack, mango so on. As noted from the experience of sample growers that though arecanut can be used as a stand for the cultivation of black pepper, the grip which provided by this crop during rainy season will not enough to stand the vines properly. This might leads to the destruction of pepper vines during heavy monsoon periods. Even also 32.81 per cent of marginal growers, 40.63 per cent of the small growers and 25 per cent of the semi medium growers prefer areca nut for pepper cultivation, because of the unavailability of enough supporting stands in their farm field. However, Murukke is one of the important supporting stand for black pepper cultivation, the percentage of growers using murukke for raising black pepper is very low (Table 5.11). In 2004, all the murukke trees in Wayanad got severely infected by a particular type of pest- Govasp, and most of the murukke got destructed. Before the incidence happened most of the pepper stands where cultivated in murukke. But the problem with the murukke led to the destruction of majority of the black pepper plants which are cultivated in murukke. The re cultivation of murukke again got failure due to pest attack. After this incidence, most of the pepper growers in Wayanad are facing difficulty to get proper supporting stands to cultivate black pepper. Type of stands used by sample pepper growers in Idukki is given in the Table 5.12.

Table 5.12 Distribution of Sample growers According to their standard preference in Idukki (in percentages)			
Stand	**Marginal**	**Small**	**Semi Medium**
Murukke	75.7	83.9	58.3
silver oak	16.2	32.3	0.0
Konna	5.4	6.5	0.0
Sheema konna	29.7	6.5	25.0
Others	51.4	51.6	66.7
Source: Sample Survey, 2012			

It may be observed from the Table 5.12 that murukke is the most preferred stand for black pepper cultivation in Idukki. Out of 80 sample growers, nearly 75.7 per cent of marginal growers, 83.9 per cent of the small growers and 58.3 per cent of the semi medium growers are cultivating black pepper in murukke. Next to this, growers are cultivating black pepper by using Sheema konna and silver oak (Table 5.12). Moreover other than murukke, silver oak, konna, Sheema konna, growers are cultivating black pepper in jack, mango and variety of other trees.

Average Yield of Black Pepper (Kg/Stand)

Table 5.13 Average Yield of black pepper in the study area

District	**2010**	**2011**
Idukki	0.96	0.76
Wayanad	0.40	0.60
Total	**0.70**	**0.66**

Source: Sample Survey, 2012

It has been noted from the Table 5.13 that average yield of black pepper in Idukki is comparatively high. In 2010, the average yield is 0.96 kg/stand, while for Wayanad it was only 0.76kg/stand. Similar is true for the year 2011.

Marketing practices

In a developing country like India, marketing infrastructures play a pivotal role in fostering and sustaining the tempo of rural and economic development (Jairath, 2008). In the context wherein markets are getting integrated with the world market

has lead most of the farmers to depend heavily on external markets to derive surplus out of produce. Marketing aspects in Idukki and Wayanad reveals that majority of the sample growers in both the study area prefer to sell their produce only after curing, that too for local dealers than whole sellers. The possible reasons found from the survey are that the local dealers are willing to give money in advance to the growers. Moreover, as we seen the average production of the sample growers are very less. This also forces the growers to sell their produce to local dealer. Similarly lacks of transportation to the place where whole sellers are available also lead some of the sample growers to go for local dealers. Other reasons which the sample growers cited involve delay in the payment by the whole sale dealers. Sometimes it will be more than 7 days.

One of the interesting points to be noted from the survey is that in Wayanad all the sample growers are facing all sort of problems such as advance taken, too small quantity and so on, the only exception is transportation cost. It is seen that local dealers are available within a distance of 1 kms. While in Idukki, it is found that few growers (18.75 per cent) were selling their produce to local dealers without any reason (all the related tables are given in Appendix 5A 11 to 5A.13.

Institutional Supports and Services

Credit

It is evident from the Table 5.14 that most of the farmers have availed credit from different sources. The share of farmers who have availed credit is as high as 86 per cent in Wayanad and 72.5 per cent in Idukki. The major source of credit is found to be co-operative and nationalised banks (see Appendix 5A.13).

Table 5. 14 Distribution of Sample Growers based on Credit availed

Category	Wayanad				Idukki			
	Marginal	**Small**	**Semi Medium**	**Total**	**Marginal**	**Small**	**Semi Medium**	**Total**
Yes	52(81.3)	30(93.8)	4(100.0)	86.0	25(67.6)	24(77.4)	9(75.0)	58(72.5)
No	12(18.8)	2(6.3)	0.0	14.0	12(32.4)	7(22.6)	3(25.0)	22(27.5)
Total	64	32	4	100	37	31	12	80

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages

Insurance

During field survey it has been noted that black pepper is one of the spice crops which is prone to different risks in the form of various pests and disease attacks and climatic variations. However, from the field survey it was transpired that as of now there is hardly any institutional arrangement for providing crop insurance for the black pepper growers.

Replanting and rejuvenation schemes

As we have mentioned earlier, spices board has started the scheme of providing replanting subsidy to the growers. Payment of subsidy is per plant basis which is planted with a minimum of two rooted or stem cuttings. Subsidy per standard replanted/rejuvenated is Rs.28.00 which will be paid in two annual instalments of Rs.16.00 during the year of planting and Rs.12.00 during the subsequent year. This provision is basically for those growers who have stands between 10 and 1080. Moreover, black pepper is one of the side crops; spices board is not providing any more schemes for the welfare of this crop. It is observed from Table 5.15 that all the categories have replanted less than 500 stands of black pepper within 5 years. Similarly in Idukki 50 per cent of the 80 total samples in Idukki are coming under this category.

Table 5. 15 Distribution of Sample growers according to replantation of standards (in percentages)

Category	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Less than 500	98.4	96.9	75.0	97.0	59.5	32.3	66.7	50.0
500 to 1000	0.0	3.1	25.0	2.0	0.0	32.3	8.3	13.8
Above 1000	0.0	0.0	0.0	0.0	8.1	6.5	0.0	6.3
Nil	1.6	0.0	0.0	0.0	32.4	29.0	25.0	30.0

Source: Sample Survey, 2012

Amount of Subsidy Availed

Subsidies can be availed only by those growers with holding upto 5 acres. As per this norm 68 growers in Idukki and 96 growers in Wayanad are eligible for availing subsidies.

