DECLINE OF PADDY CULTIVATION IN KERALA
A STUDY OF ECONOMIC CAUSES

Thesis submitted for the Award of Ph.D. Degree in Economics

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CERTIFICATE

Certified that, this written account entitled DECLINE OF PADDY CULTIVATION IN KERALA - A STUDY OF ECONOMIC CAUSES is a bonafide record of research work done by *Sri. P. M. Thomas* under my guidance and supervision. The work has not been previously submitted for any other degree or diploma.

Thrissur,

18-12-1996

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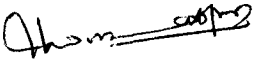
DECLARATION

I declare that, this written account entitled DECLINE OF PADDY CULTIVATION IN KERALA - A STUDY OF ECONOMIC CAUSES is the record of research work done by me under the supervision of *Dr. B. Alwin Prakash* and it has not been previously formed the basis for the award of any degree, diploma or other similar titles of recognition.

Kottayam,
16-12-1996.



P. M. Thomas.

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Chapter I

INTRODUCTION

A review of the sector-wise growth rates in the Net Domestic Product of Kerala during the last three decades from 1960-61 shows that, except for the second halves of 1960's and 1980's, primary sector had registered either very low growth rates or negative growth rates.Primary sector was the predominant sector of the state economy in1960-61 by contributing 56 percent of the state's Net Domestic Product. Thereafter as a result of the structural changes that had taken place in the economy, relative share of this sector began to decline. However, it remained to be the single largest sector till early eighties. In subsequent years tertiary sector became the largest contributor of the state's Net Domestic Product. Within a period of thirty years from 1960-61 to 1990-91 relative share of primary sector in Net Domestic Product of the state declined from 56 percent to 32.1 percent. Meanwhile the shares of secondary and tertiary sectors had increased from 15.2 percent to 28.2 percent and from 28.8 percent to 39.7 percent respectively.

Agricultural crop production accounts for nearly 95 percent of the State Domestic Product generated within the primary sector. In terms of growth rates agricultural sector of the state economy had passed through three phases corresponding to three different periods. During the first period (1960-61 to 1975-76) indices of agricultural production, area and productivity increased at the annual compound growth rates of 2.86 percent, 2.32 percent and 0.55 percent respectively.During the second period (1975 -76 to 1985- 86) growth rates in out put, area and productivity turned to be negative. This period is usually termed as the

period of 'agricultural stagnation' in Kerala, during which the annual compound growth rates in agricultural production, area and productivity were found to be (-)2.35 percent, (-)1.53 percent and (-)0.87 percent respectively. Third period (1985-86 to 1990-91) has been a period of moderate recovery in the agricultural sector. During this period total cultivated area and agricultural productivity in Kerala have shown positive growth rates of 0.42 percent and 1.18 percent respectively.

Crop wise analysis of the performance of agricultural sector in Kerala, since mid seventies, shows wide inter crop variations in growth rates. While the area under and output of the two major food crops in the state viz., paddy and tapioca, had declined during this period, some of the major commercial crops such as coconut, rubber and pepper have gained in terms of both area and production. Thus the visible signs of a revival observed in the agricultural sector of the state economy during the second half of eighties can be attributed to the better performance of commercial crops while the performance of food crops in general continued to be poor.

The overall performance of the state's rice economy was rather satisfactory till early seventies. During the period 1960-61 to 1974-75, area, production and per hectare productivity of paddy had shown annual positive growth rates of 1.10 percent, 2.06 percent and 0.93 percent respectively. After attaining its peak level of 8.81 lakh hectares in 1974-75, area under paddy in the state began to decline. During the period 1975-76 to 1991-92, area and production of paddy declined at the annual rates of (-) 3.09 percent and (-)1.54 percent respectively. Inspite of it, per hectare productivity of the crop continued to be positive during this period also.

1.1. Importance of the Problem

Rice accounts for more than 98 percent of the food grains produced in the state. Per capita daily availability of domestic rice in Kerala during the year 1961 was 162 grams which rose to 173.64 grams by the year 1971. However, during the year 1981 it decreased to 144.24 grams and later in 1991 it further declined to 97.15 grams. The dismal performance of the rice economy of Kerala creates a wide range of problems in the economic development of the state which is primarily agrarian in nature.

As per 1981 census, there are 29.1 million people in Kerala and rice is their staple food. The adult equivalent population in the state during 1991 is estimated to be 240.82 lakhs.[1] The required balanced diet of an average adult in Kerala, as recommended by the State Nutrition Board should contain 460 grams of cereals per day.[2] Accordingly, the total cereal requirements of the state amounts to 40.46 lakh tonnes in 1991. However, the domestic production of rice was only 10.60 lakh tonnes. Keeping 10 percent of the product for seed, feed and wastage, actual availability of domestic rice for home consumption amounted to 9.54 lakh tonnes which had been sufficient to meet only 23.58 percent of the state's internal requirements. For the rest of the rice the state had to depend on external sources.[3]

During the past two decades, the gap between internal production and requirement of rice in the state has been widening. Domestic production of rice was enough to meet 41 percent of the state's requirements during the year 1971. In 1981

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1. Adult equivalent population is estimated as 82.76 percent of actual population. See, Government of Kerala (1982), *Food Projection for Kerala State upto 2001 A.D.*, State Planning Board, Thiruvananthapuram.
2. Suseelan P. (1988), "Problems and Prospects of Rice in Kerala", (Paper presented at the *VIII Five Year Plan Workshop on Agricultural Development*, Thiruvananthapuram, October 6), p.4.
3. Eventhough in Kerala, tapioca is considered as an inferior substitute for rice, recently its importance as a food item is becoming more and more insignificant. During the last decade itself per capita availability of tapioca in the state had declined by 41.43 percent.

it was sufficient to meet 34 percent of the internal demand and at present more than three-fourth of the state's rice requirements are met either through imports by private traders or through central allotments. The State Planning Board had projected the cereal requirements of the state for the year 2001 AD as 54.81 lakh tonnes which include 10 percent for seed, feed and wastage. Assuming that the production of rice in the state will not further decline from the level of 1990-91, anticipated deficit for the year 2001 AD would be 83.60 percent. Allowing this gap to be filled by supplies through private imports or central allotments is very unsafe. Raising some cereal substitutes within the state is also a remote chance. Hence it is very important to revitalise the rice economy of the state.

Recovery of the paddy sector in Kerala is vital on many other grounds also. Paddy accounts for 90 percent of the total area under food crops in the state. According to the Establishment of Agency for Reporting Crop Statistics (EARCS) estimates for 1988-89 it is cultivated in 20.53 percent of the net area sown in the state. In the year 1990-91, 18.39 percent of the total cropped area in the state was under paddy cultivation. Again, paddy crop provides more than 105 million man days of employment and contributes nearly 20 percent of the state's agricultural income at 1984-85 prices.[4]

Compared to many of the plantation crops and garden crops, paddy cultivation is more labour intensive. For example, during the period 1980-81 to 1989-90, share of labour costs in per hectare cost of cultivation of paddy on an average for the three seasons Autumn, Winter and Summer were 65.40 percent, 64.80 percent and 64.92 percent respectively. For coconut crop share of labour costs in per hectare cost of cultivation during the same period on an average was only 52.69 percent.[5]

4. Suseelan P. (1988), *op. cit.*, p. 1.

5. Shares of annual average human labour costs were estimated from,
Government of Kerala, *Report on the Cost of Cultivation of Important crops in Kerala*, Department of Economics and Statistics, Thiruvananthapuram, (1980-81 to 1989-90).

Similarly the estimated share of wages in the gross value of product in paddy crop is found to be 32.12 percent and for coconut it is only 14 percent.[6] Moreover, the proportion of hired human labour use to the total human labour requirements in cultivation is also found to be comparatively higher in paddy crop. With its high rate of labour absorption capacity, paddy crop is of special significance in a state like Kerala where the rate of unemployment is very high.

Paddy crop not only provides food for the human population, but is also a major source of fodder. According to the Live Stock Census 1987, there were 32.24 lakh cattle and 3.29 lakh buffaloes in the state. Only a negligible proportion of the state's total geographical area is kept at present as permanent pastures and grazing lands. In the year 1991-92 it was only 0.04 percent of the total area. In order to feed the state's ever growing and large bovine population, straw, which is a by product of paddy can be effectively used. However, the declining trend in paddy cultivation in the state adversely affects the availability of straw and thereby reduces the supply of fodder.

Most of the agricultural development programmes envisaged by the state government since the formation of Kerala have been designed for the development of paddy sector and a lion's share of agricultural subsidies so far disbursed by the government had gone to the paddy sector. Similarly, nearly 20 per cent of the total plan outlays during the various Five Year Plan periods were earmarked for the development of primary sector and a major portion of it was meant for the development of paddy crop. Again with a view to increase the area under paddy and to augment its productivity government had formulated and implemented a number of programmes in the state. Intensive Agricultural District Programme (I.A.D.P) of 1960-'61,

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6. Unni, Jeemol (1981), *An Analysis of changes in the cropping Pattern in Kerala with Particular Reference to the substitution of coconut for Rice 1960-61 to 1978-79*, M.Phil Dissertation, Centre for Development Studies, Thiruvananthapuram.

Intensive Paddy Development Programme (Package Programme) of 1971-72, Group Farming Programme of 1989-90, Integrated Programme for Rice Development (I.P.R.D.) of 1994-95 etc. were exclusively meant for the development of paddy cultivation in the state. Inspite of all these measures paddy sector of the state economy has been showing declining growth trends both in area and production since mid seventies.

Development of the agricultural sector is considered to be a necessary condition for the overall development of any underdeveloped region. Agricultural development of Kerala in turn, is invariably related to the performance of its paddy sector. Eventhough many attempts had already been made to analyse the nature and extent of the agricultural stagnation experienced by the state since mid seventies and to evaluate the performance of the state's rice economy in general, much efforts were not yet made to identify the prime reasons behind the dismal performance of the paddy sector. Present study is an attempt in this direction, that may reveal the various causes which are impairing the development of paddy cultivation in the state.

1.2. Objectives of the Study

Objectives of this study are,

a) to examine the trends in area, production and productivity of paddy crop in Kerala during its post formation period,

b) to examine the economic causes for the decline of paddy cultivation in the state and

c) to identify the current problems of paddy cultivation.

Keeping the second objective in view, the study focus on the examination of the following apects.

i) Role of different sources of productivity in improving per hectare yield of paddy in the state.

ii) Changes in absolute profits and profitability of paddy crop over the past years.

iii) Comparative profitability of paddy and its alternative crops.

iv) Role of Public Distribution System, land prices, absentee land owners, shortage of labour and capital and conversion of paddy fields for non agricultural uses in the decline of area under paddy crop in the state.

1.3. Hypotheses

a) Sources of productivity in paddy crop have not significantly helped to improve its productivity in Kerala.

b) Low profitability of paddy cultivation and the low relative profitability of paddy compared to its alternative crops have induced paddy farmers either to keep their fields fallow or to shift their fields for the cultivation of other crops.

c) Growing pressure on land, land price differentials, shortage of labour and capital, absentee land ownership and aversion of younger generation to paddy farming also have resulted in the decline of paddy cultivation in the state.

1.4. Methodology and Data Source

1.4.1. Methodology

Period covered in this study is the post formation period of the state. Overall performance of paddy crop is assessed by estimating the growth rates in output and its two components - area under the crop and its productivity. In order to estimate growth rates, the semi-log linear curve

$$\text{Ln } Y = a + bt$$

where, the growth rate, $G(t) = b$, had been used. In cases where time series data are not given, compound growth rates are also used. Compound growth rates are estimated as,

$$G(t) = \sqrt[n]{\frac{Yt}{Y_0}} - 1$$

where Yt and Y_0 are the terminal and base year values respectively. Relative contribution of the components in output changes for the different periods have been estimated by using the additive decomposition scheme,

$$Q_1 - Q_0 = (A_1 - A_0)\, Y_0 + (Y_1 - Y_0)\, A_0 + I$$

where the first component shows the area effect, second component shows the yield effect and the third component shows the interaction effect of area and yield.

In the present study, growth rates in the performance of paddy crop are estimated period-wise, district-wise and season-wise. In period-wise analysis, considering the changes in growth trends, period of the study is divided into Period I (1960-61 to 1974-75) and Period II (1975-76 to 1991-92). In district-wise disaggregation, considering the re-organisation of districts, annual growth rates are estimated for the period from 1985-86 onwards. Seasonal variations in growth rates are examined by assessing the performance of paddy crop during the three different seasons viz., Autumn, Winter and Summer. Coverage of High Yielding Variety (HYV) seeds, proportion of irrigated paddy area, extent of the use of chemical fertilizers and plant protection measures adopted in paddy farming are considered as the sources of productivity in paddy crop.

Per hectare profit of paddy and its alternative crops for the different years have been estimated by finding the difference between per hectare cost of cultivation and value of product, including the value of by-products, if any. In this study, cost of cultivation is defined as the paid out costs which include the costs on items such as hired human labour, animal and machine labour, seeds or seedlings, manure and plant protection measures, land taxes, irrigation charges and other operational expenses plus the imputed value of self labour used in the cultivation of the crop. Due to the

rapid appreciation of land value in the state, if changes in land value is introduced as an item of the cost of cultivation, then cost of production is found to be highly inflated. Hence interest on land value is not included in the calculation of per hectare cost of cultivation.

In the case of paddy crop, average cost per season had been estimated as the Weighted Arithmetic Mean (WAM) of costs incurred during the different seasons in each year by taking the proportion of area under the various seasons as the respective weights. Profitability of crops have been estimated as the ratio of per hectare profit and cost of cultivation. Inorder to compare the profit and profitability of paddy crop with other crops, three of its alternative crops, viz., coconut, tapioca and banana are taken.

In data analysis, popular statistical tools like Mean, Range, Coefficient of Variation, Pearson's Coefficient of Correlation, Rank Correlation Coefficient etc. are used and in significance testing, test statistic 't' has been applied.

1.4.2. Data Source

While assessing the performance of the rice economy of Kerala it would have been better to cover the entire period from 1956, the year in which the state was formed. However, the statistical base for the state was not properly organised till the year 1960-61. Land utilisation surveys were systematically conducted on an annual basis from that year onwards. Therefore data related to the area, production and productivity of crops in Kerala used in the present study are from the year 1960-61 onwards. From the year 1961-62, Crop Cutting Surveys were conducted in the state as an ICAR Scheme to estimate the productivity of various crops. After the introduction of a scheme for Establishment of an Agency for Reporting Crop Statistics (EARCS) in 1975-76, the system of agricultural data collection has further improved. From the year 1980-81 onwards Department of Economics and Statistics (DES) began

to conduct annual surveys on the cost of cultivation of important crops in the state. It enables to fill up the data gap related to the cost of cultivation of major crops in Kerala.

Present study is primarily based on secondary data collected from sources such as the publications of the Department of Economics and Statistics which was formerly known as the Bureau of Economics and Statistics, State Planning Board, State Land Use Board, Department of Census, National Sample Survey Organisation etc. Various research papers, Commission reports and periodicals were also used as the sources of secondary data.

Primary data have been collected to examine the current problems of paddy cultivation. For the purpose of primary data collection, a field investigation was conducted in ten selected villages of Kuttanad region, five each belonging to Kuttanad and Kottayam taluks. The field survey had been conducted during the months of May and June in 1996. Sample farmers were selected by the method of quota sampling. Accordingly, relevant data were collected from ten sample paddy farmers from each of the selected ten villages using a structured interview schedule.

1.5. Plan of the Study

This study consists of eight chapters. First chapter is the introductory chapter. In the second chapter a brief review of earlier studies concerned with the analysis of the performance of agricultural crops in general and that of paddy crop in particular is given. Third chapter is divided into two sections. While a brief account of the trend and pattern of agricultural development in Kerala since its formation is given in the first section, second section of the chapter deals with the performance of paddy crop in the state. Role of the major sources of productivity in enhancing paddy productivity in Kerala is discussed in the fourth chapter. Changes in per hectare profit and profitability of paddy crop over the past years in relation to the decline of area

under the crop is examined in the first section of the fifth chapter, while in the second section of the chapter, relative profitability of paddy crop compared to its alternative crops and its relation to the conversion of paddy lands for the cultivation of other crops are mentioned. Other causes for the decline of paddy cultivation in the state are discussed in the sixth chapter. Findings of the field survey conducted in Kuttanad region with a view to identify the present problems of paddy farming are shown in the seventh chapter. Conclusions and findings of the present study are summarised in the eighth chapter.

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Chapter 2

REVIEW OF LITERATURE

In this chapter a brief review of earlier studies related to the performance of seasonal and annual crops in general and that of paddy in particular is given. Along with their major findings, various methods and statistical tools used in the studies are also mentioned.