Table 5.16 Distribution of Sample growers According to Subsidy (in Percentages) for the last five years

Subsidy	Wayanad			Idukki		
	Marginal	Small	Total	Marginal	Small	Total
Less than 2500	20(31.3)	10(31.3)	27(28.1)	5(13.5)	0	5(7.4)
2500-5000	9(14.1)	9(28.1)	17(17.7)	4(10.8)	5(16.1)	9(13.2)
Above 5000	2(3.1)	6(18.8)	6(6.3)	12(32.4)	12(38.7)	24(35.3)
Nil	33(51.6)	7(21.9)	40(41.7)	16(43.2)	14(45.1)	30(44.1)
Total	64	32	96	37	31	68

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages

It may be observed from the Table 5.16 that 51.6 per cent of the marginal growers in Wayanad and 43.2 per cent of the marginal growers in Idukki are not availing any subsidy. One of the reasons for this phenomenon is, most of the growers feel that applying for subsidies is a time consuming process and there is no surety that they can avail the subsidy in the setting of heavy pest and disease attack to the standards.

Establishment of Nursery

Though spices board is providing subsidies for developing black pepper nurseries in their own farm land, none of the sample growers have yet started their own nursery.

Source of Information

Table 5.17 revealed that 57 per cent of the sample growers in Wayanad are depending all the below mentioned sources to collect information on plant varieties. Among 100 sample growers in Wayanad, 6 per cent of the growers depended on other fellow farmers. While in Idukki, nearly 21.6 per cent of the

marginal growers only depends spices board only for getting information on plant variety. Whereas 47. 5 per cent of the 80 sample growers in Idukki depended on the fellow farmers to get information. It is observed that in Idukki, growers mostly depend on spices board and other farmers to obtain information.

Table 5:17 Distribution of Samples According to source of information on plant variety

	Wayanad				Idukki			
	Marginal	**Small**	**Semi Medium**	**Total**	**Marginal**	**Small**	**Semi Medium**	**Total**
Agricultural Office	0.0	0.0	0.0	0.0	1(2.7)	0.0	0.0	1(1.3)
Spice Board/ICRI	0.0	0.0	0.0	0.0	8(21.6)	2(6.5)	4(33.3)	14(17.5)
Private Consultants	1(1.6)	1(3.1)	0.0	2.0	0.0	2(6.5)	0.0	2(2.5)
Other Farmers	4(6.3)	2(6.3)	0.0	6.0	17(45.9)	18(58.1)	3(25.0)	38(47.5)
Pesticide/ Fertilizer dealers	0.0	0.0	0.0	0.0	0.0	1(3.2)	0.0	1(1.3)
Other sources	0.0	0.0	0.0	0.0	6(16.2)	3(9.7)	1(8.3)	10(12.5)
All the above	35(54.7)	19(59.4)	3(75.0)	57(57.0)	0.0	0.0	0.0	0.0
None	24(37.5)	10(31.3)	1(25.0)	35(35.0)	5(13.5)	31(16.1)	4(33.3)	14(17.5)
Total	64	32	4	100	37	31	12	80

Source: Sample Survey, 2012

When it comes to information regarding plant protection, Table 5.18 shows that in Wayanad all the sample growers depends all the below mentioned sources to gather information regarding plant protection. In Idukki, majority (30 per cent) of the sample growers depends on pesticides and fertilizer dealers to get information on plant protection.

Table 5.18 Distribution of Samples According to source of information on plant protection (in percentages)								
	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Agricultural Office	0.0	0.0	0.0	0.0	2.7	3.2	0.0	2.5
Spice Board/ICRI	0.0	0.0	0.0	0.0	18.9	9.7	25.0	16.3
Private Consultants	0.0	0.0	0.0	0.0	0.0	3.2	8.3	2.5
Other Farmers	0.0	0.0	0.0	0.0	24.3	29.0	16.7	25.0
Pesticide/ Fertilizer dealers	0.0	0.0	0.0	0.0	24.3	35.5	33.3	30.0
Other sources	0.0	0.0	0.0	0.0	24.3	9.7	8.3	16.3
Both A, B,D,F	62.5	78.1	50.0	67.0	0.0	0.0	0.0	0.0
None	37.5	21.9	50.0	33.0	5.4	9.7	8.3	7.5
Source: Sample Survey, 2012								

Source of Information on fertiliser use/ price

Regarding the source of information regarding fertiliser use, sample growers are mainly contacting agricultural office, spices board, other farmers and pesticide and fertilisers dealers, among those, percentage of sample growers who are approaching pesticide/fertiliser dealers is highest in both the districts (see Appendix 5A.14). The heavy dependence of private dealers for plant protection is indicative of the failure of institutional mechanism and its implications, especially in term of excessive use of chemical fertilizers and pesticides needs further inquiry. For information on prices, sample growers depend mostly on news paper, television and radio.

Source of Planting Material

Regarding the source of planting material, 25 per cent of the sample growers in Wayanad are depending private nurseries to get planting material. While 75 per cent are using planting material from their own farm land and also from spices board and private nurseries. In Idukki, 40 per cent of the sample

growers are getting planting material from their own field to replant and nearly 42. 5 per cent of the growers depends all the sources to get planting materials.

Table 5.19 Distribution of Samples According to source of planting material (in percentages)

	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Own Farm	0.0	3.1	0.0	1.0	37.8	45.2	33.3	40.0
Private Nursery	7.8	15.6	25.0	11.0	18.9	9.7	8.3	13.8
Spices Board	0.0	0.0	0.0	0.0	5.4	3.2	0.0	3.8
State Agri dept	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Both A,B and C	92.2	81.3	75.0	88.0	37.8	41.9	58.3	42.5

Source: Sample Survey, 2012

Organic farming

Agricultural practices world over has been undergoing changes over time. In order to ensure food security and self sufficiency, our country is following intensive agricultural practices over the past four decades. This was achieved through development of input responsive varieties coupled with use of chemical fertilizers and plant protection chemicals. Various technologies like Biological agriculture, Biodynamic farming, Health food, Green Food have been in vogue in the area of organic farming. Organic farming hinges on extensive use of naturally available resources, prefer-ably on-farm inputs to enhance soil fertility, in contrast to chemical fertilizers. The concept of organic farming is not new to Indian farming community. Several forms of organic farming are being successfully practiced in diverse agro-climatic situations, particularly in rainfed, tribal and hill areas of the country. Much of the forest produce of economic importance like medicinal plants by default come under this category.

Though spices board is providing support to undertake organic farming, only 5 per cent of the growers in Idukki are engaged in organic farming, whereas in Wayanad only 18 per cent of growers are engaged in organic farming.

Table 5.20 Distribution of sample According to Organic farming adoption (in percentages)

Category	Wayanad				Idukki			Total
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	
Yes	14.1	25.0	25.0	18.0	10.8	3.2	8.3	7.5
No	85.9	75.0	75.0	82.0	89.2	96.8	91.7	92.5

Source: Sample Survey, 2012

Regarding the support for organic farming, 83 per cent of the sample growers in Wayanad and 82.5 per cent of the sample growers in Idukki are not availing any support (Table 5.21). Coming to the source of support, in case of those who have availed any support, in Wayanad, spices board is providing assistance for organic farming while in Idukki state agricultural department is giving more assistance to the growers (see Appendix Table 5.25)

Table 5.21 Distribution of samples According to Organic farming Support (in percentages)

Category	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Yes	14.1	21.9	25.0	17.0	18.9	19.4	8.3	17.5
No	85.9	78.1	75.0	83.0	81.1	80.6	91.7	82.5

Source: Sample Survey, 2012

Table 5.22 Distribution of samples According to Organic Supporting Source (in percentages)

	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Spices Board	3.1	12.5	25.0	7.0	5.1	0.0	0.0	2.5
Agri dept	4.7	6.3	0.0	5.0	17.9	19.4	8.3	15.0
Nil	92.2	81.3	75.0	88.0	76.9	80.6	91.7	82.5

Source: Sample Survey, 2012

Training Programmes

It has been observed from the study area that, nearly 58 per cent of the sample growers in Wayanad had attended the training programmes more than three times within the last five years (Table 5. 23), while in Idukki 47.5 percent of sample growers have attended classes once in the reference period. These programmes are organised by various institutions amongst which spices board organised majority of the programmes in Wayanad and state agricultural office in Idukki (see Table 5.24)

Table 5 23 Distribution of sample growers according to training camp attended for last five years

	Wayanad				Idukki			
Number of Times	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Once	2 (3.1)	1 (3.1)	0	3 (3)	20(54)	13 (35)	5 (42)	38 (47.5)
Twice	16 (25)	8 (25)	0	24 (24)	3 (8)	5 (13.5)	2 (16)	10 (12.5)
more than 3	37 (58)	19 (59.4)	2 (50)	58 (58)	4 (10.8)	3 (9.7)	0	7 (8.75)
Nil	9 (14)	4 (12.5)	2(50)	15 (15)	10 (27)	10 (32.3)	5 (42)	25(31.25)
Total	**64**	**32**	**4**	**100**	**37**	**31**	**12**	**80**

Source: Sample Survey, 2012

Table 5.24 Distribution of sample growers according to institution wise training camp attended for last five years (in percentages)

	Wayanad				Idukki			
Organisation	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Agri Dept	50.0	56.3	25.0	51.0	57.4	51.2	47.1	53.3
Spices Board	35.9	31.3	25.0	34.0	21.3	24.4	23.5	22.9
Nil	14.1	12.5	50.0	15.0	21.3	24.4	29.4	23.8
Total								

Source: Sample Survey, 2012

It is observed from the Table 5.25 that 47 per cent of those attended responded that classes were good and 36 per cent found it very good. While in Idukki, 26.25 per cent of the sample growers responded that classes were good but

majority of the samples (31.25 per cent) were not willing to the rate the programme (see Table 5.28).

Table 5.25 Effectiveness of Training programme

Organisation	Wayanad	Idukki
Nil	15 (15)	25 (31.25)
Average	2 (2)	6 (7.5)
Good	47 (47)	21 (26.25)
Very Good	36 (36)	12 (15)
Excellent	0	16 (20)
Total	100	80

Source: Sample Survey, 2012
Note figures in parentheses are percentages

Utilisation of Extension Services

Though most of the sample growers have attended the classes and rated that their classes were good, only 3 per cent of the total sample growers in Wayanad had approached different institutions for solving agriculture related problems. While in Idukki 60 per cent approached different institutions for agriculture related problems.

It has been noted that majority of the sample growers were not willing to rate the services provided by the concerned institutions. (see Appendix Table 5A. 16 and 17). Moreover 53 percent of the sample growers in Wayanad responded that extension officers often visit their farm field while in Idukki, 48 per cent responded the same (Table 5.26)

Table 5:26 Extension Officers Visit (in percentages)

Frequency	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Very Often	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Often	51.6	59.4	25.0	53.0	54.1	41.9	50.0	48.8
Rarely	0.0	9.4	0.0	3.0	13.5	12.9	16.7	13.8
Very Rarely	48.4	31.3	75.0	44.0	32.4	45.2	33.3	37.5

Source: Sample Survey, 2012

V. Summing Up

This chapter deals with the exploration of price and non price factors behind the divergent performance of black pepper in Kerala across regions. Analysis on the black pepper prices at different markets across regions reveals that there is no regional variation in prices across different markets. To explore the role of non price factors, the study conducted a survey in Idukki (central Kerala) and Wayanad (northern Kerala). Analysis shows that the intensity of cultivation in Idukki as compared to Wayanad is very high. Moreover it is noted from the field that Wayanad is more prone to risk that Idukki. The incidence- govasp attack on murukke-happened after 2000 in Wayanad destroyed the standards of black pepper. This adversely affected black pepper vines in the district. After this incidence, pepper growers in Wayanad are facing the problem of lack of proper, strong standards to grow the black pepper vines. Whereas, Idukki has the advantage of more strong standards like murukke which allows the growers to cultivate more black pepper in their small plot of land.