This chapter is divided into four parts. In the first part, studies related to the growth rates in agricultural out put and its components at the aggregate and disaggregate levels are reviewed. Second part deals with those studies which analyse the decomposition of growth rates in agricultural crop production and the third part is concerned with the studies which analyse the role of different sources of productivity in crop production. Literature related to the examination of cost, price and other factors involved in cropping pattern changes are reviewed in the fourth part.

2.1. Growth Rates in Agricultural Output and Its Disaggregation

During the second half of sixties, Indian economy witnessed the introduction of a new technology in its farm sector which is usually termed as 'Green Revolution'. Most of the earlier studies on the performance of food crops in India focus on the growth differentials between the periods before and after the introduction of Green Revolution.

Failure of Green Revolution in augmenting agricultural output growth rates in the country had been pointed out by C.H. Hanumantha Rao.[1] As part of his study the

1. Hanumantha Rao C.H. (1975), *Technological change and Distribution of Gains in Indian Agriculture*, The Macmillan Co. of India Ltd., New Delhi.

author compared the growth rates in the production and productivity of all major crops before and after the introduction of the new agricultural technology. The study observes that even in the absence of any remarkable change in technology and mode of cultivation, during 1950's agricultural growth rates showed accelaration in the country. However, inspite of the application of HYV seeds, improvements in irrigation and increase in fertilizer use, growth rates decelerated during 1960's.

In order to analyse agricultural growth rates, V.N. Reddy had applied two non parametric statistics viz., Kendell's 'K' statistic and Spearman's rank correlation coefficient 'P', along with the conventional statistical methods.[2] The period covered in his study was 1950-51 to 1973-74 which was further divided into six sub periods for growth rate comparisons. The study observed the phenomenon of deceleration in agricultural production in all the sub-periods except the period 1964-65 to 1973-74 during which growth rates remained constant.

Nilakantha Rath had analysed the overall performance of Indian agricultural sector for the period 1955-56 to 1977-78 by fitting exponential trend functions to the index numbers of production, area and yield of all major crops raised in the country.[3] Taking 1964-65, which was the last year of good crop before the introduction of HYV seeds, as the year of separation, the author had divided the period of his study into two sub periods. Growth rates in the production of food grains, non food grains and all crops taken together were separately estimated for the two sub periods. The study shows that the growth rates of both food crops and non food crops had declined during the second period compared to the first period and with the introduction of HYV seeds only two cereals viz., wheat and ragi improved their performance, while rice production showed negative growth rates.

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2. Reddy V.N. (1978), "Growth Rates", *Economic and Political Weekly*, Vol. 13, No.19, May 13, pp. 806-812.
3. Rath Nilakantha (1980), "A Note of Agricultural Production in India During 1955-78", *Indian Journal of Agricultural Economics*, Vol. 35, No. 2, April-June, pp. 94-103.

After comparing the performance of the rice economy of Kerala for the period 1951-52 to 1970-71 with some of the major rice producing states in the country, K.N. Raj, P.G.K. Panikar and T.N. Krishnan observed that the linear growth rate of rice production in Kerala during the period 1952-53 to 1964-65 was the highest in the country.[4] According to their study, eventhough the bulk of paddy in the state remained outside the main stream of Green Revolution, a small segment of it viz., the Summer crop has shown significant increase in yield rates during the second half of 1960's.

Growth rate differences in agricultural production can be analysed by using an appropriate statistical test of significance as shown by Yoginder K. Alagh and P.S. Sharma.[5] Inorder to examine the differences in agricultural growth rates before and after the introduction of Green Revolution, the authors had applied a 't' test. The test statistic used in their analysis is given as,

$$t = \frac{b_1 - b_2}{(SEb_1)^2 + (SEb_2)^2}$$

where b_1 and b_2 are the regression coefficients for the first and second periods. Their study has shown that the relative growth rates in food crops had been higher during the period 1960-61 to 1969-70.

Eventhough various statistical curves like linear, log-linear and Gompertz are used in the analysis of growth rates, different authors analysing the same set of data may arrive at different rates of growth depending on the goodness of fit of the various curves they use. In order to solve this growth rate controversy M. Chattopadyay and G. Battacharya have used a Logistic curve in their crop-wise analysis of agricultural

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4. Raj K.N. et. al. (1972), *Some Perspectives of Planning and Development With Particular Reference to Kerala - A Preliminary Paper on the Approach to the Fifth Five Year Plan*, Working Paper No. 5, Centre for Development Studies, Thiruvananthapuram.

5. Alagh Yoginder K, Sharma P.S. (1980), "Trend in Growth Rates", *Indian Journal of Agricultural Economics*, Vol. 35, No.2, April-June, pp. 104-118.

production for the period 1950-51 to 1982-83.[6] Their study shows that except for some commercial crops, Green Revolution had no impact on inferior cereals and had little impact on superior crops. Again the HYV technology, as the study observes, had taken place in such a scattered and fragmentary way that its impact on the country as a whole was only marginal.

While dividing the whole period of study into sub-periods many of the earlier authors had assumed discontinuity in growth rates. As proved by J.K. Boyce, this assumption may result in misleading conclusions.[7] In order to avoid the discontinuity assumption, he had introduced a kinked exponential model. In an analysis with two sub-periods, the model is given as,

$$\text{In } Y = a_1 + b_1 (d_1 t + d_2 K) + b_2 (d_2 t - d_2 K) + U$$

Where K is the break point, b_1 and b_2 are the growth rates for the sub periods and d_1 and d_2 are the dummy variables.

For nearly two decades since its formation overall agricultural production and its components had shown positive growth rates in Kerala. However, since mid-seventies it began to decline. This phenomenon of the retarded growth of the agricultural sector of the state economy is usually termed as 'agricultural stagnation'. In most of the state level studies conducted during the eighties and early nineties, growth rates are compared between the periods before and after mid seventies.

An exploratory analysis of the agricultural stagnation in Kerala was under taken by K.P. Kannan and K.Pushpangadan, covering the period 1962-63 to 1985-86.[8] Their study begins with an analysis of the changes in land use pattern and then it

6. Chattopadyay M, Battacharya G. (1986), "Growth of Indian Agriculture - A Reappraisal", *Indian Journal of Agricultural Economics*, Vol. 42, No.I, January-March, pp.67-75.
7. Boyce J.K. (1986), "Kinked Exponential Models for Growth Rate Estimation", *Oxford Bulletin of Economics and Statistics*, p.48.
8. Kannan K.P., Pushpangadan K. (1988), "Agricultural Stagnation in Kerala - An Exploratory Analysis", *Economic and Political Weekly*, Vol.23, No.39, September-24, pp. A 120-128.

examines the growth rates in output, yield and acreage of food grain and non food grain crops. As the sources of productivity; area under irrigation, rain fall index and fertilizer use per hectare were considered. Their empirical analysis shows that, during the period 1962-63 to 1974-75 there had been an overall increase in the growth rates in area, production and yield of all major commercial crops. However, the period from 1975-76 to 1985-86 was one of near stagnation in the growth rates of aggregate area under cultivation, production and productivity.

In a disaggregate study of the rice economy of Kerala, P.S.George and Chandan Mukherjee analysed the growth trends and variability in area, yield and production of paddy during the three seasons in the major rice growing districts in the state.[9] The period covered in their study was 1960-61 to 1982-83 which had been divided into two sub periods by taking the year 1975-76 as the break point. According to the study, during the first period rice production, its acreage and productivity had shown positive growth rates. However, during the second period rice production declined, inspite of an improvement in productivity. The study also reveals the wide disparities that exist in the compound growth rates of area, production and productivity across different regions and over the various seasons.

In order to capture the spatial and crop dimensions of agricultural stagnation, K.P. Kannan and K. Pushpangadan in another study analysed the growth performance of individual crops for the state as a whole as well as across regions.[10] Growth rates were estimated by using a kinked exponential model in order to avoid the discontinuity assumption. Their analysis shows that, during the period 1962-63

9. George P.S., Mukherjee Chandan (1986), *Rice Economy of Kerala - A Disaggregate Analysis of Performance*, Working Paper No. 213, Centre for Development Studies, Thiruvananthapuram.

10. Kannan K.P., Pushpangadan K. (1990), *Dissecting Agricultural Stagnation in Kerala- An Analysis Across Crops, Seasons and Regions*, Working Paper No. 238, Centre for Development Studies, Thiruvananthapuram.

to 1974-75, seasonal crops such as paddy and tapioca had registered positive growth rates while among the perennial crops, coconut was the only one crop that showed a declining trend. During the second period, from 1975-76 to 1985-86, all seasonal and perennial crops in the state except rubber have shown declining growth trends.

A crop specific analysis of agricultural stagnation attempted by K.Pushpangadan also shows that the symptoms of stagnation had been more severe among food crops, especially paddy and tapioca.[11] His empirical analysis identifies the sources of stagnation as the falling demand coupled with instability in the market, resulting in loss of income to the farmers of food crops.

According to D. Narayana, most of the earlier studies on the agricultural performance of the state economy are based on methods of analysis suitable for an agrarian economy predominated by seasonal and annual crops.[12] However, as he points out, the state's agricultural sector is dominated by tree crops which are of a perennial nature. His study concludes that the period from mid seventies has not been one of agricultural stagnation in Kerala, instead, it is a period of intense investment activity in replanting, under planting and intermixed cropping.

2.2. Decomposition of Growth Trends in Agricultural Production

The first systematic attempt to decompose the agricultural growth in India was made by B.S. Minhas and A. Vaidyanathan.[13] They have taken area, yield and cropping pattern as the pure components of output. In their additive scheme of decomposition

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11. Pushpangadan K. (1990), *Agricultural Stagnation in Kerala - An Econometric Study of Tapioca*, Working Paper No. 226, Centre for Development Studies, Thiruvananthapuram.

12. Narayana D. (1990), *Agricultural Economy of Kerala in the Post Seventies - Stagnation or Cycles*, Working Paper No. 235, Centre for Development Studies, Thiruvananthapuram.

13. Minhas B.S., Vaidyanathan A. (1965), "Growth of Crop Output in India 1951-54 to 1958-61 - An Analysis of Component Elements", *Journal Indian Society of Agricultural Statistics*, Vol. 17, No. 2, December, pp. 230-252.

contributions of changes in area, yield and cropping pattern and the interaction effect of these components in growth of output were analysed. Their analysis shows that the changes in cropping pattern had contributed substantially to improving the total Agricultural output in the country during 1950's.

While analysing the growth of agricultural productivity in Rajastan, Vidya Sagar has decomposed the changes in the value of agricultural production in terms of area, productivity and price.[14] In his scheme of decomposition, price component measures the effect of inflation in the growth of output values. The productivity component is a composite of four structural components viz., cropping pattern, price structure, yield structure and their interactions.

As additive schemes of decomposition are useful only in the decomposition of linear growth rates in output, many writers have applied multiplicative models to verify the relative role of various output components.[15] In his multiplicative model A. Parikh used the identity of the index number of production as a multiple of the index numbers of area, changes in cropping pattern and changes in crop yields.[16] His study also accepts the hypothesis that the effect of cropping pattern changes in output is significant.

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14. Sagar Vidya (1980), "Decomposition of Growth Trends and Certain Related Issues", *Indian Journal of Agricultural Economics*, Vol.35, No. 2, April-June, pp.42-59.

15. See for example,

Venkteswaralu (1965), "Growth of Agricultural Output in Andhra Pradesh During the Period 1952-53 to 1961-62", *Arthaniti*, Vol. 8, No. 2, July, p. 43.

Dayal R. (1986), "Agricultural Growth Rates and Their Components", *Indian Journal of Agricultural Economics*, Vol. 21, No. 4, October-December, pp. 125-129.

George P.S., Mukherjee Chandan (1986), *op. cit.*, p. 36.

16. Parikh Ashok (1966), "State wise Growth Rates in Agricultural Output - An Econometric Analysis", *Artha Vijnana*, Vol. 8, No. 1, March, pp. 5-10.

2.3. Sources of Productivity in Agricultural Crop Production

Role of different sources of productivity such as HYV seeds, use of fertilizer, irrigation etc., in enhancing agricultural productivity has been analysed by many authors. In order to examine the causes of inter state disparities in crop yields and agricultural growth rates, K.N Raj had compared the performance of seven major crops in different states for the period 1949-50 to 1958-59.[17]. Factors such as the percentage of irrigated area, size of land holdings and changes in technology were treated as the sources of productivity. Again the extent of mechanisation and fertilizer use were taken as the indicators of changes in technology. The study came to the conclusion that the use of fertilizers and the proportion of area under irrigation are positively related to agricultural productivity.

Inorder to examine the role of technological progress in the agricultural sector of the Kerala economy, P.P. Pillai has examined the contributions of irrigation, fertilizers, pesticides, HYV seeds and modern implements in improving farm productivity.[18] According to his analysis, role of irrigation and HYV coverage in the state in improving paddy productivity is doubtful. However, the study points out that eventhough at the aggregate level the link between agricultural productivity and fertilizer use has been very weak during the sixties and the seventies, increase in paddy productivity recorded since the early eighties in Kerala can be partly attributed to the increase in fertilizer consumption.

Evaluation studies conducted by the State Planning Board had earlier pointed out that the cost of cultivation of HYV paddy in the state has been almost 30 percent higher than the cost of cultivation of traditional varieties and their average yield was

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17. Raj K.N. (1961), "Some Features of the Economic Growth of the Last Decade in India", *Economic and Political Weekly*, Vol. 13, Annual Number, February, pp. 117-121.

18. Pillai P.P. (1994), *Kerala Economy*, Institute of Planning and Applied Economic Research, John Matthai Foundation, Aranattukara, Thrissur, pp. 59-101.

nearly 42 percent higher than that of local varieties.[19] Therefore these studies had come to the conclusion that from the point of economic viability, HYV paddy has only a slight advantage over the traditional varieties and the application of HYV seeds creates only an environment for the efficient use of other inputs.

P.G.K Panikar has also made a similar attempt to examine the trends in the adoption of HYVs, their yield rates and other factors affecting its adoption in Kerala.[20] Findings of his study were based on field surveys conducted in Palakkad and Kuttanad, the two principlal rice growing regions in the state. According to the study, yield rates of HYVs in the study areas have not shown any significant positive relationship with either the size of holding or the application of fertilizers. On the other hand, the high and rising prices of fertilizers and plant protection costs had pushed up the cost of cultivation of HYV paddy over the years. Therefore the study concludes that the rice economy of the study areas is caught in a paradox of modernisation without commensurate improvement in net returns.

It is generally believed that the infrastructural facilities needed for the adoption of HYVs are more accessible to rich farmers having large holdings and they are in a better position to bear the risk involved in the change of farm technology. As Rapporteurs Report on Economic Aspects of HYV programme puts it, "In so far as the success of HYV programme depends on the ready and adequate availability of credit, access to knowhow, markets etc, and so far as these are related to the size of

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19. Government of Kerala (1976), *High Yielding Varieties Programme in Kerala (Virippu Paddy) 1973-74 - An Evaluation study.*
High Yeilding Programme in Kerala (Mundakan and Punja Paddy) 1973-74 - Evaluation Report, Evaluation Division, State Planning Board, Thiruvananthapuram.

20. Panikar P.G.K. (1981), *High Yielding Varietiesof Rice - A Study of Selected Areas in Kerala*, Working Paper No. 140, Centre for Development Studies, Thiruvananthapuram.

holdings, the HYVs may benefit richer farmers to a greater extent than the poor ones".[21] However, according to a study conducted by M.L. Dantwala the new strategy of using HYV seeds is neutral to the scale of farming as large holdings are not needed in the interest of higher production techniques in agriculture.[22]

Making use of data obtained from a number of field studies conducted by the Agro Economic Research Centre in the selected districts of South India between 1966-67 and 1968-69, C. Muthiah had made an attempt to examine the participation rates of small and large farmers in HYV paddy programme.[23] He observes that small size tenant holdings are better suited to the labour intensive new varieties of seeds and therefore more favourable to the small farmers. With regard to the participation rate his analysis shows that small farmers do not lag much behind large farmers in adopting HYV programme, although their participation rate was much lower initially.

Many writers had tried to examine the role of irrigation in improving paddy productivity. In the Kerala context most of these studies assert that the proportion of irrigated area under paddy is not positively related to its productivity. A study conducted by D. Narayana to examine the impact of irrigation in the agricultural development of the state shows that the contribution of irrigation in stabilising and increasing paddy productivity in the state has been marginal.[24] Studies of Kannan and Pushpangadan (1988), George and Mukherjee (1986), Suseelan (1988), and Pillai (1994) also regard the role of irrigation in improving paddy productivity in the state as insignificant or marginal.