Regarding the institutional setups, it has been observed that in Wayanad, spices board has been playing a better role than agricultural office- Krishibhavans, while in Idukki it is the other way round. The Spices Board has started taken care of this crop only after getting guidelines from NHM during mid 2000. Before this, state government alone was providing all the assistance to the growers. But the failure of state government to provide timely assistance to the growers during the crisis situation created by pest attack on standards led to huge reduction both pepper production and area under cultivation.

Though growers in both the study area would like to continue in the black pepper cultivation, the problems associated with the cultivation especially pests attack creates problems for the cultivation. Weak extension system along with lack of co ordination among spices board and state agriculture departments affects the efficient utilisation of resources available with the research system which in turn affects the quality and quantity of the support received by the growers.

Appendix 5A

Table 5A.1 Age wise classification of growers at Wayanad and Idukki

Age	Wayanad			Idukki			Total
	Marginal	Small	Semi Medium	Marginal	Small	Semi Medium	
Less than 50	12 (18.8)	8 (25)	2 (50)	11 (30)	17 (55)	6 (50)	**56(31)**
51 to 65	40 (62.5)	20 (62.5)	2 (50)	23 (62)	13 (42)	4 (33)	**102 (57)**
Above 65	12 (12.5)	4 (12.5)	0	3 (8)	1 (3)	2 (17)	**22 (12)**
Total	**64**	**32**	**4**	**37**	**31**	**12**	**180**

Note: Figures in the parentheses are percentages
Source: Sample Survey, 2012

Table 5A.2 Distribution of the Members of the Households by Category of Land Holdings and Gender

Gender	Wayanad			Idukki			
	Marginal	Small	Semi Medium	Marginal	Small	Semi Medium	Total
Male	62 (97)	32 (100)	3 (75)	32 (87)	30 (97)	11 (92)	**170 (94)**
Female	2 (3)	0	1 (25)	5 (14)	1 (3)	1 (8)	**10 (6)**
Total	**64**	**32**	**4**	**37**	**31**	**12**	**180**

Source: Sample Survey, 2012
Note: Figures in the parentheses are percentages

Table5A.3 Distribution of the Households in the sample by Marital Status

Marital Status	Marginal	Small	Semi Medium	Marginal	Small	Semi Medium	Total
Married	56 (88)	31 (97)	3 (75)	34 (92)	30 (97)	10 (83)	164 (91)
Unmarried	2 (3)	1 (3)	0	0	0	0	3 (2)
Widow	6 (9)	0	1 (25)	3 (8)	1 (3)	2 (17)	13 (7)
Total	**64**	**32**	**4**	**37**	**31**	**12**	180

Source: Sample Survey, 2012
Note: Figures in the parentheses are percentages

Table5A.4 Education Wise Distribution of growers in Different farming category

	Wayanad			Idukki			
Category	**Marginal**	**Small**	**Semi Medium**	**Marginal**	**Small**	**Semi Medium**	**Total**
1	24 (38)	6 (19)	0	13 (35)	5 (16)	1 (8)	49 (27)
2	30 (47)	16 (50)	2 (50)	15 (41)	15 (48)	9 (75)	87 (48)
3	8 (13)	6 (19)	1 (25)	4 (11)	3 (10)	2 (17)	24 (13)
4	0	2 (6)	0	4 (11)	7 (23)	0	13 (7)
5	1 (6)	2 (6)	1 (25)	1(3)	1 (3)	0	6 (3)
6	1(6)	0	0	0	0	0	1 (1)
Total	**64**	**32**	**4**	**37**	**31**	**12**	180

Note: 1= Primary or Less, 2= Upto SSLC, 3= Secondary Passed but have no degree, 4= Degree holders in general, 5= other Professional degree, 6= Illiterate

Figures in parentheses are percentages

Source: Sample Survey, 2012

Table5A.5 Distribution of Sample Pepper Growers by Primary Occupational Choice

Category*	Wayanad			Idukki			
	Marginal	**Small**	**Semi Medium**	**Marginal**	**Small**	**Semi Medium**	**Total**
1	51 (80)	28 (88)	2 (50)	30 (81)	29 (94)	11 (92)	**149 (83)**
2	2 (3)	1 (3)	1 (25)	1 (3)	1 (3)	0	**6 (3)**
3	0	0	1 (25)	2 (5)	0	0	**3 (2)**
4	1 (2)	1 (3)	0	1 (3)	0	0	**3 (2)**
5	5 (8)	2 (6)	0	2 (5)	0	1 (8)	**10 (6)**
6	2 (3)	0	0	0	0	0	**2 (1)**
7	2 (3)	0	0	1 (3)	0	0	**3 (2)**
8	0	0	0	0	0	0	**0**
9	1 (2)	0	0	0	1 (3)	0	**2 (1)**
Total	**64**	**32**	**4**	**37**	**31**	**12**	**180**

Note- 1= Farming, 2= Employed in State/Central Govt., 3= Employed in Semi Govt. Aided School etc, 4= Employed in Private Sector, 5=Self Employed, 6= Unpaid family Work, 7= Agricultural Labour, 8= Animal Husbandry and Poultry farming, 9= Pensioners

Note: Figures in parentheses are percentages

Source: Sample Survey, 2012

Table 5A.6 Distribution of Sample black peppers growers by Secondary Occupational Choice