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21. *Rapporteur's Report on Economic Aspects of High Yielding Varieties Programme*, (1968), as quoted in, Muthiah C. (1971), "The Green Revolution - Participation by Small Versus Large Farmers", *Indian Journal of Agricultural Economics*, Vol. 26, No. 1, p. 53.
22. Dantwala M.L. (1969), "Towards an Efficient and Just Land System", *Yojana*, Vo.13, No. 23, November, pp. 34-38.
23. Muthiah C. (1971), op. cit., pp. 53-65.
24. Narayana D. (1983), "Linking Irrigation with Development - The Kerala Experience", *Economic and Political Weekly*, Vol. 18, Nos. 45,46, July-December, pp. 1935-1939.

At the disaggregate level C.J. Joseph had examined the economic aspects of minor irrigation in Kerala on the basis of a field survey conducted at Piravam village.[25] Major conclusion emerged from his study is that minor irrigation has helped paddy farmers in the state to intensify cropping, increase the application of modern inputs and thereby to improve productivity.

The resource use efficiency in rice cultivation has been examined by P.K.Muraleedharan.[26] Findings of his study are based on a case study conducted in Thrissur district. According to his study inputs such as human labour, fertilizers and manures are not effectively used in the study area. Similarly K.N. Ninan had made an attempt to examine the relationship between labour use and productivity of tapioca and paddy crops.[27] The study points out that the average labour productivity in tapioca and paddy can be increased only by reducing the per acre labour input and a simultaneous increase in both employment and productivity is possible only through the upgradation of farming technology in the state.

During the last decade the proportion of Plan outlays on agriculture and allied services had shown a declining tendency both in the country and in the state. Recently A. Ganeshkumar has made an attempt to assess the consequence of falling agricultural investments in our economy.[28] According to his analysis even though the shifting of resources away from agriculture to non agricultural purposes may result in a faster growth of GDP, the resultant growth across sectors is likely to be uneven

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25. Joseph C.J. (1984), *Economics of Minor Irrigation in Kerala - A Case Study*, unpublished Ph.D. Thesis, Calicut University.

26. Muraleedharan P.K. (1982), "Resource Use Efficiency in Rice Cultivation in Lowlying Lands in Kerala" in Pillai P.P. (ed), *Agricultural Development in Kerala*, Agricole Publishing Academy, New Delhi, pp. 147-153.

27. Ninan K.N. (1984), "Labour Use in Agriculture - Case Studies of Tapioca and Paddy", *Economic and Political Weekly*, Vol. 19, Nos. 52, 53, December 22-29, pp. A 199-204.

28. Ganeshkumar A. (1992), "Falling Agricultural Investments and Its Consequences", *Economic and Political Weekly*, Vol. 27, No.42, October 17, pp. 2307-2312.

and the decline in agricultural growth will lead to growing income inequalities in rural areas.

Relevant issues related to fertilizer subsidy in the Indian agricultural context were analysed by Ashok Gulati and G.D. Kalra.[29] In their paper they examined the desirability of a trade off between fertilizer subsidy and investment in irrigation. According to the findings of their study resource allocation becomes more effective by a shift in favour of irrigation. Similarly the implications of price subsidies and irrigation investment in India were anlysed by D.K. Rath and Atul Sarma.[30] Their study concludes that investment in irrigation is better than subsidies in the long run, eventhough it may create some problems in the immediate future from the point of view of equity.

2.4. Cost-Price Structure and Other Factors as Determinants of Cropping Pattern Changes

Generally factors behind changes in cropping pattern can be broadly divided into price factors and non price factors. The conventional method to study the role of price factors in cropping pattern changes is to adopt the Nerlovian allocation model in which expected prices determine the allocation of area under different crops.[31] According to K.P. Kannan and K. Pushpangadan a traditional Nerlovian model of price expectation must be modified and longterm factors must be incorporated in order to explain the acreage allocation decisions in the Kerala context.[32] It is because of the

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29. Gulati Ashok, Kalra G.D. (1992), "Fertilizer subsidy; Issues Related to Equity and Efficiency", *Economic and Political Weekly*, Vol. 27, No.13, July-December pp. A. 43-48.

30. Ratha D.K., Sarma Atul (1992), "Price Subsidies and Irrigation Investment in India - Macro Implications", *Economic and Political Weekly*, Vol. 27, July- December, pp. A. 117-122

31. Nerlove M. (1958), "Distributed Lags and Estimation of Supply and Demand Elasticities, Theoretical Considerations", *Journal of Farm Economics*, Vol. 40, No. 2, p. 305.

32. Kannan K.P., Pushpangadan K. (1988), *Agricultural Stagnation and Economic Growth in Kerala*, Working Paper No. 227, Centre for Development Studies, Thiruvananthapuram, p. 30.

fact that in Kerala acreage shift has been from an annual crop like paddy to perennial crops like coconut and rubber.

While examining the role of non price factors in cropping pattern changes, Dharm Narain observes that apart from the new technology, factors such as irrigation and the location of increase in cropped area play key roles in changes in the all India cropping pattern.[33] In his analysis, time series for the area under different crops were constructed by aggregating the irrigated and unirrigated area components of each crops in all of the states in a year, inorder to estimate changes in cropping pattern under the isolated impact of changes in total irrigated-cum-cropped area. According to his findings, in the case of non food grain crops relative prices play an effective role in the determination of its share in the total cropped area while the extent of area under food grain crops largely depends on non price factors.

The N C A E R survey (1962), which was the pionier official attempt to assess the problems and prospects of paddy cultivation in Kerala, after examining the cost price structure of various major crops cultivated in the state, came to the conclusion that under the topographical and climatic conditions of Kerala, commercial crops are more suitable than paddy.[34] The Report also criticized the government policy of giving too much importance to paddy at the cost of plantation crops and cash crops.

Inorder to examine the cost price structure and thereby to assess the profitability of paddy cultivation in the major rice producing areas in Kerala, the Kuttanad Enquiry Commission was appointed by the state government and the Commission submitted its report to the government in November 1971.[35]

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33. Narain Dharm (1977), "Growth of Productivity in Indian Agriculture", *Indian Journal of Agricultural Economics*; Vol. 32, No. 1, January-March, pp. 1-44.

34. National Council of Applied Economics Research (1962), *Techno-Economic Survey of Kerala*, N C A E R Report, New Delhi.

35. Government of Kerala (1972), *Report of the Kuttanad Enquiry Commission*, Thiruvananthapuram.

The terms of reference of the Commision were,

(i) the cost of cultivation of paddy in Kuttanad compared to similar areas like kole lands of Thrissur etc.,

(ii) the prevailing wage rates of agricultural labour in Kuttanad and their relation to paddy prices in comparison with the wage structure in Palakkad district and

(iii) other matters including methods for the reduction of cost of cultivation.

After comparing the increase in wages and paddy prices the Commision came to the conclusion that wage rates had increased at higher rates than paddy prices in the study area. For the improvement of paddy cultivation it recommended the provision of certain infrastructural facilities and the formulation of certain statutory bodies in the major rice producing areas of the state.

Many writers have attempted to identify the important price and non price factors responsible for the low level of absolute and relative profitability of paddy cultivation in Kerala and other matters that induce farmers to shift their paddy growing areas for other uses. After examining the performance of paddy crop in Kerala during the seventies, P.G.K. Panikar has noticed declining tendency in paddy growing areas since mid seventies for the two major seasons, Autumn and Winter. However, area under Summer paddy had shown a slight increase during the second half of the seventies.[36] According to his study, the major reasons for the declining trend in paddy cultivation were the rise in the cost of cultivation on the one hand and the simultaneous fall in the price of paddy on the other hand.

Similarly, after considering the drastic decrease in area under paddy in Kerala, V. Radhakrishnan, E.K. Thomas and Jessy Thomas single out falling profitability of the crop as the prime cause for this situation.[37] According to the authors,

36. Panikar P.G.K. (1980), *Recent Trends in Area Under and Production of Rice in Kerala*, Working Paper No.116, Centre for Development Studies, Thiruvananthapuram.

37. Radhakrishnan V. et.al.(1994), "Performance of Rice Crop in Kerala" in B.A. Prakash (ed), *Kerala's Economy - Performance, Problems, Perspectives*, Sage Publications New Delhi, pp. 160-179.

rice cultivation in the state can be made more attractive by adopting any one or more of the measures aimed to (i) reduce the cost of production of paddy, (ii) improve paddy productivity and (iii) subsidise paddy cultivation. Inorder to improve the relative profitability of paddy crop their study suggests the fixation of ceiling prices for competing crops.

M.A. Ommen had highlighted the role of absentee land owners and the high prices of land that prevail in Kerala in the decline of paddy cultivation.[38] According to him, following the Gulf boom, land prices have skyrocketed and far from being a means of production land has become a prominent commodity of exchange in the state. Many of the land owners have become employees in the service sector and to them farming is not an occupation but a secure asset or at best a secondary source of income. His study concludes that the system of absentee land lordism has paved the way for a shift of cropping area from seasonal crops such as paddy and tapioca to perennial crops which do not require personal supervision.

Relationship between the abnormal increase in land prices and decline in area under paddy had been pointed out by P. Venugopal.[39] He observes that after the crash of share market, investors in Kerala have turned to real estate investment and as a result of it land prices are shooting up in the state. According to his study, inorder to take advantage of the rising demand for land, paddy field owners convert their wet lands to salable plots after filling it with soil and it results in the decline of area under paddy.

A study conducted by the Centre for Development Studies in the early seventies had pointed out that the growth of production in Kerala had been accompanied

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38. Oommen M.A. (1994), "Land Reforms and Economic Change", in B.A. Prakash(ed) *Kerala's Economy*, Ibid, pp. 117-140.

39. Venugopal P. (1994), "Paddy Fields Fast Becoming Housing Plots", *The Indian Express* (Kochi), February 16.

by a significant shift of work force from the primary sector to the secondary sector, eventhough the output per worker in the agricultural sector was not relatively low.[40] While analysing the changes in cropping pattern and the resultant changes in the employment situation in Kerala, C. Gopinath and C.S. Sundaresan also observe the same phenomenon.[41] According to their study the declining share of labour in agricultural sector is mainly due to the shift of cultivating area from labour intensive crops to capital intensive crops. The decline in area under paddy is attributed to a number of factors such as the reversal of the rising trend in paddy prices, marginal increase in yield and low profitability of rice.

K. Pushpangadan observes that the wide spread decline in the profitability of paddy cultivation in Kerala has uniformly reduced the rental value of paddy lands.[42] According to his study land owners have a tendency to allocate their paddy fields for the next best use which leads to the further decline in area under paddy in the state. It also points out that the only way to reverse the trend in paddy production is through the introduction of a cost reducing innovation in production technology.

To sum up, in all of the earlier studies performance of agricultural crops are assessed by examining the growth rates in area, production and productivity of crops. Similarly area, yield and cropping pattern changes are regarded as the pure components of changes in agricultural output. Proportion of irrigated area, size of holdings, coverage of HYV seeds, extent of fertilizer use and mechanisation are taken

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40. United Nations (1975), *Poverty, Unemployment and Development Policy - A Case Study of Selected Issues With Special reference to Kerala*, United Nations, New York.

41. Gopinath C., Sundaresan C.S. (1990), *Cropping Pattern Changes and Employment Effects in Selected Districts of Kerala*, Centre for Management Development, Thiruvananthapuram.

42. Pushpangadan K. (1992), *Wage Determination in a Casual Labour Market - The Case of Paddy Field Labour in Kerala*, Working Paper No. 224, Centre for Development Studies, Thiruvananthapuram.

as the major sources of productivity. Both price and non price factors are considered in the analysis of cropping pattern changes. Many of the studies point out that Green Revolution had not made much impact in the performance of kharif crops in general and that of paddy crop in particular. Various studies related to the agricultural development of the state economy show that the low profitability of crops, inadequate infrastructural facilities and environmental degradation are the major causes of agricultural stagnation in Kerala. Poor performance of paddy crop in the state since mid seventies is attributed to factors like high cost of cultivation, negative growth trends in paddy prices, low profitability of the crop compared to its alternative crops, use of paddy lands for non agricultural purposes etc.

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Chapter 3

PERFORMANCE OF AGRICULTURE WITH SPECIAL REFERENCE TO PADDY CROP

In this chapter we examine some of the salient features of agricultural development in Kerala giving special emphasis to the performance of paddy sector. First section of this chapter deals with the overall performance of the agricultural sector while the performance of paddy crop is analysed in detail in the second section.

3.1. A REVIEW OF THE PERFORMANCE OF AGRICULTURAL SECTOR IN KERALA

This section is divided into five parts. As an introduction a brief description of the location and area of the state is given in the first part. Second part deals with the changes in land use pattern in Kerala since its formation. Sector wise growth trends and changes in the relative contributions of each sector to the State Domestic Product are given in the third part. Growth rates in the overall agricultural out put, area under cultivation and productivity indices are analysed in the fourth part along with the comparative performances of food grain crops and non food grain crops. Fifth part deals with the changes in cropping pattern.

3.1.1. Kerala- Location and Area.

Kerala state lies in the south west part of the Indian subcontinent. It was formed on November Ist 1956, by unifying the erst while Travancore - Cochin state and Malabar. The state is located between 8^0 and 12^0 north latitude and 74^0 and 77^0 east longitude. It has a coastline of 560 kilometers. Out of the state's total geographical

Table 3.1

Land Use Pattern in Kerala (1960-61 to 1990-91)

(Area in '000 ha.)

Classification of Land	Year						
	1960-61	1965-66	1970-71	1975-76	1980-81	1985-86	1990-91
Total geographical area	3858 (100.00)	3858 (100.00)	3858 (100.00)	3885 (100.00)	3885 (100.00)	3885 (100.00)	3885 (100.00)
Forests	1056 (27.37)	1055 (27.34)	1055 (27.34)	1082 (27.85)	1082 (27.85)	1082 (27.85)	1082 (27.85)
Land put to non-agricultural use	205 (5.31)	228 (5.93)	275 (7.15)	253 (6.67)	270 (6.90)	279 (7.20)	297 (7.65)
Barren and un-cultivated land	151 (3.91)	110 (2.86)	72 (1.87)	86 (2.21)	86 (2.21)	83 (2.10)	58 (1.50)
Permanent pastures	45 (1.17)	28 (0.73)	28 (0.73)	19 (0.51)	5 (0.13)	4 (0.10)	2 (0.05)
Land under misce-llaneous tree crops	204 (5.29)	200 (5.20)	132 (3.43)	84 (2.17)	64 (1.65)	50 (1.29)	34 (0.88)
Cultivate waste	144 (3.73)	108 (2.81)	80 (2.08)	113 (2.92)	129 (3.32)	126 (3.24)	95 (2.43)
Fallow other than current fallow	62 (1.61)	32 (0.81)	23 (0.60)	23 (0.59)	27 (0.69)	28 (0.72)	25 (0.68)
Current fallow	67 (1.74)	33 (0.86)	24 (0.62)	37 (0.94)	44 (1.13)	43 (1.11)	44 (1.13)
Net area sown	1924 (49.87)	2064 (53.37)	2169 (56.22)	2189 (56.35)	2180 (56.11)	2191 (56.40)	2247 (57.82)
Area sown more than once	425 (11.02)	487 (12.66)	764 (19.80)	792 (20.38)	705 (18.15)	676 (17.40)	796 (20.49)
Total cropped area	2349 (60.89)	2551 (66.33)	2933 (76.02)	2981 (76.73)	2885 (74.26)	2867 (73.80)	3043 (78.31)
Cropping intensities	122.1	123.5	135.2	136.2	132.3	130.8	135.4

Note : Percentages to total geographical area are given in parantheses.

Source : DES, *Statistics for Planning* (Various Issues).
SPB (1993), *Economic Review 1992.*

area of 38.85 lakh hectares, 3.92 lakh hectares are low land area lying less than 7.5 meteres above Mean Sea Level (MSL), 16.23 lakh hectares are lying between 7.5 and 75 metres above MSL and the remaining are high lands lying 75 metres above the MSL.[1]

3.1.2. Land use Pattern in Kerala

In order to assess the performance of the agricultural sector in Kerala it is useful to examine the pattern of land utilisation in the state and its changes. During the period 1960-61 to 1990-91, total cropped area (TCA) in the state has increased from 23.49 lakh hectares to 30.43 lakh hectares showing and overall increase of 29.54 percent and an average annual growth rate of 0.87 percent (Table 3.1). However, annual growth rates in TCA were not uniform over the years. During the period 1960-61 to 1975-76, TCA increased at an impressive rate of 1.60 percent per year. Between the years 1975-76 to 1985-86 average annual growth rate turned to be negative [(-)0.39 percent)] and during the period 1985-86 to 1990-91 it again showed an annual positive growth rate of 1.20 percent.

A similar growth pattern is discernible in the case of area sown more than once in the state. The annual compound growth rates in area sown more than once for the three periods 1960-61 to 1975-76, 1975-76 to 1985-86 and 1985-86 to 1990-91 were 4.24 percent, (-)1.57 percent and 3.32 percent respectively. Net area sown (NAS) in the state also increased during the period 1960-61 to 1975-76, remained nearly stagnant during 1975-76 to 1985-86 and marginally improved after 1985-86. Similarly during the first period total fallow lands decreased from 3.35 percent to 1.53 percent of the state's total geographical area which increased to 1.83 percent by the year 1985-86. There after it remains more or less the same.

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1. Government of Kerala (1989), *Land Resources and Land Use in Kerala,* Land Use Board, Thiruvananthapuram, p. 5.

Table 3.2

Sector-wise Growth Rates of Net Domestic Product in Kerala

(1960-61 to 1990-1991)

Period	Growth Rates (Percentage)			
	Primary	Secondary	Tertiary	Total
i) *At 1960-61 prices*				
1960-61 to 1965-66	(+) 0.4	(+) 5.8	(+) 4.4	(+) 2.5
1965-66 to 1970-71	(+) 5.1	(+) 4.3	(+)5.6	(+) 5.1
ii) *At 1970-71 prices*				
1970-71 to 1975-76	(+) 1.6	(+) 4.0	(+) 3.3	(+) 2.6
1975-76 to 1980-81	(-) 1.2	(+) 5.6	(+) 4.1	(+) 2.0
iii) *At 1980-81 prices*				
1980-81 to 1985-86	(+) 0.2	(+) 0.6	(+) 3.2	(+) 1.4
1985-86 to 1990-91	(+) 5.3	(+) 6.4	(+) 5.9	(+) 5.8

Source: BES (1978), *Statistics for Planning 1977.*
DES, *State Income and Related Aggregate of Kerala (Various issues)*
SPB (1993), *Economic Review 1992.*

3.1.3. Sectorwise Analysis of NDP in Kerala

A review of the sector wise growth rates of the state's Net Domestic Product for the period 1960-61 to 1990-91 shows that the performance of the primary sector was dismal compared to the performance of the secondary and tertiary sectors. As shown in table 3.2, except for the second halves of 1960's and 1980's, primary sector of the state economy registered either very low growth rates or negative growth rates. Average annual growth rates in NDP during the post-formation period of the state is found to be invariably related to the performance of the primary sector because it reeled under 2.5 percent whenever the growth rates in primary sector were marginal or negative and attained the moderate levels of more than 5 percent with an improved performance of the primary sector.

Table 3.3

Sector-wise Distribution of Net Domestic Product in Kerala

Year	Sectorwise Distribution (Percent)			
	Primary	Secondary	Tertiary	Total
1. *At 1960-61 prices*				
1960-61	56.0	15.2	28.8	100.0
1970-71	50.5	17.1	32.4	100.0
2. *At 1970-71 prices*				
1970-71	49.4	16.3	34.2	100.0
1980-81	40.3	20.6	39.2	100.0
3. *At 1980-81 prices*				
1980-81	39.2	24.4	36.4	100.0
1990-91	32.1	28.2	39.7	100.0

Source : Same as Table 3.2

The major structural change that had occurred in the state economy during this period was the decline in the relative share of the primary sector in the state's NDP and the simultaneous increase in the share of the tertiary sector.[2] Within a period of thirty years percentage share of the primary sector had declined from 56.0 to 32.1, showing an average annual growth rate of (-)1.42 percent (Table 3.3). Meanwhile the relative share of the tertiary sector increased from 28.8 percent to 39.7 percent and its average annual growth rate is found to be 1.26 percent.

Inspite of the substantial decrease in the share of primary sector in NDP, agricultural income in the state which was stagnating around Rs.1340 crores at 1980-81 prices during the first half of eighties has shown steady and continuous recovery from 1986-87 onwards.[3] During the period of five years from 1986-87 to 1991-92 agricultural income in Kerala increased from Rs. 1309.49 crores to

2. Prakash B.A. (1993), *Unemployment in Kerala - Problems and Policy Options*, Dr. John Matthai Centre, Thrissur, November, p. 52.

3. Government of Kerala (1993), *Economic Review*, 1992, State Planning Board, Thiruvananthapuram, p. 20.

Table 3.4

Index Number of Production, Area and Productivity of Agriculture Sector in Kerala (1960-61 to 1991-92)

(Base : Average of Triennium ending 1961-62)

Year	Production	Area	Productivity
1960-61	100.7	101.1	99.6
1965-66	113.8	109.3	104.1
1970-71	146.0	127.1	114.9
1974-75	159.8	131.8	121.2
1975-76	153.7	142.7	108.2
1980-81	140.8	120.7	116.5
1984-85	155.0	123.8	120.0
1985-86	121.2	122.3	99.1
1989-90	139.8	129.8	107.7
1990-91	121.7	127.5	105.6
1991-92	120.5	125.4	106.3

Note : Data re-estimated with change of base.

Source : BES (1976), *Basic Statistics on Kerala Economy, 1975.*
DES, *Statistics for Planning* (Various issues).
SPB (1993), *Economic Review 1992.*

Rs.1902.25 crores (at 1980-81 prices). The annual compound growth rate in agricultural income during this period is estimated as 7.75 percent.

3.1.4 . Growth Rates in Agricultural Production, Area and Productivity

Overall performance of the agricultural crop sector in Kerala can be assessed by analysing the changes in output and its two components - area under cultivation and productivity per hectare. Index of agricultural production had been steadily increasing in the state during the sixties and early seventies (Table 3.4). During the period 1960-61 to 1974-75 average annual growth rate in production was 3.13 percent. In 1974 -75 agricultural production index reached the peak level of 159.8 . It was followed by a period of negative growth rates or agricultural stagnation. Inspite of 8.3 percent increase in the total cropped area , output declined by 3.8 percent in 1975-76 compared to the previous year. Thus it can be rightly pointed out that "the stagnation began with a decline in productivity in the agricultural sector."[4] Index of agricultural production declined to 121.2 in 1985-86 and remained more or less stagnant at that level in the subsequent years with the exception of 1989-90 when it suddenly rose to 139.8. The annual growth rate in agricultural production during the period 1975-76 to 1991-92 is found to be (-) 1.51 percent.

Index number of cropped area in the state reached its zenith in 1975-76, a year after the indices of production and productivity reached its peak points. Annual growth rate in cropped area during the period 1960-61 to 1975-76 is estimated to be 2.32 percent. Between the years 1975-76 and 1985-86 index of area in the state declined at the average annual rate of (-)1.53 percent. The situation improved since 1985-86 and during the period 1985-86 to 1991-92 there has been a marginal annual increase of 0.42 percent in cropped area.

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4. Kannan K.P., Pushpangadan K. (1988), *op. cit.*, p.11.

Agricultural productivity index in Kerala showed continuous increase till the year 1974-75 when it reached the peak level of 121.2. Annual compound growth rate in productivity during the period 1960-61 to 1974-75 is estimated to be 1.41 percent. After 1974-75 index of productivity began to decline and it reached its lowest point in 1985-86. During this period annual growth rate in agricultural productivity is found to be (-)1.81percent. It is to be noted that the index of productivity during the year 1960-61 had been slightly higher than that of 1985-86. Therefore it can be rightly observed that the state has lost twenty five years of agricultural growth in terms of productivity by the year 1985-86. As in the cases of the index numbers of production and area, productivity index also improved considerably in 1989-90 and thereafter it remains more or less stagnant.

Table 3.5

Index of Production, Area and Productivity of Foodgrain and Non Foodgrain Crops in Kerala

(Base year = Average of 3 years ending 1979-80)

Type of Crops		Period		Gowth Rates
		1976-77 to 1978-79	1989-90 to 1991-92	
Food Crops	Production	98.67	85.48	(-)1.10
	Area	102. 55	69.67	(-)2.48
	Productivity	96.22	122.40	1.87
Non Food Crops	Production	100.52	90.07	(-)0.84
	Area	101.00	119.15	1.38
	Productivity	99.52	72.42	(-)2.42
All Crops	Production	100.17	89.27	(-)0.88
	Area	101.48	103.56	0.15
	Productivity	98.71	83.11	(-)1.31

Source : SPB (1993), *Economic Review* 1992, p.42.

At the disaggregate level comparative performances of food grain and non-food grain crops can be examined by analysing the indices of production, area and productivity of these two categories of crops separately.

During the period 1976-79 to 1989-92, while the index of the production of non foodgrain crops decreased from 100.52 to 90.07, index of food grain production declined from 98.67 to 85.48 showing a comparatively higher rate of decline (Table 3.5). Rate of growth in the output of all crops taken together during the period is estimated as (-) 0.88 percent per year and the average annual growth rates in food grains and non food grains production are found to be (-) 1.10 percent and (-) 0.84 percent respectively. Meanwhile the average annual growth rates in area under the two types of crops are found to be (-) 2.48 percent and 1.38 percent respectively. Contrary to the movements of area and output indices, index of the productivity of non-food crops decreased during this period at the average annual rate of (-) 2.42 percent. At the same time productivity of food grains has increased substantially at the annual rate of 1.87 percent. Inspite of it, the performance of non-food grains in terms of output is found to be better and it was due to its comparative advantage in area.

3.1.5. Changes in Cropping Pattern

Due to diversity in topographic, climatic and soil conditions, a wide variety of crops such as coconut, rubber, paddy, pepper, coffee, tea, cashew nut and cardamom are cultivated in Kerala. Broadly, the crops grown in the state are divided into three categories viz., food crops, garden crops and plantation crops. Food crops include paddy, other cereals and millets, banana and other plantains, tapioca and pulses. Crops like coconut, cashew nut and pepper are treated as garden crops while tea, coffee, cardamom and rubber are regarded as plantation crops.

Table 3.6

Area Under Food Crops, Garden Crops and Plantation Crops in Kerala (1960-61 to 1990-91)

(Area in '000 ha.)

Year	Food Crops	Garden Crops	Plantation Crops	Other Crops	Total Cropped Area (TCA)
1960-61	1122.54 (47.79)	654.91 (27.83)	205.91 (8.77)	365.50 (15.56)	2348.86 (100.00)
1965-66	1134.16 (44.45)	713.43 (27.96)	241.55 (9.47)	462.20 (18.12)	2551.34 (100.00)
1970-71	1268.32 (43.25)	922.87 (31.47)	245.90 (10.09)	445.45 (15.19)	2932.54 (100.00)
1975-76	1305.22 (43.78)	856.55 (28.73)	339.74 (11.39)	479.77 (16.09)	2981.28 (100.00)
1980-81	1135.92 (39.37)	900.90 (31.22)	385.88 (13.38)	462.14 (16.02)	2884.84 (100.00)
1985-86	951.08 (33.18)	963.98 (33.63)	490.94 (17.13)	460.55 (16.07)	2866.55 (100.00)
1990-91	802.22 (26.36)	1154.15 (37.93)	560.66 (18.42)	526.01 (17.27)	3043.04 (100.00)

Note : Percentages to TCA are given parantheses

Source : BES (1978), *Statistics for Planning 1977*

SPB, *Economic Review* (Various issues)

Based on the variations in the growth rates of area under the different categories of crops, period of the present analysis is divided into three subperiods - period I (1960-61 to 1975-76), period II (1975-76 to 1985-86) and period III (1985-86 to 1990-91).

During the first period, area under food crops increased at the average annual rate of 1.01 percent, but the proportion of its area to the total cropped area in the state had declined from 47.79 percent to 43.78 percent (Table 3.6). During this period area under garden crops increased at the average annual rate of 1.81 percent and its proportion also marginally improved. However, wide fluctuations are observed in the acreage allocation of garden crops which had shown a decline in area during the first half of seventies. In the case of plantation crops, annual growth rates in area are found to be rather steady and continuous not only in the first period but also in the subsequent periods.

During the second period, area under food crops declined sharply at the annual rate of (-)3.12 percent while area under garden crops and the plantation crops showed positive growth rates of 1.19 percent and 3.75 percent respectively. During the third period, growth rates in area under food crops continued to be negative and the annual growth rate in area under garden crops (3.67 percent) exceeded the growth rate in area under plantation crops (2.69 percent).

Thus, the present analysis shows a shift in cropping pattern in the state in favour of garden crops and plantation crops at the expense of food crops. Inspite of an increase of 6.94 lakh hectares in the T C A in the state during the period 1960-61 to 1990-91, absolute area under food crops decreased by 3.20 lakh hectares. Meanwhile 4.99 lakh hectares of additional land came under garden crops and 3.55 lakh hectares of land was added to the area under plantation crops.

Table 3.7

Area Under Major Crops in Kerala (1960-61 to 1990-91)

(Area in '000 ha.)

Year	Crops				
	Paddy	Tapioca	Pepper	Coconut	Rubber
1960-61	778.91 (33.16)	242.20 (10.31)	99.83 (4.25)	500.74 (21.32)	122.87 (5.23)
1965-66	802.33 (31.45)	229.68 (9.00)	99.75 (3.91)	556.31 (21.80)	149.63 (5.86)
1970-71	874.93 (29.84)	293.55 (10.1)	117.59 (4.01)	719.14 (24.52)	179.26 (6.11)
1975-76	872.02 (29.38)	326.87 (10.96)	117.54 (3.94)	629.95 (21.13)	206.26 (6.92)
1980-81	801.70 (27.79)	244.99 (8.49)	108.07 (3.75)	651.37 (22.58)	237.77 (8.24)
1985-86	678.28 (23.66)	202.92 (7.08)	121.56 (4.24)	704.68 (24.58)	330.32 (11.52)
1990-91	559.49 (18.39)	146.49 (4.81)	168.51 (5.54)	870.02 (28.59)	384.00 (12.62)

Note : Percentages to TCA are given brackets

Source : BES (1978), *Statistics for Planning 1977.*

SPB, *Economic Review* (Various issues)

In order to assess the changes in cropping pattern at a disaggregate level, a crop wise analysis is attempted. Nearly 70 percent of the TCA in the state come under five major crops viz., paddy, tapioca, pepper, coconut and rubber and hence changes in area under these crops are separately considered in the present analysis.

Among the five major crops the relative share of pepper in TCA remained more or less the same till the year 1985-86 and there after it began to increase marginally (Table 3.7). Relative share of tapioca remained rather stagnant till 1975-76 and there after fell sharply. Absolute area under tapioca during the whole period declined by 39.52 percent. Proportion of area under paddy declined steadily while the proportion of area under rubber increased continuously. Total loss in area under paddy during the period 1960-61 to 1990-91 was 2.19 lakh hectares (28.12 percent) and the gain of area under rubber was 2.61 lakh hectares (212.53 percent). Relative share of coconut growing areas in the state remained rather constant till 1975-76 and then began to increase. Absolute gain in area under coconut during the whole period is found to be 3.69 lakh hectares which amounts to 73.74 percent of its area in 1960-61.

To sum up, it can be stated that all the broad indicators of agricultural development which we have examined such as the changes in the pattern of land use, growth rates in agricultural out put, area and productivity suggest that the agricultural sector of the state economy had passed through three distinct stages during the period 1960-61 to 1990-91. The first period (1960-61 to 1975-76) was the period of positive growth rates, while the second period (1975-76 to 1985-86) was the period of agricultural recession or stagnation and the third period (1985-86 to 1990-91) is one of recovery and positive growth trends. Changes in cropping pattern in the state since the beginning of the sixties show that the area under commercial crops had been increasing in Kerala while the area under food crops in general and that of paddy and tapioca in particular had been declining.

3.2. PERFORMANCE OF PADDY CROP IN KERALA

In this section we analyse the performance of the rice economy of Kerala in terms of growth rates in area, productivity and output. An additive model is used to examine the relative roles of area and productivity in changes in paddy production.

3.2.1. Paddy Sector in Kerala and India - A Comparison

Linear growth rate of rice production in Kerala during the period 1952-53 to 1964-65 was one of the highest in the country. Annual growth rate in the productivity of rice in the state was also one of the highest among all the states in India during this period.[5] In the year 1960-61, 2.5 percent of the total rice producing area in the country belonged to Kerala. In 1975-76, the state's share in area under paddy in the country came down to 2.23 percent and it further declined to 1.31 percent by the year 1990-91. Similarly the state's share in the total production of rice in India declined from 3.09 percent to 1.50 percent within a period of thirty years from 1960-61 to1990-91 (Table 3.8).

During this period area under paddy at the all India level increased from 311.28 lakh hectares to 426.90 lakh hectares showing an average annual growth rate of 1.06 percent. Meanwhile area under paddy in Kerala declined from 7.79 lakh hectares to 5.59 lakh hectares registering a negative growth rate of (-)1.10 percent per year. With regard to the production of rice all India figure rose from 345.74 lakh tonnes in 1960-61 to 722.90 lakh tonnes in 1990-91 and the average annual growth rate in production was 2.49 percent. Meanwhile in Kerala rice production had shown only marginal increase and the average annual growth rate was only 0.06 percent. Thus both in terms of area and production the relative position of Kerala had considerably deteriorated during the past three decades.

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5. Raj K.N. et.al. (1972), *op. cit.*, p. Appendix 2.