Category*	Wayanad			Idukki			
	Marginal	**Small**	**Semi Medium**	**Marginal**	**Small**	**Semi Medium**	**Total**
1	11 (17.2)	2 (6.3)	1 (25)	3 (8.1)	1 (3.2)	-	4 (10)
2	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-
4	-	-	-	-	1(3.2)	-	1 (0.6)
5	-	-	-	-	-	-	3 (1.7)
6	-	-	-	-	-	-	-
7	-	-	-	1 (2.7)	-	1 (8.3)	2 (1.1)
8	37 (57.8)	17 (53.1)	3 (75)	28 (75.7)	22(71)	8(66.7)	58(63.9)
9	-	-	-	-	-	-	-
10	16 (25)	13 (40.6)	-	3 (8.1)	7(22.6)	2(16.7)	12(22.8)
Total	**64**	**32**	**-**	**37**	**31**	**12**	**80**

Note- 1= Farming, 2= Employed in State/Central Govt., 3= Employed in Semi Govt. Aided School etc, 4= Employed in Private Sector, 5=Self Employed, 6= Unpaid family Work, 7= Agricultural Labour, 8= Aminal husbandry and poultry farming, 9= Pensioners, 10= Nil

Figures in parentheses are percentages

Source: Sample Survey, 2012

Table 5A: 7 Distribution of sample growers According to Experience of Black Pepper cultivation

Year	Wayanad			Idukki			
	Marginal	Small	Semi Medium	Marginal	Small	Semi Medium	Total
Less Than 25	8 (12.5)	1 (3.1)	0	2 (5.4)	4 (12.9)	1 (8.3)	16(8.9)
25 to 45	49(76.6)	27 (84.4)	4 (100)	24 (64.9)	20 (64.5)	9 (75)	133 (73.9)
Above 45	7(10.9)	4 (12.5)	0	11 (29.7)	7(16.1)	2 (16.7)	31 (17.2)
Total	64	32	4	37	31	12	180

Source: Sample Survey, 2012

Note: Figures in the parentheses are percentages

Table 5A: 8 Distribution of Sample growers According to type of Cultivation

Category	Wayanad			Idukki			
	Mono cropping	Mixed cropping	District Total	Mono cropping	Mixed cropping	District Total	Total
Marginal	0	64 (100)	64	-	37 (100)	37	101 (56)
Small	1 (3)	31 (97)	32	10(25.8)	23 (74.2)	31	63 (35)
Semi Medium	0	4 (100)	4	4 (33)	8 (67)	12	16 (9)
Total	1	99 (99)	100	14 (17.5)	65 (81.1)	80	180

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages.

Table 5A. 9: Distribution of Sample Pepper growers According to Choice of Cropping Pattern in Wayanad

Crops	Marginal	Small	Semi Medium	Total
Pepper	37(37)	31(31)	12(12)	**100**
Cardamom	4 (80)	1(20)	-	**5(5)**
Arecanut	57 (62.6)	31 (34.1)	3 (3.3)	**91(91)**
Coffee	57 (61.9)	31 (33.7)	4 (4.3)	**92(92)**
Coconut	56 (63.6)	29 (32.9)	3 (3.4)	**88(88)**
Banana	42 (66.7)	20 (31.7)	1 (1.6)	**63(63)**
Rubber	37 (54.4)	27 (39.7)	4 (5.9)	**68(68)**
Vegetables	1 (50)	1 (50)	-	**2 (2)**
Paddy	7 (63.6)	3 (27.3)	1 (9.1)	**11(11)**

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages

Table 5A.10 : Cropping Pattern of Sample Black Pepper Growers in Idukki

	Marginal	Small	Semi Medium	Total
Pepper	37 (46.3)	31 (38.8)	12 (15)	80 (100)
Cardamom	18 (50)	13 (36.1)	5 (13.9)	36 (45)
Arecanut	7 (41.2)	6 (35.3)	1 (5.9)	17 (21.3)
Coffee	11 (35.5)	15 (48.4)	6 (19.4)	31 (38.8)
Coconut	22 (46.8)	20 (42.6)	5 (10.6)	47 (58.8)
Banana	14 (38.9)	18 (50)	4 (11.1)	36 (45)
Rubber	3 (25)	7 (58.3)	2 (16.7)	12 (15)
Vanila	5 (62.5)	3 (37.5)	0	8 (10)
Cocoa	7 (43.8)	7 (43.8)	2 (12.5)	16 (20)
Vegetables	11 (61.1)	5 (27.8)	2 (11.1)	18 (22.5)

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages

Table 5A.11 Distribution of Sample growers According to mode of sale

Mode of sale	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Garden Sale	0.0	0.0	0.0	0.0	1(2.7)	0.0	0.0	0.0
Green sale	0.0	0.0	0.0	0.0	0.0	0.0	1(8.3)	1(1.3)
Sale After Curing	64 (64)	32 (32)	4(4)	100	33(89.2)	31(100.0)	10(83.3)	74(92.5)
Nil	0.0	0.0	0.0	0.0	3(8.1)	0.0	8.3	4(5.0)
Total	64	32	4	100	37	31	12	80

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages

Table 5.12 Distribution of Samples According to the Sales

Selling the Produce	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Local dealer	46(71.9)	19(59.4)	4(100.0)	69 (69.0)	34 (91.9)	20(64.5)	8(66.7)	62(77.5)
Whole sale	18 (28.1)	13 (40.6)	0	31 (31.0)	2(5.4)	9(29.0)	3(25.0)	14(17.5)
Nil	0	0	0	0	1 (2.7)	2(6.5)	1(8.3)	4(5.0)
Total	64	32	4	100	37	31	12	80

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages

Table 5A.13 Distribution of Samples According to the reasons for sales to local dealers

Reasons	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Advance taken	1(1.56)	2(6.25)	0.00	3(3.85)	2(5.41)	2(6.45)	0.00	4(5.00)
Too small a quantity	1(1.56)	1(3.13)	0.00	2(2.56)	9(24.32)	3(9.68)	0.00	12(15.00)
Transport cost	0.00	0.00	0.00	0.00	11(29.73)	13(41.94)	0.00	24(30.00)
Other reasons	44(68.75)	22(68.75)	2(50.00)	46(58.97)	9(24.32)	7(22.58)	2(16.67)	18(22.5)
All the above	18(28.13)	7(21.88)	2(50.00)	27(34.62)	2(5.41)	2(6.45)	1(8.33)	5(6.25)
Nil	0.00	0.00	0.00	0.00	4(10.81)	4(12.90)	58.33	15(18.75)
Total	64	32	4	100	37	31	12	80

Source: Sample Survey, 2012
Note: Figures in parentheses are percentages

Table5A.14 Distribution of Sample Growers According to Source of Credit (in percentages)

Banks	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Co op bank	42.2	28.1	0.0	36.0	24.3	41.9	16.7	30.0
Nationalised Banks	12.5	25.0	100.0	20.0	27.0	29.0	33.3	28.8
Both	26.6	37.5	0.0	29.0	5.4	3.2	16.7	6.3
Nil	18.8	9.4	0.0	15.0	43.2	25.8	33.3	35.0

Source: Sample Survey, 2012

Table 5A.15 Distribution of Samples According to source of information on fertilizer use (in percentages)

	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Agricultural Office	15.6	28.1	0.0	19.0	2.7	0.0	8.3	2.5
Spice Board/ICRI	18.8	21.9	0.0	19.0	16.2	6.5	0.0	10.0
Private Consultants	0.0	0.0	0.0	0.0	0.0	3.2	8.3	2.5
Other Farmers	10.9	9.4	0.0	10.0	13.5	16.1	8.3	13.8
Pesticide/ Fertilizer dealers	18.8	21.9	50.0	21.0	37.8	45.2	33.3	40.0
Other sources	0.0	0.0	0.0	0.0	21.6	12.9	8.3	16.3
None	35.9	18.8	50.0	31.0	8.1	16.1	33.3	15.0

Source: Sample Survey, 2012

Table 5A.16. Rating the agri department service

Organisation	Wayanad				Idukki			
	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Bad	0	1	1	2	3	2	2	7
Average	0	1	1	2	0	1	0	1
Good	34	16	0	50	5	1	1	7
Very Good	0	0	0	0	2	2	0	4
Excellent	0	0	0	0	1	2	0	3
None	30	14	3	47	26	23	9	58
Total	64	32	4	100	37	31	12	80

Source: Sample Survey, 2012

Table 5A.17. Rating Spices Board department service								
	Wayanad				Idukki			
Organisation	Marginal	Small	Semi Medium	Total	Marginal	Small	Semi Medium	Total
Bad	1	0	1	2	2	0	0	2
Average	0	0	0	0	5	1	0	6
Good	0	0	0	0	4	3	1	8
Very Good	0	0	0	0	12	4	1	17
Excellent	0	0	0	0	6	6	3	15
None	63	32	3	98	8	17	7	32
Total	64	32	4	100	37	31	12	80
Source: Sample Survey, 2012								

Chapter 6

Summary and Concluding Observations

It is often argued that, during the past few decades, driven by number of factors- both price and non-price, the cropping pattern in Kerala has undergone major changes which *inter alia* included a shift away from food crops to commercial crops. In this context, the present study has made an attempt to explore the performance of commercial crops in Kerala to understand whether all the commercial crops have been experiencing up upward trend? Moreover, are there any differences across crops? If there are observed differences in the performance between different commercial crop, then how to account for the same? In this context, the present study undertakes an analysis of the performance of commercial crops in Kerala with focus on Black pepper. The objectives of the study are as follows: to understand the performance of commercial crops in Kerala, to analyse the trends in area, production, yield and price of black pepper in the state with a regional perspective and to explore the role of non price factors (especially the institutional arrangements) that influence the cultivation of Black pepper.

The study is based on both primary and secondary data. Secondary data is collected from various government sources to realize the objective at macro level. To understand the regional pattern in the observed trend, the state is divided into three regions- southern, central and northern. Further, analysis has been carried out for the period of last fifty years: that is, 1960-61 to 2009-10. To explore the role of non price factors, primary data from a sample of 180 households spread across two districts; namely, Idukki and Wayanad was collected using a structured interview schedule. Both qualitative and quantitative information has been gathered to the purpose of the study.

Before getting into the analysis, the study explored various secondary data sources on Kerala's commercial agriculture and highlighted their limitations. It is found

that there are various issues related to the –estimation of NSA and cropping intensity of the state. Further it was also observed data for various categories especially the age wise distribution of plants (or yielding area) in the case of perennial crops is not available, which lead to bias in the production estimates. There is lack of uniformity in data across different sources and different publications under same source.

Since there is no other alternative sources to get unbiased data, the present study relied on Department of Economics and Statistics, Kerala to fulfil the objectives of the study. Analysis of the performance of commercial crops has shown that until 2000, area under most of the commercial crops registered an upward trend. But after 2000, while certain crops (such as rubber, arecanut and coffee) continued its upward trend in area, some other crops such as black pepper and coconut, experienced an decline in area under cultivation. Among the crops that recorded decline in area, the highest decline was observed in case of black pepper. Analysis on growth rates of commercial crops revealed that the pace of decline in area under black pepper is very high as compared to the growth rate of other crops. Moreover decomposition analysis revealed that for black pepper, contribution of area effect is more towards the decline in production over the last thirty years, though yield effect dominated in the second half that is after 1995. The observed unique performance of black pepper called for inquiry in terms of its regional variation and underlying factors.

Black Pepper, considered to be the *king of spices*, has an important role in the Kerala economy and for a number of centuries it has been the centre of attraction for many foreign traders and adventurers who came in India in pursuit of pepper trade (George *et.al*, 1986). Black Pepper is a small holder, homestead farming crop which can be grown along with arecanut, coconut, shaded trees of cardamom, tea and coffee with comparatively low cost of cultivation. In this setting it would be of immense relevance, both for theory and policy, to understand why a mixed supportive crop such as black pepper has recorded a decline in its performance in terms of both area and production in recent years. The issue becomes all the more

important as black pepper is cultivated mostly by small and marginal holders and their livelihood has crucial bearing on this crop. Moreover, going by the available statistics, in 2009-10 the state of Kerala accounted for more than 95 percent of production and 89 per cent of area in India. Obviously, any down turn in Kerala's production is bound to have a negative impact on country's production. Against this background, the study has made an attempt to explore underlying factors behind the negative growth rate in terms of area and production of black pepper in Kerala at disaggregated level by a close examination of institutional arrangements, along with price factors, behind the acreage decision of pepper growers and the enhancement of pepper production in Kerala.