Table 3.8

Area, Production and Productivity of Rice in Kerala and India

Year	Area (in lakh ha.)		Production (in lakh tonnes)		Productivity (in tonne/ha.)		
	Kerala	India	Kerala	India	Kerala	India	%difference
1960-61	7.79 (2.50)	311.28	10.68 (3.09)	345.74	1.37	1.01	35.64
1965-66	8.02 (2.26)	354.70	9.97 (3.26)	305.89	1.24	0.86	44.19
1970-71	8.75 (2.35)	372.30	12.92 (3.26)	390.03	1.48	1.12	32.14
1975-76	8.76 (2.23)	392.84	13.31 (2.75)	483.61	1.51	1.24	21.77
1980-81	8.02 (1.99)	402.00	12.72 (2.37)	536.00	1.59	1.34	18.66
1985-86	6.78 (1.66)	409.12	11.73 (1.83)	641.53	1.73	1.55	11.61
1990-91	5.59 (1.31)	426.90	10.86 (1.50)	722.90	1.94	1.74	11.49
Compound Growth rate	(-)1.10	1.06	0.06	2.49	1.17	1.83	(-)36.07

Note : Percentage shares of Kerala in area and production are given in parantheses

Source : CSO (1987), *Basic Statistics Relating to Indian Economy 1986.*

SPB, *Economic Review* (Various issues)

CMIE (1995), *Basic Statistics India 1994.*

Considering the per hectare productivity of paddy the situation is rather different. In the year 1960-61 paddy productivity in Kerala was 35.64 percent higher than the all India average. Even after thirty years it still remained higher to the all India level by 11.49 percent. However, during this period the rate of increase in paddy productivity in the state had been 1.17 percent per year while the corresponding rate at the all India level is found to be 1.83 percent.

3.2.2. Growth of Area Under Paddy Crop in Kerala

In most of the recent studies regarding the performance of paddy sector in Kerala, period of study is divided into two sub periods taking the year 1974-75 as the break point.[6] The period of the present analysis is also divided into period I (1960-61 to 1974-75) and period II (1975-76 to 1991-92) . The cut off year was selected after considering the following factors. Firstly, area under paddy in the state which had been increasing during the sixties and early seventies, reached its peak level in the year 1974-75 and there after it began to decline. Secondly, the methodology of data collection in the state changed from 1975-76 onwards with the introduction of EARCS estimates.

a. **State level growth rates in area**

Area under paddy in the state declined from 7.79 lakh hectares in 1960-61 to 5.41 lakh hectares by the year 1991-92 showing an overall decrease of 30.50 percent (Table 3.9). Average annual growth rate during this period is found to be (-)0.95 percent.[7] However, annual growth rates have shown wide temporal variations.

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6. See for example,
   (i) George P.S., Mukherjee Chandan (1986), *op. cit.*
   (ii) Suseelan P. (1988), *op. cit.*
   (iii) Kannan K.P., Pushpangadan K. (1990), *op. cit.*
7. Growth rates are estimated using the semilog equation

$$\ln Y = a + bt$$

where b shows the linear growth rate for the period t.

Table 3.9

Area Under Paddy in Kerala (1960-61 to 1991-92)

(Area in '000 ha.)

Year	Area	Growth Rate	Year	Area	Growth rate
1960-61	778.91	NA	1976-77	854.37	(-)2.47
1961-62	752.69	(-)3.37	1977-78	840.31	(-)1.65
1962-63	802.66	6.64	1978-79	779.24	(-)4.89
1963-64	805.08	0.30	1979-80	793.27	(-)0.75
1964-65	801.12	(-)0.49	1980-81	801.70	1.06
1965-66	802.33	0.15	1981-82	806.92	0.65
1966-67	779.44	(-)2.85	1982-83	797.89	(-)1.12
1967-68	809.54	3.86	1983-84	740.09	(-)7.24
1968-69	873.87	7.95	1984-85	730.38	(-)1.31
1969-70	874.04	0.02	1985-86	678.28	(-)7.13
1970-71	874.93	0.10	1986-87	663.28	(-)2.23
1971-72	875.16	0.03	1987-88	604.08	(-)8.90
1972-73	873.70	(-)0.17	1988-89	577.00	(-)4.47
1973-74	874.68	0.11	1989-90	583.39	1.11
1974-75	881.47	0.78	1990-91	559.49	(-)4.10
1975-76	876.02	(-)0.62	1991-92	541.33	(-)3.25

Source : BES (1967), *Fact Book on Agriculture 1966.*

BES (1975), *Agricultural Statistics in Kerala, 1975.*

SPB, *Economic Review* (Various issues)

During the sixties area under paddy in the state had increased considerably. After reaching 8.74 lakh hectares in 1969-70 it remained more or less stagnant for the next five years and attained its peak level of 8.81 lakh hecteres in 1974-75. Average annual growth rate in paddy growing areas in the state for the period 1960-61 to 1974-75 is found to be 1.10 percent.

During the second period (1975-76 to 1991-92) area under paddy declined by 38 percent. Negative growth rates are observed in all the years except 1980-81, 1981-82 and 1989-90 in this period. Average annual growth rate in area under paddy during the second period is estimated as (-)3.09 percent.

Eventhough absolute area under paddy began to fall only from the year 1974-75 onwards, percentage share of paddy growing areas to the total cropped area in the state had begun to decline from 1960-61 itself (Table 3.7). Relative share of area under paddy steadily decreased from 33.16 percent in 1960-61 to 18.38 percent by the year 1990-91.

b. **District wise distribution of area and growth rates**

Eventhough reliable talukwise data are available on area, yield and production of paddy in the state since 1960-61, a comparative analysis of the performance of various districts becomes impossible from that year onwards. Since 1960-61, four districts were formed in the state and the last one of it was Kasaragod which had been formed in 1985-86 by dividing northern district of Kannur. Hence in the present study, region wise analysis at the district level is attempted for a period from 1985-86 to 1992-93. Inorder to mitigate the impact of annual fluctuations in area, productivity and production, three year averages are taken as the base and terminal year values.

About 70 percent of the paddy growing areas in the state come under the five districts of Palakkad, Thrissur, Ernakulam, Alappuzha and Malappuram. Among

Table 3.10

District wise Distribution of Area Under Paddy in Kerala

(Area in '000 ha.)

District	Period*		% Change in area	Compound growth rate
	1985-88	1990-93		
Thiruvananthapuram	25.03 (3.86)	19.88 (3.64)	(-)20.58	(-)4.50
Kollam	32.62 (5.03)	28.86 (5.29)	(-)11.50	(-)2.42
Pathanamthitta	13.91 (2.14)	13.43 (2.46)	(-)3.48	(-)0.70
Alappuzha	61.55 (9.49)	56.63 (10.37)	(-)7.99	(-)1.65
Kottayam	31.78 (4.90)	25.19 (4.61)	(-)20.75	(-)4.54
Idukki	6.90 (1.06)	4.78 (0.87)	(-)30.81	(-)7.08
Ernakulam	81.81 (12.61)	64.75 (11.86)	(-)20.86	(-)4.57
Thrissur	89.64 (13.82)	70.09 (12.83)	(-)21.81	(-)4.80
Palakkad	153.46 (23.66)	146.28 (26.79)	(-)4.68	(-)0.95
Malappuram	61.41 (9.47)	51.07 (9.35)	(-)6.85	(-)3.62
Kozhikode	17.49 (2.70)	11.45 (2.10)	(-)34.54	(-)8.12
Wayanad	27.36 (4.22)	20.35 (3.73)	(-)25.60	(-)5.75
Kannur	25.91 (3.99)	19.42 (3.56)	(-)25.07	(-)5.60
Kasaragod	19.86 (3.06)	13.96 (2.56)	(-)29.68	(-)6.81
Kerala	648.72 (100.00)	546.13 (100.00)	(-)15.81	(-)3.38

* Average of the triennium ending 1988 and 1993

Note : Percentages to total area are given in brackets

Source : DES (1989), *Farm Guide 1988.*

SPB, *Economic Review (Various issues)*

these major paddy growing districts, Palakkad alone accounts for nearly 25 percent of total area under paddy in the state. On the other side the five districts of Thiruvananthapuram, Idukki, Pathanamthitta, Kozhikode and Kasaragod taken together accounts for only less than 12 percent of the state's paddy growing areas.

During the period 1985-88 to 1990-93 total area under paddy in Kerala declined by 15 percent. This declining trend is observed in all the 14 districts in the state with wide inter district variations in growth rates (Table 3.10). In the four northern districts of the state viz., Kozhikode, Wayanad, Kannur and Kasaragod area under paddy crop declined by more than 25 percent and the highest average annual rate of decrease [(-)8.12 percent] is noted in Kozhikode district. Rate of decline in area under paddy is found to be higher than the state average in three of the major paddy cultivating districts viz., Ernakulam, Thrissur and Malappuram. However, in Palakkad district, rate of decline in paddy area had been marginal [(-)0.95 percent] and in Alappuzha, another major paddy growing district, annual rate of decline in area is found to be less than 2 percent.

c. **Seasonal variations in area under paddy**

In Kerala paddy is cultivated during three seasons in a year. They are Autumn (Virippu), Winter (Mundakan) and Summer (Punja). Autumn paddy is sown during the months April to June and is harvested during August to December. Winter paddy is sown during August, September and October and is harvested during December and January. The summer crop is sown during the months of November to March and harvested during the summer months from February to May.

The two major paddy crop seasons in the state are Autumn and Winter, together which account for more than 80 percent of the total area under paddy. Summer crop is mainly concentrated in the four districts of Alappuzha, Kottayam, Ernakulam and Thrissur. Among these districts Alappuzha alone accounts for more than 40 percent

Table 3.11

Percentage Share of Area Under Autumn, Winter, Summer Crops (1960-61 to 1991-92)

Year	Seasons			Year	Seasons		
	Autumn	Winter	Summer		Autumn	Winter	Summer
1960-61	50.9	39.4	9.7	1976-77	42.6	44.7	12.7
1961-62	48.6	41.5	9.9	1977-78	43.4	44.1	12.5
1962-63	49.4	41.0	9.6	1978-79	43.4	43.3	13.3
1963-64	49.4	41.0	9.6	1979-80	43.9	42.8	13.3
1964-65	49.3	41.1	9.6	1980-81	43.6	44.2	12.2
1965-66	49.6	40.9	9.5	1981-82	43.0	44.1	12.0
1966-67	49.6	41.0	9.4	1982-83	44.0	45.3	10.7
1967-68	49.3	40.4	10.3	1983-84	44.3	43.9	11.8
1968-69	45.2	43.6	11.2	1984-85	43.6	44.8	11.6
1969-70	45.0	43.7	11.3	1985-86	41.2	46.2	12.6
1970-71	45.2	43.7	11.1	1986-87	43.2	44.8	12.0
1971-72	45.2	43.6	11.2	1987-88	39.7	48.7	11.6
1972-73	44.9	43.7	11.4	1988-89	38.3	46.7	15.0
1973-74	43.9	42.6	13.5	1989-90	41.9	46.0	12.2
1974-75	44.8	43.7	11.5	1990-91	42.2	46.2	11.6
1975-76	42.8	45.2	12.0	1991-92	40.4	46.9	12.7

Source : George P.S., Mukherjee Chandan (1986), *Rice Economy of Kerala*, Table 1, p.7.
SPB, *Economic Review* (Various issues)

of the total Summer paddy area in the state.

At the beginning of the sixties the share of Autumn crop was more than half of the total area under paddy in Kerala while the shares of Winter and Summer crops were nearly 40 percent and 10 percent respectively (Table 3.11). There after the dominance of Autumn paddy began to diminish gradually. Meanwhile the percentage share of area under Winter paddy improved. By mid seventies relative shares of area under Autumn and Winter crops became more or less equal. Percentage share of summer paddy area increased during the first two decades from 1960-61, and thereafter began to decline.

During the whole period of 1960-61 to 1991-92 share of area under Autumn crop declined at the average annual rate of (-)0.57 percent and the relative shares of Winter and Summer crops increased at the annual rates of 0.58 percent and 0.65 percent respectively.

3.2.3. Growth Rates in Productivity

a. Productivity of paddy at the state level

With a few exceptions, per hectare productivity of paddy in Kerala showed a steady and sustained increase over the past three decades. During the period 1960-61 to 1991-92 per hectare productivity of rice in the state had increased from 1371 kilograms to 1959 kilograms showing an overall increase of 42.89 percent (Table 3.12). Average annual growth rate in productivity of rice for the period is estimated as 1.17 percent.

During the period from 1960-61 to 1964-65 productivity of rice in the state had increased at the rate of 1.75 percent per year. Suddenly in the year 1965-66 it declined sharply by 14.86 percent. Inspite of a mild recovery in subsequent years, annual growth rate in rice productivity for the period 1966-67 to 1976-77 was only

Table 3.12

Productivity of Rice in Kerala (1960-61 to 1991-92

(Productivity in Kg. per ha.)

Year	Productivity	Annual Growth Rate	Year	Productivity	Annual Growth Rate
1960-61	1371	NA	1976-77	1468	(-)3.42
1961-62	1334	(-)2.70	1977-78	1541	4.97
1962-63	1362	2.10	1978-79	1592	3.31
1963-64	1401	2.86	1979-80	1638	2.89
1964-65	1460	4.21	1980-81	1587	(-)3.11
1965-66	1243	(-)14.86	1981-82	1660	4.60
1966-67	1356	9.09	1982-83	1639	(-)1.27
1967-68	1388	2.36	1983-84	1632	(-)0.43
1968-69	1432	3.17	1984-85	1720	5.39
1969-70	1403	(-)2.03	1985-86	1729	0.52
1970-71	1483	5.70	1986-87	1708	(-)0.58
1971-72	1544	4.11	1987-88	1709	0.06
1972-73	1575	2.01	1988-89	1754	2.63
1973-74	1437	(-)8.76	1989-90	1956	11.52
1974-75	1513	5.29	1990-91	1943	(-)0.72
1975-76	1520	0.46	1991-92	1959	0.88

Source : BES (1967), *Fact Book on Agriculture, 1966*
BES (1976), *Agricultural Statistics in Kerala 1975*
SPB, *Economic Review* (Various issues)

0.94 percent. Incidently, it was the period in which HYV seeds were extensively used in paddy farming in the state.

Per hectare rice productivity nearly stagnated once again during the period 1978-79 to 1983-84 in which the annual growth rate was only 0.49 percent. Later in 1989-90, the year in which Group Farming programme in paddy cultivation was introduced in the state, productivity of rice all on a sudden rose by 11.52 percent. There after it remains more or less stagnant.

It is observed that the potential productivity of paddy crop in Kerala is much higher than what the state has already realized. For example, during the year 1975-76, Kerala Agricultural University conducted a National Demonstration in Thrissur district in which 18 paddy farmers had participated and their average per hectare yields for the Winter and Summer seasons were found to be 5604 kilograms and 4960 kilograms of paddy respectively.[8] The state average yield during the same year for the two crops were 2340 kilograms and 1835 kilograms respectively. Again a district wise competition conducted by the Department of Agriculture in 1986-87 has shown that per hectare yields ranging from 6657 kilograms to 9320 kilograms of paddy are within the reach of paddy farmers in the state.[9] However, the realized per hectare productivity of paddy in Kerala even in the year 1991-92 is found to be 2938 kilograms which is 55.85 percent to 68.48 percent less than the potential yield.

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8. Agricultural University, Kerala (1976), *Annual Report of National Demonstration 1975-76*, Directorate of Extension, Thrissur.

9. Suseelan P (1988), *op. cit.*, p. 8.

Table 3.13

District wise Rice Productivity in Kerala (1985-88 and 1990-93)

(Productivity in Kg/ha.)

District	Average of triennium ending		Average Annual Growth Rate
	1987-88	1992-93	
Thiruvananthapuram	1691 (98.60)	1793 (90.88)	1.21
Kollam	1729(100.82)	1833 (92.90)	1.20
Pathanamthitta	2050 (119.53)	2426 (122.96)	3.67
Alappuzha	1920 (111.95)	2186 (110.80)	2.77
Kottayam	2018 (117.67)	2364 (119.82)	3.43
Idukki	2046 (119.30)	2168 (109.88)	1.19
Ernakulam	1602 (93.41)	1678 (85.05)	0.95
Thrissur	1584 (92.36)	1762 (89.31)	2.25
Palakkad	1875 (109.33)	2290 (116.07)	4.43
Malappuram	1452 (84.66)	1588 (80.49)	1.87
Kozhikode	1108 (64.61)	1211 (61.38)	1.86
Wayanad	1802 (105.07)	2210 (112.01)	4.53
Kannur	1500 (87.46)	1585 (80.33)	1.13
Kasaragod	1620 (94.46)	1759 (89.15)	1.72
State	1715 (100.00)	1973 (100.00)	3.01

Note : Percentages to state averages are given in brackets

Source : Same as in table 3.11

b. **Inter-district variations in rice productivity**

Wide variations are observed in rice productivity between the different districts in Kerala. During the period 1985-88 to 1990-93 inter district range in rice productivity increased from 942 kilograms per hectare to 1215 kilograms per hectare.