Detailed analysis of black pepper has shown that the decline in the performance of black pepper (in terms of area, production and yield at the state level) has been contributed mainly by the northern region of the state. However, central region has experienced a steady increase in acreage allocation under black pepper since 1990. Another interesting point noted in this section is that production has recorded a negative growth in the recent decade in all the regions. Similarly growth in the yield of all the regions shows that, southern and central Kerala has experienced a positive growth while northern Kerala recorded a negative growth, though the pace of decline has come down after 1999. This finding called for an exploration of the factors behind the divergent performance across regions – central and northern regions.

An analysis of the average whole sale price of black pepper in the two major markets of the crop- Cochin and Calicut - from 1980-81 to 2010-11using cointegration techniques revealed that these markets are highly integrated and that the observed regional difference cannot be attributed to price. Hence the study explored in detail the role of non price factors in general and institutions in particular.

Based on the primary survey conducted in both Idukki and Wayanad, where black pepper cultivation is concentrated, has come up with following findings. Black pepper, a crop highly vulnerable to pests and disease attack, is under the purview

of multiple actors: Spices Board, Ministry of Commerce, Government of India and State Government. However, there is very limited coordination between different agencies involved in the promotion of this crop. The study observes that Wayanad is more prone to risk in terms of pest attack and climatic disorder against Idukki. Moreover, the intensity of cultivation (Number of stands per acre) is very high in the case of Idukki against Wayanad. Moreover, the access to irrigation facilities is comparatively more in Idukki than Wayanad. The extension activities and the other support given by the departments concerned are found to be more or less same in both the districts. However, on interaction with the farmers in Wayanad, it was transpired that, despite the existence of institutional arrangements, the system turned out to be a passive spectator to the massive destruction of the black pepper in Wayanad in 2004 on account of varied diseases like quick wilt, slow wilt and little leaves along with destruction of the supporting trees (murukku) due to wasp disease. It appears that the growers have lost faith the ability of the institutional arrangements to offer timely help for addressing contingencies confronted by them. In a context of the failure of Institutional support at proper time and lack of coordination among agencies concerned lead the growers to diversify their cropping pattern to other commercial crops. Drawing from its findings, the study calls for more intense institutional intervention and highlights the need for better coordination among various agencies to provide the extension services and support at proper time to the pepper growers.

Although the study tried to explain the distinct performance of black pepper as compared to other commercial crops in Kerala; even differential performance of this crop in two regions; but we were not able to cover some of the important concerns related with the issue at hand, mainly due to paucity of time. Therefore, there is immense scope to carry forward this investigation in the state or in comparison with other black pepper growing state. Some of the research questions for further research are highlighted below.

- How far the dependency of growers on this crop along with other commercial crops has been changed from last two decades?

- In the context of globalization and liberalization, what is the role of technology and its diffusion to generate surplus for sustainable livelihood point of view of the growers?
- What is the role of different assets in shaping the livelihood of growers?
- What is the importance of state to provide better livelihood opportunity to the small and marginal growers? How they are coping with risk and uncertainty associated with farming?

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Household Questionnaire

Performance of Commercial Crops in Kerala: A Study of Black Pepper with Focus on Non Price factors

All information in this questionnaire will be kept strictly CONFIDENTIAL

GENERAL INFORMATION

Serial No	
District	
Village	

I. Household Details

1. Name of the household/HH No. :
2. Name of the head :
3. Name of the Place :
4. Name of the respondent :
5. Relation with the head of the household :

1	2	3	4	5	6	7	
Name (Sl. No)	Relation with Head	Gender 1.Male 2.Female	Age	Marital Status	Education	Occupation	
						Primary	Secondary

Code for Col	Codes for Col: 5	Codes for Col: 6	Codes for Col:7
1 Head of the HH 2. Spouse 3. Unmarried child 4. Married child 5. Son/Daughter in law 6. Grand child 7. Parents 8. Father/Mother/ in aws	1.Unmarried 2. Married 3. Widow/Widower 4. Divorced 5. Separate	1. Primary or less (?) 2. Upper primary up to secondary 3. Secondary passed but have no Degree 4. Degree holders general 5. Degree in agriculture 6. Other Professional degree (specify) 7.Illiterate	1. Farming 2. Employed in State /Central Govt. 3. Employed in Semi Govt. Aided school/college, co-operative /local administrative bodies. Etc 4. Employed in Private sector 5. Self employed 6. Unpaid family work 7. Agricultural labour 8 Animal husbandry/diary/poultry/

9. Others			fishing/ 9. Labourer in non-agri. Sector 10. Job seeker 11. Student 12. Pensioners, too old to work/ handicapped 13. Employed abroad

(There could be more than one secondary occupation please indicate all by putting codes)

9). Income (Average per year) of the household:

Code	1.<5000	2. 5000-10000	3. 10000-20000	4. >20000

10. Experience in pepper cultivation (years):

II. Production Conditions

11. Land ownership (Area in acres)

Total area of land owned	Total area with Patta	Area under mono crop black pepper	Area with mixed crop

If they have no patta for the land ask them in which way it affects them

12. Did you purchase or sell land (during last five years)? 1. Yes

2. No

13. If yes, please specify

1. Sold in acres 2. Bought in acres

14. In case of mixed crops please give the following details

Crops	Area	No.of trees	Age Structure					
			Pre bearing (No)*		Peak bearing(No)**		Over-aged***	
			Local	HYV	Local	HYV	Local	HYV
Pepper								
Cardamom								
Areca nut								
Coffee								
Coconut								
Vanilla								
Clove								
Nutmeg								
Ginger								
Tapioca								
Banana								
Rubber								
Vegetables								

Pre bearing *= 0-3 years , Peak bearing ** = 3-20 years, Over-aged ***= more than 20 years

15. In case of mono crop please give the following details

Crops	Age Structure					
	Pre bearing (No)		Peak bearing(No)		Over-aged (No)	
	Local	HYV	Local	HYV	Local	HYV
Black pepper						

If the farm has over aged plants then why replanting has not been done on time

16. Type of pepper standard:

1. *Murukke* 2. Silver Oak 3. *Konna* 4. *Sheema Konna* 5. Others, Specify

17. Did you shift from black pepper to other crops during the last 5 years?

Yes No

If yes, specify the crop and why:

18. Production of black pepper (dried product)

Year (2011)			**Year (2010)**		
Quantity produced (quintal = 100kg)	Quantity Sold (Quintal)	Average price Received (Rs/Kg)	Quantity produced (in quintal)	Quantity sold (Quintal)	Average price Received (Rs/kg)

19. Have you availed any credit? 1. Yes 2. No

If yes, please give the details

Source of credit	Type of loan (on Money/ by pledging loan Gold)	Purpose of loan	Amount outstanding	Rate of interest (per year)
1.Co-operatives				
2.Nationalised banks				
3.Money lenders				
4.Friends and relatives				
5.Others				

Code for purpose of loan: 1- capital exp in farm business, 2- current exp in farm business 3- Nonfarm business 4- consumption expenditure, 5- marriages/ other ceremonies 6- Education 7. Other specify

20. Do you have kissan credit card? 1. Yes 2. No

21. Do you have soil health card? 1. Yes 2. No

22. Do you have Spices board ID card (Y/N):

23. Do you have any type of crop insurance:

24. Do you have access to irrigation 1.Yes 2. No

If yes, please give the area covered (acre):

25. Replanting, land improvement and others (last 5 years)

Activity	Extent of coverage	Total expenditure	Amount of subsidy	Source of subsidy(Code)
Black pepper replanting (No. of plants)				
Land improvement (area)				
Irrigation (area)				
Farm machinery				
Establishment of nursery				

Code for Subsidy: 1. Commodity board 2. State Govt agencies, 3. NGOs 4. Others, Specify

III Post harvest operations and marketing

26. Do you have any machinery for post harvesting operations: Yes No

(Specify the source)

27. Marketing details

Particulars	Black pepper	
	At present	Past (5 years back)
1) Main mode of disposal (code)		
2) % of garden (contract) sale		
3) % of green sale		
4) To whom do you sell most of the product (code)		
5) Reason for sale to local dealer (code)		
6) When you sell your produce		
If during harvest, specify the reason		
If later, how long and specify the reason		

Code for 1	Code for 4	Code for 5	Code for 6
1. Garden sale (contract) 2. Green sale 3. Sale after curing	1. Local dealer 2. Wholesale 3. Auctions	1. Advance taken 2. Too small a quantity 3. Transport cost 4. other reasons (specify)	1. During harvest 2.Later

28. Distance to the nearest major market (in Kms):

29**. Source of information**

Sl.No	Particulars	Black pepper	
		current	past
1	Selection of plant variety while planting (Code)		
2	Information on plant protection		
3	Information on fertilizer use		
4	Information on prices		
5	Information on weather		
6	Have you done soil testing 1 Yes 2.No		
7	Who provide soil testing facility		
8	Source of planting material		
9	Information on the quality of planting material		

Codes: for 1-7 and 9.

1. Agricultural office 2. Spice Board/ICRI 3. Private consultants
4. Other farmers 5. Pesticide/fertilizer dealers 6. NGOs 7. Other sources 8. None

Code for 8.

1 Own nursery 2.Private nursery. 3 Spices Board 4 State Agriculture Dept 5. Others

30. Source of innovations adopted in the past 5 years

Sl. No	Technology	Pepper		
		Govt	Private	Govt
1	Variety			
2	Machinery			
3	Processing techniques			
4	Others			

31. Do you adopt organic farming 1. Yes 2. No

32. If yes, do you receive any support from any institution? 1. Yes 2. No

33. If yes, please give the major source (s)

1. Spices Board 2. Agriculture Department 3. NGOs 4. Other farmers 5 Others (specify)

34. Have you ever attended any training programme/campaigns etc. 1.Yes 2. No

How many in the last five years:

35. Training details

Organizer	Theme	Duration	Effectiveness

Effectiveness code 1. Bad 2. Average 3. Good 4. good 5 Excellent
Organizer code 1. Agri Dept 2. Spices board 3 NGOs
Extension services

36. Have you ever approached the following institutions for you agri related problems during the last one year? 1.Yes 2. No

37. If yes, how do you rate their services?

Agency	Rating
Agri Department	
Spices Board	
NGOs	

1. Bad 2. Average 3. Good 4. Very Good 5. Excellent

38. How frequently the extension officers/scientists visit your plot or you attend the spice clinics

1 Very often	2. Often	3. Rarely	4. Very rarely

Problems faced by the grower

39. Did you face any constraint while growing black pepper for last 5 years? Yes No

If yes, Specify:

Code: 1. Pests, 2. Labour issue, 3. Cost of cultivation, 4. Water Shortage, 5. Climate change
6. Others , specify

Specify the name of pest(s)

40. If there is labour problem, then what are the type of operations in which do you find labour shortage most acute? (codes)

Code- 1. Land preparation 2) Planting 3) Weeding 5) Plant protection 6) Fertilizer application 8) harvesting
10)threshing 11) Thrashing

41. What are your strategies to address this problem?

42. Difficulties in Selling Pepper:

1. Lower Price 2. Middlemen exploitation 3. Transporting difficulties 4. Others (specify)

43. Did you face any problems to get institutional support?

44. Asset position of the Household (tick as appropriate)

T.V		Telephone connection		Vehicles			Fridge	Electricity	Computer	Internet
Normal	LCD	Mobile	Landline	Heavy	Light	Bike				

45. Type of House owned

Roof	1 Thatched	2 Tiles	3 Concrete
No of floors	1 Single floor	2 Double floor	
Size of the house	1 Small	2 Big	3 Very big
Type of floor	1 Cement or less	2 Tiles	3 Granite/marble

46. Suggestions and Remarks (Respondent's)