In terms of per hectare rice productivity, Pathanamthitta district ranked first in 1985-88 with 2050 kilograms closely followed by the districts of Idukki (2046 kilograms), Kottayam (2018 kilograms) and Alappuzha (1920 kilograms). During the period 1990-93 also Pathanamthitta retained its first position in rice productivity with 2426 kilograms per hectare. It was followed by the districts of Kottayam, Palakkad and Wyanad. Rice productivity in all of the districts in North Kerala except Wayanad stood below the state average and the lowest level of productivity is observed in Kozhikode district (Table 3.13).

At the state level compound growth rate in per hectare rice productivity during the period 1985-88 to 1990-93 is found to be 3.01 percent. The highest annual growth rate at the district level is observed in Wayanad (4.53 percent), followed by Palakkad (4.43 percent), Pathanamthitta (3.67 percent) and Kottayam (3.43 percent). The lowest growth rate in productivity is observed in Ernakulam district where the average annual growth is found to be 0.95 percent. Other districts with low growth rates are Kannur (1.13 percent), Idukki (1.19 percent), Kollam (1.20 percent) and Thiruvananthapuram (1.21 percent).

c. **Season wise analysis of growth rates in rice productivity**

Per hectare productivity of rice in Kerala shows wide inter seasonal variations. The annual average productivity of rice for the three seasons, Autumn, Winter and Summer during the whole period from 1960-61 to 1991-92 are found to be 1.51 tonnes, 1.58 tonnes and 1.83 tonnes respectively (Table 3.14). Thus even though the proportion of area under Summer crop in the state is relatively low, it has

Table 3.14

Season wise Annual Average Productivity of Rice (1960-61 to1991-92) and Growth Rates in Productivity

Seasons	Growth Rates			Annual Average Productivity (in tonnes/ha.)
	Period I (1960-61 to 1974-75)	Period II (1975-76 to 1991-92)	Period I and II (1960-61 to 1991-92)	
Autumn	1.22	1.59	1.43	1.51
Winter	0.08	1.31	0.86	1.58
Summer	1.71	1.38	1.49	1.83

Source : Estimated from,

BES (1967), *Fact Book on Agriculture 1966.*

BES (1975), *Agricultural Statistics in Kerala 1975.*

SPB, *Economic Review* (Various issues)

a comparative advantage in terms of productivity. On an average, during the period 1960-61 to 1991-92, productivity of summer crop had been 21.19 percent higher than Autumn crop and 15.82 percent higher than that of winter crop.

Period wise analysis of the growth rates in productivity for the three seasons shows that during the first period (1960-61 to 1974-75) per hectare productivity of Winter crop remained more or less constant and the annual growth rate in Summer crop had been comparatively higher than the Autumn crop. During this period per hectare rice productivity of Autumn, Winter and Summer crops had increased at the annual rates of 1.22 percent, 0.08 percent and 1.71 percent respectively. During the second period (1975-76 to 1991-92) productivity of Winter crop improved substantially and the average annual growth rate in productivity of Autumn crop exceeded that of Summer crop. Annual growth rates in productivity of the three seasons Autumn, Winter and Summer during the second period are estimated as 1.59 percent, 1.31 percent and 1.38 percent respectively. Taking the two periods together,

Table 3.15

Rice Production in Kerala (1960-61 to 1991-92)

(Production in '000 tonnes)

Year	Production	Growth rate	Year	Production	Growth rate
1960-61	1067.53	N.A.	1976-77	1254.00	(-)5.80
1961-62	1003.93	(-)5.96	1977-78	1294.64	3.24
1962-63	1093.21	8.89	1978-79	1272.74	(-)1.69
1963-64	1128.00	3.18	1979-80	1299.70	2.12
1964-65	1121.38	(-)0.59	1980-81	1272.00	(-)2.13
1965-66	997.49	(-)11.05	1981-82	1339.87	5.34
1966-67	1084.06	8.68	1982-83	1308.01	(-)2.38
1967-68	1123.90	3.68	1983-84	1207.92	(-)7.65
1968-69	1251.35	11.34	1984-85	1255.94	3.98
1969-70	1226.41	2.00	1985-86	1173.05	(-)6.60
1970-71	1292.01	5.35	1986-87	1133.79	(-)3.35
1971-72	1351.74	4.62	1987-88	1032.58	(-)8.92
1972-73	1376.37	1.82	1988-89	1013.00	(-)1.90
1973-74	1257.67	(-)8.62	1989-90	1141.23	12.66
1974-75	1333.03	5.99	1990-91	1086.58	(-)4.79
1975-76	1331.19	(-)0.14	1991-92	1060.35	(-)2.43

Source : BES (1967), *Fact Book on Agriculture 1966.*

BES (1976), *Agricultural Statistics in Kerala 1975.*

DES (1989), *Farm Guide 1988.*

SPB, *Economic Review* (Various issues)

productivity of Summer crop is found to be comparatively better. During the period 1960-61 to 1991-92, per hectare productivity of Autumn, Winter and Summer crops increased at the annual rates of 1.43 percent, 0.86 percent and 1.49 percent respectively.

3.2.4. Growth Rates in Rice Production

a. **State level**

Inspite of a sustained increase in per hectare productivity, total rice production in Kerala had declined since the early half of 1970's. It was due to the more than proportionate decrease in area under paddy compared to the rate of increase in productivity. During the period from 1975-76 to 1991-92 rice productivity increased by 28.29 percent but area under paddy at the same declined by 38.21 percent resulting in a net reduction of total rice production in the state by 20.36 percent. Rice production in Kerala reached its peak level in 1972-73 when the state produced 13.76 lakh tonnes of rice (Table 3.15). There after growth rates in production turned to be negative.

Amount of rice produced in the state during the year 1960-61 had been 10.68 lakh tonnes and it declined to 10.60 lakh tonnes by the year 1991-92. Linear growth rate in rice production during the period 1960-61 to 1991-92 is estimated as 0.02 percent. However, during the first period (1960-61 to 1974-75) rice production had increased at the annual rate of 2.06 percent. With the exception of the year 1973-74, rice production remained more or less stagnant during the first half of seventies and afterwards it began to fall. Annual growth rate in production during the second period (1975-76 to 1991-92) is found to be (-)1.54 percent. The only year which showed positive growth rate in rice production in the state since mid eighties is 1989-90, when production increased by 12.66 percent compared to the previous year.

Table 3.16

District wise Rice Production in Kerala During the Triennium Ending 1987-88 to 1992-93

District	Production (in '000 tonnes)		Percentage Change	Compound growth rate
	1985-88	1990-93		
Thiruvananthapuram	42.43 (3.81)	35.58 (3.30)	(-)16.15	(-)3.46
Kollam	56.37 (5.06)	53.02 (4.92)	(-)5.96	(-)1.22
Pathanamthitta	28.55 (2.57)	32.48 (3.02)	13.75	2.61
Alappuzha	117.63 (10.57)	123.64 (11.48)	5.11	1.02
Kottayam	64.02 (5.75)	59.56 (5.53)	(-)6.96	(-)1.43
Idukki	13.82 (1.24)	10.36 (0.96)	(-)25.06	(-)5.01
Ernakulam	131.21 (11.79)	108.70 (10.09)	(-)17.16	(-)3.69
Thrissur	142.04 (12.76)	123.45 (11.46)	(-)13.09	(-)2.77
Palakkad	288.00 (25.87)	335.10 (31.11)	16.35	3.27
Malappuram	89.25 (8.02)	81.10 (7.53)	(-)9.13	(-)1.90
Kozhikode	19.46 (1.75)	13.87 (1.29)	(-)28.70	(-)5.74
Wayanad	49.59 (4.46)	45.04 (4.18)	(-)9.18	(-)1.91
Kannur	38.46 (3.46)	30.77 (2.86)	(-)20.00	(-)4.01
Kasaragod	31.96 (2.87)	24.56 (2.28)	(-)23.15	(-)4.63
Kerala	1113.14(100.00)	1077.23 (100.00)	(-)3.23	(-)0.65

Note : Percentages to total production are given in brackets

Source : DES (1989), *Farm Guide 1988.*

SPB, *Economic Review (Various issues)*

b. **District wise production of rice**

Out of the total amount of rice produced in Kerala during the period 1990-93, more than 30 percent was the contribution of a single district, Palakkad (Table 3.16). The other major rice producing districts in the state were Alappuzha, Thrissur and Ernakulam which contributed 11.48 percent, 11.46 percent and 10.09 percent respectively to the state's total paddy production. Together the above four districts account for nearly two-third of the total rice produced in the state. On the other hand the six districts of Thiruvananthapuram, Pathanamthitta, Idukki, Kozhikode, Kannur and Kasaragod taken together had contributed only 13.71 percent of the state's rice production in that period.

Between 1985-88 and 1990-93 total rice production in the state declined by 3.23 percent and the annual compound rate of decline is found to be (-)0.65 percent. During the period annual growth rates in rice production were negative in all of the districts inKerala except Palakkad and Alappuzha. The highest rate of decline in rice production is observed in Kozhikode district [(-) 5.74 percent] followed by Idukki [(-) 5.01 percent], Kasaragod [(-) 4.63 percent] and Kannur [(-) 4.01 percent]. Among the five major rice producing districts, Palakkad and Alappuzha have shown positive growth rates of 3.27 percent and1.02 percent respectively.

c. **Season wise rice production and growth rates**

Total production of rice in Kerala during the year 1991-92 was 10.60 lakh tonnes. Out of it the contributions of Autumn, Winter and Summer crops were 4.01 lakh tonnes (37.87 percent), 5.08 lakh tonnes (47.87 percent) and 1.51 lakh tonnes (14.26 percent) respectively (Table 3.17). The share of Autumn crop during the period 1960-61 to 1991-92 ranged between 37.9 percent (1991-92) and 46.9 percent (1960-61), share of Winter crop ranged between 39.1 percent (1965-66) and 47.9 percent (1991-92) and the share of Summer crop ranged between 8.6 percent

Table 3.17

Seasonal Production of Rice in Kerala (1960-61 to 1991-92)

Year	Production (in '000 tonnes)			Year	Production (in '000 tonnes)		
	Autumn	Winter	Summer		Autumn	Winter	Summer
1960-61	500.9(46.9)	447.5 (41.9)	119.6 (11.2)	1976-77	487.8 (38.9)	588.1 (46.9)	178.1 (14.2)
1961-62	420.7 (41.9)	461.8 (46.0)	121.5 (12.1)	1977-78	551.7 (42.6)	559.4 (43.2)	180.0 (13.9)
1962-63	495.1 (45.3)	482.0 (44.1)	115.9 (10.6)	1978-79	544.8 (42.8)	529.6 (41.6)	198.6 (15.6)
1963-64	508.7 (45.3)	498.6 (44.2)	118.4 (10.5)	1979-80	568.1 (43.7)	526.5 (40.5)	205.4 (15.8)
1964-65	494.4 (44.1)	508.9 (45.4)	117.7 (10.5)	1980-81	553.3 (43.5)	548.2 (43.1)	169.2 (13.3)
1965-66	521.4 (52.3)	389.8 (39.1)	85.7 (8.6)	1981-82	557.0 (41.6)	589.2 (44.0)	192.8 (14.4)
1966-67	498.6 (46.0)	470.5 (43.4)	114.9 (10.6)	1982-83	578.6 (44.3)	565.5 (43.3)	161.9 (12.4)
1967-68	521.5 (46.4)	469.8 (41.8)	132.6 (11.8)	1983-84	520.6 (43.1)	520.6 (43.3)	166.7 (13.8)
1968-69	521.7 (41.7)	571.7 (45.7)	157.6 (12.6)	1984-85	548.9 (43.7)	540.1 (43.0)	167.0 (13.3)
1969-70	521.1 (42.5)	526.0 (42.9)	179.0 (14.6)	1985-86	462.2 (39.4)	526.7 (44.9)	184.2 (15.7)
1970-71	538.7 (41.5)	567.2 (43.7)	192.1 (14.8)	1986-87	468.3 (41.3)	496.7 (43.8)	169.0 (14.9)
1971-72	551.6 (40.8)	597.6 (44.2)	202.8 (15.0)	1987-88	420.4 (40.7)	470.0 (45.5)	141.5 (13.7)
1972-73	576.5 (41.9)	609.6 (44.3)	189.9 (13.8)	1988-89	388.0 (38.3)	473.1 (46.7)	152.0 (15.0)
1973-74	605.9 (48.2	507.8 (40.4)	143.3 (11.4)	1989-90	479.2 (42.0)	504.3 (44.2)	157.5 (13.8)
1974-75	534.9 (40.1)	603.0 (45.2)	196.1 (14.7)	1990-91	462.6 (42.6)	480.0 (44.2)	143.4 (13.2)
1975-76	550.2 (41.4)	598.1 (45.0)	180.7 (13.6)	1991-92	401.7 (37.9)	507.7 (47.9)	150.5 (14.2)

Note : Percentage shares are given in parantheses

Source : BES (1967), *Fact Book on Agriculture 1966*
BES (1976), *Agricultural Statistics in Kerala 1975*
SPB, *Economic Review* (Various issues)

(1965-66) and 15.8 percent (1978-79). During this period the percentage share of Autumn crop has shown a declining tendency while the relative shares of Winter and Summer crops have been increasing.

During the period 1960-61 to 1991-92 annual growth rate in rice production for Autumn season is found to be negative while the other two seasons, Winter and Summer, had shown positive growth rates. Period wise analysis of growth rates in production of the seasons shows that during the period 1960-61 to 1974-75 rate of growth in rice production from Summer crop had been comparatively higher. While the annual growth rates in rice production from Autumn and Winter crops were 1.44 percent and 2.03 percent respectively, Summer crop production increased at a higher rate of 4.40 percent. During the second period (1975-76 to 1991-92) Autumn, Winter and Summer crops showed negative growth rates and the linear growth rates are found to be (-)1.85 percent, (-)1.21 percent and (-)1.64 percent respectively.

3.2.5. Decomposition of Changes in Rice Production

In this part we attempt to decompose the changes in rice production in Kerala for the period 1960-61 to 1991-92 by taking area under rice and its productivity as the pure components of output. In the additive decomposition model used in the present study contributions of changes in area, productivity and their interaction

Table 3.18

Percentage Contribution of Area and Yield in Production Changes

Seasons	Period I (1960-61 to 1974-75)		Period II (1975-76 to 1991-92)		Combined (1960-61 to 1991-92)	
	Area	Yield	Area	Yield	Area	Yield
Autumn	(-)5.84	106.28	(-)153.54	091.76	(-)226.52	229.33
Winter	73.19	21.36	(-)237.86	215.14	(-)128.74	276.68
Summer	53.50	34.83	(-)171.94	172.87	(-)34.99	148.74
All Seasons	52.94	41.60	(-)187.79	142.06	(-)5725.92	4072.07

effects are considered.[10] Changes in output are analysed separately of the three seasons (Autumn, Winter and Summer) and all the seasons taken together. Similarly changes in output during the sub periods (1960-61 to 1974-75 and 1975-76 to 1991-92) and the combined period (1960-61 to 1991-92) are separately considered. Percentage contributions of area and yield in production changes for different periods and seasons are given in table 3.18.

It is observed that the increase in Autumn rice production during the first period was entirely due to the changes in rice productivity. While changes in yield accounted for 106.28 percent changes in rice production during the period, contribution of area had been negative. For the second period changes in area accounted for (-)153.54 percent change in output while the contribution of yield continued to be positive. For the combined period contribution of area is found to be negative at (-)226.52 percent and productivity changes accounted for 229.33 percent of the total changes in output.

Relative role of changes in area in increasing Winter rice production during the first period is found to be greater than that of productivity changes. During this period the contributions of both area and productivity for the Winter crop had been positive. However, during the second period eventhough yield had a positive contribution of 215.14 percent, contribution of area was (-)237.86 percent. During the combined period also area effect is found to be negative and yield effect positive.

A major share of the increase in the production of Summer crop during the first period can be attributed to the changes in area. For the second period area

10. Additive decomposition model used in the present study is,

$$Q_1 - Q_0 = A_1 - A_0 (Y_0) + Y_1 - Y_0 (A_0) + I$$

Where the first component shows area effect, second component shows yield effect and the third component shows the interaction effect of area and yield.

For details refer,

Minhas B.S., Vaidyanathan A. (1965), *op. cit.*, pp. 230-252

effect in Summer rice production is found to be negative while the yield effect continued to be positive. The relative shares of changes in area and productivity for the changes in Summer rice production for the combined period were (-)34.99 percent and 148.74 percent respectively.

Taking all the three seasons together, during the first period positive contribution of increase in area is found to be higher than the yield effect in increasing rice production. However, during the second period change in area accounted for a negative share of (-) 187.79 percent and the share of yield remained positive at the level of 142. 06 percent. For the combined period increase in productivity accounted for a positive share of 4072.07 percent as a against a larger negative area effect of (-) 5725.92 percent in output change.

To sum up, the present analysis of the rice economy of Kerala shows that during the period of the present study, comparative position of the state taking the country as a whole had deteriorated in terms of area under and production of rice. However, per hectare productivity of rice in the state is still higher than the all India average. It is seen that area under paddy crop had considerably decreased in the state since mid seventies. Loss in area under paddy is observed in all of the districts in Kerala with remarkable inter district variations in rates. However, during the past three decades per hectare productivity of rice in the state has considerably increased. Thus the negative effect of decrease in area in total rice production is partially offset by the increase in productivity. Disaggregate analysis at the district level shows that the performances of Northern and Southern districts in Kerala are generally poorer compared to those districts situated in central Kerala. Season wise analysis shows that in terms of productivity Summer crop is better placed compared to Autumn and Winter crops. However, area under Summer paddy in the state constitutes only a small proportion of the total area under paddy.

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Chapter 4

SOURCES OF PRODUCTIVITY AND PERFORMANCE OF PADDY CROP

Estimated annual growth rate in per hectare productivity of paddy crop in Kerala during the second period of the present analysis (1975-76 to 1991-92) is found to be higher than that of the first period (1960-61 to 1974-75). But this relatively better yield rate during the second period is misleading if the rate of decline in area under paddy during this period is not considered. It can be reasonably believed that during the second period, paddy fields with comparatively lower productivity have been going out of cultivation which had infact inflated the average per hectare productivity of remaining paddy fields. As K.P. Kannan and K. Pushpangadan observe, the increase in yield of paddy in the state since mid seventies is not due to any technological change but it is "purely due to the marginal land going out of cultivation."[1]

This chapter is an attempt to verify the hypothesis that the different sources of productivity in paddy crop have not significantly helped to improve its productivity in Kerala and the observed positive growth rates in productivity is mainly due to the decline in area under the crop. Area under HYV paddy, extent of fertilizer use, rainfall index, area under irrigation and adoption of plant protection measures are taken as the sources of paddy productivity.

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1. Kannan K.P., Pushpangadan K. (1990), *op. cit.*, p.43.

Table 4.1

Spread of HYV Paddy in Kerala (1969-70 to 1991-92)

(Area in '000 hectares)

Year	Area Under HYV	Percentage of HYV Coverage	Year	Area Under HYV	Percentage of HYV Coverage
1969-70	136.0	15.56	1981-82	250.7	31.07
1970-71	159.1	18.17	1982-83	196.4	24.61
1971-72	167.9	19.18	1983-84	212.4	28.70
1972-73	210.4	24.08	1984-85	220.5	30.19
1973-74	248.3	28.39	1985-86	163.3	24.08
1974-75	167.7	19.03	1986-87	165.9	25.02
1975-76	230.1	26.27	1987-88	119.7	19.82
1976-77	264.0	30.90	1988-89	137.0	23.74
1977-78	293.3	34.90	1989-90	155.6	26.67
1978-79	279.2	34.93	1990-91	162.8	29.10
1979-80	282.2	35.57	1991-92	166.3	30.72
1980-81	279.7	34.89			

Source : DES, *Farm Guide* (Various issues)

SPB (1994), *Economic Review 1993.*

4.1. Spread And Performance of HYV Paddy in Kerala

4.1.1. Growth In Area Under HYV Coverage

Introduction of HYV paddy in India as an integral part of the New Agricultural strategy of mid sixties had not made much impact in the rice economy of Kerala till the early years of seventies. The proportion of HYV paddy to the total area under the crop in the state was only 15.56 percent in 1969-70 which gradually increased to 35.57 percent by the year 1979-80 and thereafter began to decline (Table 4.1).

Area under HYV paddy in the state reached its peak level in 1977-78 when 2.93 lakh hectares were brought under its coverage. During the period 1969-70 to 1977-78 area under HYV paddy increased at the annual rate of 8.33 percent. For a period of nine years from 1978-79 annual growth rate had shown declining trends. Annual average growth in HYV paddy area during this period is found to be (-)8.04 percent. However, from the year 1988-89 onwards area under HYV paddy has shown a moderate rate of recovery and by the year 1991-92 its proportion to the total paddy growing areas in the state had become 30.72 percent.

Compared to all India level the proportion of area under HYV paddy and its annual growth rates are found to be lesser in Kerala. In the year 1976-77, the proportion of HYV paddy in Kerala had been 30.90 percent while at the all India level it was 34.60 percent. Thereafter the difference widened more sharply and during the year 1989-90 while 62.10 percent of the total area under paddy at the all India level was covered by HYV seeds, in Kerala the corresponding proportion remained as low as 26.67 percent.[2]

Season wise distribution of area under HYV paddy in Kerala shows that in

2. All India figures are quoted from,
Tyag : B.P. (1994), *Agricultural Economics and Rural Development*, Jai Prakash Nath and Co., Meerut, p. 566.

Table 4.2

Season wise Distribution of HYV Paddy in Kerala

(Area in '000 hectares)

Year	Seasons		
	Autumn	Winter	Summer
1969-70	39.8 (10.12)	49.7 (13.01)	46.5 (47.06)
1970-71	58.0 (14.66)	48.1 (12.58)	53.0 (54.58)
1971-72	68.6 (17.35)	31.9 (8.36)	67.4 (68.78)
1972-73	94.3 (24.03)	55.0 (14.40)	60.1 (60.34)
1973-74	125.3 (32.62	57.1 (15.32)	65.9 (55.80)
1974-75	77.5 (19.64)	51.0 (13.25)	39.2 (38.70)
1975-76	98.5 (26.27)	62.2 (15.71)	69.4 (66.03)
1976-77	115.8 (31.83)	73.4 (19.23)	74.8 (68.94)
1977-78	142.1 (38.97)	89.6 (24.19)	61.6 (58.67)
1978-79	144.9 (41.78)	77.9 (22.51)	56.4 (53.06)
1979-80	142.5 (40.94)	84.6 (24.93)	55.1 (52.23)
1980-81	136.2 (39.00)	92.4 (26.09)	51.1 (51.98)
1981-82	138.9 (39.95)	73.6 (20.67)	47.2 (45.52)
1982-83	113.1 (33.00)	51.9 (14.73)	31.4 (37.60)
1983-84	101.8 (31.04)	62.1 (19.17)	48.5 (55.11)
1984-85	112.4 (35.35)	63.7 (19.48)	44.5 (52.35)
1985-86	83.8 (29.93)	40.7 (13.00)	38.8 (45.65)
1986-87	80.1 (27.91)	44.6 (15.02)	41.3 (51.63)
1987-88	54.8 (22.83)	33.8 (11.50)	31.3 (44.71)
1988-89	62.4 (26.78)	38.0 (13.87)	36.7 (52.43)
1989-90	79.0 (32.38)	36.9 (13.77)	39.7 (55.92)
1990-91	80.0 (33.90)	40.0 (15.47)	42.8 (66.05)
1991-92	73.3 (33.50)	49.7 (19.57)	43.3 (63.12)

Note : Percentages to total area under paddy in each season are given in parantheses

Source : DES, *Statistics for Planning* (Various issues)
SPB (1994), *Economic Review 1993*, Table 4.1, p.191.

the beginning of 1970's total area under HYV seeds had been distributed more or less equally among the three seasons- Autumn, Winter, Summer. However, by the end of 1980's nearly 50 percent of the HYV area had come under the Autumn crop and the rest was more or less equally shared between Winter and Summer seasons.As the Summer crop constitutes only a small proportion (nearly 12 percent) of the total area under paddy in the state, it is seen that the coverage of HYV seeds in Summer crop is comparatively higher (Table 4.2).

The relatively better coverage of HYV paddy in Summer season is attributed to a number of factors present during the summer months such as the relatively low level of humidity and high temperature, proper control over water management, low susceptibility to plant diseases etc., which are all essential for the successful adoption of HYV seeds. These factors lessen the risk element involved in the cultivation of paddy during the summer season and paddy farmers are therefore prepared to experiment with new inputs and techniques in that season.[3]

4.1.2. Causes for the lower rate of HYV coverage

The major factor that induces paddy farmers to adopt HYV seeds is its relatively higher rates of yield. During the period 1969-70 to 1979-80, the average annual per hectare yield of HYV rice in Kerala had been 1835 kilograms and for the traditional varieties it was only 1397 kilograms. Thus on an average, yield of HYVs are found to be 31.35 percent higher than that of local varieties (Table 4.3). However, the cost of cultivation of HYV rice is estimated to be nearly 30 percent higher than that of local varieties.[4] Again it is observed that since HYVs are generally dwarf, per hectare yield of straw is relatively low in its cultivation. Thus in terms of profitability comparative advantage of HYVs is only marginal.

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3. Raj K.N., et. al. (1972), *op. cit.*, p. Appendix 1-5.
4. Government of Kerala (1976), *High Yielding Varieties Programme in Kerala - (Virippu paddy 1973-74) - An Evaluation Study, op. cit.*, p.12.

Table 4.3

Yield of HYV and Traditional Varieties of Rice in Kerala

(1969-70 to 1979-80)

(Yield in Kgs./ha.)

Year	HYV	TV	Percentage difference
1969-70	1783	1333	33.76
1970-71	1854	1401	32.33
1971-72	2150	1401	53.46
1972-73	1836	1493	22.97
1973-74	1627	1362	19.46
1974-75	1758	1456	20.74
1975-76	1820	1392	30.75
1976-77	1752	1341	30.65
1977-78	1968	1311	50.11
1978-79	1982	1383	43.31
1979-80	2167	1320	64.17
Average annual yield	1835	1397	31.35
C.V	7.16	3.32	---

Source : Suseelan P. (1988), *Problems and Prospects of Rice in Kerala,* Table 4.7, p. 23.

Farm level decisions regarding the adoption of new varieties of seeds depend not only on its yield rates but to a greater extent on the variability in yields also. It is observed that the per hectare productivity of HYV rice is more variable than that of the traditional varieties which makes its adoption more risky. For the period 1969-70 to 1979-80 variability, measured in terms of coefficient of variation (C.V.) of HYV paddy is found to be 7.16 percent while for the traditional varieties it was only 3.32 percent.

Small size of operational land holdings also act as a constraint in the spread of HYV paddy in Kerala. Evaluation studies conducted by the State Planning Board had shown that the rate of HYV adoption in the state is positively related to the size of holdings.[5] In Kerala more than 90 percent of the number of holdings are marginal holdings of less than one hectare while at the all India level only 60 percent of the land holdings are marginal holdings.[6] Since the infrastructural facilities needed for the adoption of HYVs are not generally accessible to marginal farmers and they are usually averse to bear the risk involved in the change of farm technology, majority of them are reluctant to apply HYV seeds in their farms.

Another possible explanation for the low proportion of area under HYV coverage in the state is the relatively higher incidence of pests and plant diseases prone to HYV paddy. Again many of the new generations of HYV plants are dwarf and it makes weeding operations very difficult. Finally, as HYV rice widely regarded to be of low quality and poor taste, its market demand is also found to be poor compared to that of the traditional varieties.

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5. *Ibid.*

6. Government of India (1994), *Basic Statistics - India*, Centre for Monitoring Indian Economy, August, Table .6.

4.1.3. HYV coverage and paddy productivity

It is observed that in Kerala annual growth rate in the per hectare productivity of rice is not necessarily related to the growth rates in area under HYV paddy. During the period 1969-70 to 1977-78 area under HYV paddy in the state had increased at the average annual rate of 8.33 percent. Meanwhile annual rate of increase in rice productivity is found to be 0.46 percent. But inspite of a decline in HYV paddy area, per hectare productivity had shown a comparatively higher positive growth rate during the period 1977-78 to 1985-86. While the annual growth rate in area under HYV paddy during this period is found to be negative at (-)6.62 percent, productivity of rice per hectare had shown an annual positive growth rate of 1.20 percent.

Proportion of paddy area under HYVs shows wide inter district variations within the state. During the year 1991-92, in terms of the proportion of paddy area under HYV coverage, Kottayam district (86.55 percent) stood first followed by its neighbouring districts Alappuzha (66.26 percent)and Pathanamthitta (56.12 percent). But during that year per hectare productivity of rice had been highest in Palakkad district (2344 kilograms) which was closely followed by Kottayam (2312 kilograms) and Pathanamthitta (2310 kilograms) districts. The lowest proportion of HYV coverage is observed in Palakkad district which had shown the highest per hectare productivity in that year (Table 4.4).

Extent of relationship between the proportion of HYV coverage and per hectare productivity of rice can be examined by estimating Spearman's rank correalation coefficient (P) of the two variables and testing its significance. For this purpose ranks have been assigned to all the 14 districts in the state according to their performance both in terms of per hectare productivity and HYV coverage of paddy. The estimated value of rank correlation coefficient is found to be 0.1 which is not

Table 4.4

District wise Percentage of Area Under HYVs and Productivity of Rice in Kerala (1991-92)

District	Percentage of HYVs area	Productivity (in Kg./ha.)	Ranks in	
			Area	Productivity
Thiruvananthapuram	38.11	1771	6	8
Kollam	45.08	1668	4	11
Pathanamthitta	56.12	2310	3	3
Alappuzha	66,26	2077	2	6
Kottayam	86.55	2312	1	2
Idukki	17.11	2253	13	4
Ernakulam	32.68	1684	7	10
Thrissur	24.53	1762	10	9
Palakkad	07.19	2344	14	1
Malappuram	23.21	1595	11	12
Kozhikode	21.06	1194	12	14
Wayanad	32.43	2185	8	5
Kannur	39.35	1536	5	13
Kasaragod	24.57	1778	9	7

Note : Percentages are estimated values.

Source : SPB (1993), *Economic Review 1992.*

significant at both 1 percent and 5 percent level of significance.[7] Thus the present analysis does not suggest any positive relation between productivity and proportion of area under HYV seeds in paddy crop.

4.2. Fertilizer Consumption and Paddy Productivity

The New Agricultural Strategy which was adopted in India during the second half of the sixties had also proposed the optimum application of fertilizers along with the use of HYV seeds inorder to improve agricultural productivity in the country. As a result of it within a period of 25 years from 1965-66 to 1990-91, per hectare application of chemical fertilizers (N+P+K) in the state increased from the meagre level of 15.40 kilograms to a reasonably high level of 80.92 kilograms. Since cropwise data regarding the per hectare consumption of fertilizers in the state are not available, it is difficult to assess the extent and nature of relationship between fertlizer use and productivity of a crop like paddy. However, the effectiveness of fertilizer application in enhancing paddy productivity can be indirectly examined by comparing the yield rates in different seasons with different levels of fertilizer use. Again per hectare costs on manure can be taken as the indices of fertilizer consumption in each of the seasons in a year.

During the period of 1980-81 to 1989-90 annual average cost of manure for the Summer crop had been 6.16 percent higher than that of Winter paddy and 17.27 percent higher than that of Autumn paddy. Meanwhile per hectare productivity of Summer paddy on an average had been more than 15 percent higher than those of

7. Test Statistic used for rank correlation coefficient, P is

$$t = \frac{P\sqrt{n-2}}{1-P^2}$$

Estimated value of P = 0.1

Table value of t at 5 percent significance level (d.f. = 12) = 2.18,

at 1 percent significance level (d.f. = 12) = 3.06.

Since observed value of 't' is less than table values, P is not significant.

Table 4.5

Season wise Distribution of Manure Cost and Rice Productivity in Kerala (1980-81 to 1989-90)

Year	Cost of Manure (in Rs./ha.)			Productivity of Rice(in tonnes/ha.)		
	Autumn	Winter	Summer	Autumn	Winter	Summer
1980-81	560	623	514	1.60	1.66	1.73
1981-82	627	735	854	1.62	1.67	1.87
1982-83	632	702	910	1.69	1.60	1.93
1983-84	714	856	947	1.60	1.60	1.93
1984-85	793	966	913	1.73	1.67	2.00
1985-86	893	976	976	1.67	1.73	1.53
1986-87	1007	957	970	1.64	1.67	2.12
1987-88	949	951	1071	1.75	1.60	2.04
1988-89	1000	1106	1224	1.69	1.75	2.19
1989-90	1048	1207	1262	1.99	1.91	2.26
Annual average	822	908	964	1.70	1.69	1.96

Source : DES, *Report on the Cost of Cultivation of Important Crops in Kerala* (Various issues)

Autumn and Winter crops. Thus, among the three seasons per hectare cost on manure had been comparatively higher during the Summer season and its productivity is also found to be relatively higher. However, between Autumn and Winter crops per hectare productivity on an average is found to be slightly higher during the Autumn season eventhough the average annual cost of manure for the Winter crop had been 10.46 percent higher than that of Autumn crop (Table 4.5). It shows that a higher rate of fertilizer use need not lead to higher productivity in paddy crop.

Since July 1991, administered prices of Nitrogenous fertilizers were increased by 30 percent in accordance with the New Fertilizer Policy of the Union government. Increase in the prices of Phosphatic and Pottassic fertilizers were in the tune of 250 percent from August, 1992. As a result of the steep hike in prices, average per hectare use of fertilizers in the state had fallen down from 80.92 kilograms in 1990-91 to 67.18 kilograms by the year 1992-93 showing an overall decrease of 16.98 percent.[8] Inspite of this sharp decline, per hectare rice productivity in the state had increased from 1942 kilograms to 2018 kilograms during this period showing an overall increase of 3.91 percent. This erratic behaviour of paddy productivity suggests that increased fertilizer application is not a necessary condition for an improvement in paddy productivity in the state.

4.3. Impact of Rainfall and Irrigation on Paddy Productivity

4.3.1. Annual rainfall and paddy productivity

Indian agriculture is often described as a 'gamble on monsoon' indicating the strong relationship between the quantum of annual rainfall and agricultural productivity. However, in Kerala at least in the case of paddy variations in annual rainfall had not significantly affected its productivity over the past years. This fact

8. Government of Kerala (1994), *Economic Review 1993*, p. 31.

Table 4.6

Annual Rainfall and Index of Paddy Productivity in Kerala

(Base year = Average of 3 years ending 1972-73)

Year	Rainfall (in mm)	Percentage to normal rainfall	Index of paddy productivity
1972	2746	90.05	102.72
1973	2389	78.38	93.72
1974	2769	90.85	98.67
1975	3528	115.75	99.13
1976	2044	67.06	95.74
1977	3087	101.28	100.50
1978	2323	76.21	103.83
1979	1935	63.48	106.83
1980	2861	93.86	103.50
1981	2977	97.67	108.26
1982	1465	48.06	106.89
1983	2319	76.08	106.43
1984	2620	85.96	112.97
1985	2482	81.43	112.76
1986	1772	58.14	112.11
1987	2040	66.93	112.96
1988	2653	87.04	114.39
1989	2642	86.68	127.57
1990	2780	91.21	126.65
1991	3106	101.90	127.76

Note : Normal Rainfall in Kerala = 3048 mm. Index of Productivity in 1972-73 is approximated as the index for 1972 and so on.

Source : SPB (1993), *Economic Review 1992.*

DES, *Statistics for Planning* (Various issues)

can be verified from table 4.6 which shows the annual amounts of rainfall in Kerala and the index number of paddy productivity for the period 1971 to 1991. Rainfall data correspond to the calendar years while productivity data are of financial years.

It is observed that both the amount of rainfall and productivity of paddy in the state have shown considerable variations over the past yèars. However, instability in annual rainfall had been comparatively higher as its coefficient of variation is found to be 19.66 percent while for paddy productivity it is estimated as 8.92 percent only.

Inorder to examine the extent of relationship between annual rainfall and index of paddy productivity in the state, Pearson's coefficient of correlation has been used. Correlation coefficient estimated for the two variables for the period 1971 to 1991 is found to be 0.08 which is statistically insignificant at 5 percent and 1 percent levels of significance.[9] Thus the present analysis shows that the per hectare productivity of paddy in Kerala is not significantly related to the variations in annual rainfall.

4.3.2. Irrigation and productivity of paddy

With a view to enhance agricultural production government had given great importance to the development of irrigation in Kerala. Till the end of 1991-92, the state government had spent Rs.1049.02 crores in the irrigation sector and the net area benefited was 3.39 lakh hectares.[10] Up to the year 1972-73 ten major and medium irrigation projects were completed in the state with a total cost of Rs. 23.55 crores. The expected net area irrigated from these projects was 121.37 thousand hectares

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9. In order to test the significance of correlation coefficient, r, 't' test was used. Estimated value of 't' is found to be 0.341, while the critical value of t at 5 percent level of significance is 2.1 and at 1 percent level of significance it is 2.88. Since the calculated value of t is less than critical value correlation is insignificant. Test statistic t is given as,

$$t = \frac{\sqrt{n-2}}{\sqrt{1-r^2}} \cdot r$$

10. Government of Kerala (1993), *Economic Review 1992*, p. 42.

Table 4.7

Irrigated Area Under Paddy in Kerala (1979-80 to 1990-91)

(Area in '000 hectares)

Year	Irrigated Paddy Area	Percentage to Total Paddy Area
1979-80	286.80	36.15
1980-81	276.86	34.53
1981-82	275.45	34.14
1982-83	279.44	37.76
1983-84	286.93	38.77
1984-85	312.86	40.17
1985-86	282.53	42.60
1986-87	298.44	45.00
1987-88	376.45	60.71
1988-89	342.47	59.35
1989-90	326.96	56.04
1990-91	341.10	60.95
Growth rate	2.25	4.58

Source : DES, *Farm Guide 1988.*

SPB, *Economic Review* (Various issues)

but the achievement till the end of 1991-92 was only 76.69 thousand hectares.[11] During the period 1972-73 to 1992-93 no major or medium irrigation projects were commissioned in the state.

In Kerala irrigation is mainly confined to paddy and seven out of the ten major and medium projects completed in the state till 1991-92, viz., Chalakkudy, Peechi, Pothundy, Malampuzha,Walayar, Vazhani and Mangalam are located in the two major rice producing districts of Palakkad and Thrissur.

Eventhough any major or medium projects were not commissioned, the proportion of irrigated area under paddy has substantially increased in Kerala since the beginning of the eighties. In absolute terms during the period 1979-80 to 1990-91 irrigated area under paddy increased at the annual rate of 2.25 percent. In relative terms, the percentage of irrigated area under paddy during this period increased at the annual rate of 4.58 percent (Table 4.7). The difference in growth rates is due to the decline in area under paddy in the state during these years.

The very fact that both the area under irrigation and productivity of paddy had increased in the state over the past years is not an indication of the positive relationship between the two variables. Inorder to examine the nature of relationship, yield rates in irrigated areas must be compared with yield rates in non-irrigated areas keeping the other sources of productivity intact. Lack of data makes such an attempt impossible. However, the direction of the resultant changes in paddy productivity due to irrigation can be detected by comparing the performances of different districts having various levels of irrigation facilities. Table 4.8 shows the district wise distribution of irrigated area under paddy and its per hectare productivity during the

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11. As per available data net area irrigated in the state declined from 4.65 lakhs hectares to 2.21 lakh hectares (a sharp decline of more than 50 percent) between the years 1974-75 to 1976-77 which makes the authenticity of data dubious.

Refer, Kannan K.P., Pushpangadan K. (1988), *op. cit.*, p. 56.

Table 4.8

District wise Proportion of Paddy Area and Productivity of Paddy (1986-87)

District	Irrigated Paddy area (%)	Productivity (in Kg./ha.)	Ranks in	
			Irrigated Area	Productivity
Thiruvananthapuram	34.53	1714	8	7
Kollam	12.09	1669	14	8
Pathanamthitta	31.65	1863	10	5
Alappuzha	15.37	1736	13	6
Kottayam	31.72	2021	9	2
Idukki	44.78	2112	4	1
Ernakulam	76.89	1622	1	9
Thrissur	62.37	1601	2	10
Palakkad	55.84	1879	3	4
Malappuram	35.79	1536	7	12
Kozhikode	18.51	1103	12	14
Wayanad	42.38	1924	5	3
Kannur	25.49	1483	11	13
Kasaragod	37.70	1544	6	11

Source : DES, *Agricultural Statistics of Kerala 1986-87.*
SPB (1993), *Economic Review 1992.*

year 1986-87. Ranks are given to all the districts based on the proportion of irrigated paddy area and per hectare productivity of paddy.

According to the proportion of irrigated paddy area Ernakulam and Thrissur districts stand in the first and second positions while in terms of yield rates Idukki and Kottayam hold the first and second ranks respectively (Table 4.8). Rank correlation coefficient estimated from the data is found to be 0.21 which is not statistically significant at both 5 percent and 1 percent level of significance.[12] Thus the present analysis does not suggest any positive relationship between the proportion of irrigated paddy area and its per hectare productivity.

4.4. Other Sources of Productivity

Other sources of paddy productivity imply plant protection measures such as the use of fungicides, insecticides, weedicides and rodenticides. Due to lack of crop wise data with regard to the extent of its application, it is assumed that the proportion of pesticides and insecticides used among the various crops in Kerala had remained the same over the past years.

Total amount of pesticides and insecticides used in the state had declined from 1092.07 tonnes in 1980-81 to 705.55 tonnes by the year 1992-93 and the annual rate of decline during the period is estimated as (-)3.57 percent (Table 4.9). Meanwhile per hectare productivity of paddy in the state had shown a positive compound growth rate of 2.02 percent per annum. Period wise analysis shows that during the first period (1980-81 to 1986-87) while the use of pesticides and insecticides declined at a mild rate of (-)0.82 percent per year, paddy productivity in the state had increased at the annual rate of 1.34 percent. However, during the second period (1987-88 to 1992-93) when the amount of pesticides and insecticides declined at higher rate of (-)8.15 percent, paddy productivity had shown a better growth rate of 3.10 percent,

12. Observed value of t is found to be 0.76 which is less than the table values of t at 5 percent level of significance (2.18) and 1 percent level of significance (3.06).

Table 4.9

Consumption of Fungicides, Pesticides, Weedicides and Rodenticides in Kerala

(Quantity in tonnes)

Year	Fungicides	Insecticides	Weedicides	Rodenticides	Total
1980-81	304.17	615.76	153.62	18.52	1092.07
1986-87	536.45	472.15	24.35	6.50	1039.45
1987-88	488.81	556.54	25.73	7.92	1079.00
1992-93	349.01	302.17	36.72	17.65	705.55

Compound Growth Rates

1980-81 to 1986-87	9.92	(-)4.33	(-)26.43	(-)16.01	(-)0.82
1987-88 to 1992-93	(-)6.52	(-)11.50	7.37	17.38	(-)8.15
1980-81 to 1992-93	1.15	(-)5.76	(-)11.24	(-)0.40	(-)3.57

Source : SPB, *Economic Review 1992*, Table 4.21.
SPB, *Economic Review 1993*, Table 4.22.

indicating that the per hectare yield of paddy in the state has not been adversely affected by the decline of various plant protection materials used in its cultivation.

An analysis of the per hectare costs of pesticides and insecticides and paddy productivity during the Autumn and Winter seasons for the period 1980-81 to 1989-90 also suggests that productivity in paddy crop is not influenced by the amount of plant protection costs. The average annual per hectare costs on pesticides and insecticides during the period for Autumn and Winter crops are found to be Rs. 52.60 and Rs. 88.70 respectively.[13] Thus on an average, plant protection costs of Winter crop had been 68.63 percent higher than that of Autumn crop. Inspite of it, the average per hectare yield of Autumn paddy during the period (1698 kilograms) is found to be marginally higher than that of Winter crop (1686 kilograms).

To sum up, it is observed that at the state level none of the different sources of productivity that we have examined such as the adoption rate of HYV seeds, level of fertilizer consumption, extent of irrigation facilities and plant protection measures had any significant positive role in improving paddy productivity eventhough in individual farms at the micro level the situation can be different. It is in confirmation with our earlier observation that the positive linear growth rate observed in the productivity of paddy crop in the state over the past years was not due to any significant positive contribution of the different sources of productivity, but rather it was the result of marginal paddy lands with relatively lesser productivity going out of cultivation in the state.

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13. Costs are estimated from,
Government of Kerala, *Report on the Cost of Cultivation of Important Crops in Kerala* (1980-81 to 1989-90), Department of Economics and Statistics, Thiruvananthapuram.

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Chapter 5

PROFITABILITY IN PADDY CULTIVATION AND DECLINE OF AREA UNDER PADDY

A review of the changes in land use pattern in Kerala during its post formation period shows that since mid seventies there had been a continuous and steady decline in area under paddy with a simultaneous increase in area under garden crops and plantation crops suggesting a shift in area under paddy to perennial crops. As experience shows, farm level acreage allocation decisions are mainly based on the profitability of crops in the absence of any effective legal barriers to prevent the convertion of area under different crops.[1] Inspite of the agro-climatic and other constraints, during the short period extent of area under a particular crop depends largely on the absolute profitability of that crop while long term area allocation decisions are influenced mainly by the relative profitability of the crop compared to its competing crops.

In order to cover both the absolute and relative dimensions of profitability and thereby to make the analysis more comprehensive, present chapter is divided into two sections. While the first section deals with the trends in per hectare profit and profitability of paddy crop second section is concerned with the relative profitability of the crop.

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1. Eventhough in the *Kerala Land Utilisation Act - 1962*, there are provisions to discourage the conversion of paddy fields, the Act is not strictly enforced in the state so that majority of farmers are unaware of its provisions.

5.1. TRENDS IN PROFITABILITY OF PADDY CROP

Profitability of paddy crop depends on the amount of per hectare cost of cultivation and value of output. Earlier the Kuttanad Enquiry Commission had defined cost of cultivation of paddy as the sum of owned and hired human labour costs, hire charges of machinery and implements, cost of material inputs, land revenue, irrigation cess, agricultural taxes and interest on working capital. Interest on land value and rent on leased land were not included in costs.[2]

Reliable and continuous data regarding the cost of cultivation of paddy crop in Kerala were not available until the Department of Economics and Statistics began to estimate the cost of cultivation of some major crops in the state from 1980-81 onwards. These estimates are based on three cost concepts-Cost A Cost B and Cost C. Cost A is defined as the paid out costs which consist of the cash and kind expenses incurred by the farmers. Cost B is obtained by adding the interest of fixed capital (including land) to Cost A. Cost C is estimated by adding the imputed value of family labour (including value of exchange human labour) to Cost B. While calculating the cost of cultivation in each season interest on land value at the rate of 10 percent per annum for the period of six months was considered.[3] However, due to the inclusion of interest on land value, cost of cultivation is heavily inflated bacause in Kerala land prices had increased substantially during the past years. As P.S. George points out, "the practice of using current value of land in estimating cost of cultivation is conceptually inappropriate."[4]

Accepting the above argument and considering the method adopted by the Kuttanad Enquiry Commission, in this study cost of cultivation is defined as the paid

2. Government of Kerala (1971), *Report of the Kuttanad Enquiry Commission, op. cit.*, p.23.
3. Government of Kerala (1984), *Report on the Cost of Cultivation of Important Crops in Kerala*, Department of Economics and Statistics, Thiruvananthapuram, p.10.
4. George P.S. (1988), "Dilemma of Cost of Cultivation in Kerala", *Economic and Political Weekly*, Vol. 23, No. 39, September 24, p.A.- 131.

Table 5.1

Composition of Labour Cost in Paddy Cultivation in Kerala (1980-81 to 1989-90)

(Costs in Rs./ha.)

Year	Hired human labour	Household labour	Animal labour	Machine labour	Total labour costs
1980-81	1516 (76.22)	95 (4.78)	308 (15.48)	70 (3.52)	1989 (100.00)
1981-82	1867 (74.56)	202 (8.07)	342 (13.66)	93 (3.71)	2504 (100.00)
1982-83	1913 (73.13)	258 (9.86)	346 (13.23)	99 (3.78)	2616 (100.00)
1983-84	2177 (74.66)	191 (6.55)	354 (12.14)	194 (6.65)	2916 (100.00)
1984-85	2371 (74.44)	232 (7.28)	359 (11.27)	223 (7.00)	3185 (100.00)
1985-86	2509 (74.43)	267 (7.92)	397 (11.78)	198 (5.87)	3371 (100.00)
1986-87	2737 (73.08)	308 (8.22)	420 (11.21)	280 (7.48)	3745 (100.00)
1987-88	2996 (72.91)	357 (8.69)	474 (11.54)	282 (6.86)	4109 (100.00)
1988-89	3666 (76.77)	378 (7.92)	403 (8.44)	328 (6.87)	4775 (100.00)
1989-90	3509 (75.14)	348 (7.45)	443 (9.49)	370 (7.92)	4670 (100.00)
Annual average	2526 (74.56)	264 (7.79)	385 (11.36)	214 (6.32)	3388 (100.00)
Growth rate	9.25	11.68	4.00	35.27	9.25

Note : Labour Cost are the estimated W.A.M. of three seasons.

Percentages are given in parantheses.

Source : DES, *Report on the cost of Cultivation of Important Crops in Kerala* (1980-81 to 1989-90)

out costs on items such as hired human labour, animal and machine labour, seed or seedling, manure, land revenue and irrigation cess, interest on working capital, repair and maintenance charge of implements and other expenses plus the imputed value of household labour. Accordingly cost of cultivation is estimated by adding the imputed value of household labour to Cost A.

5.1.1. Cost of Cultivation of Paddy-Structure and Changes

Labour costs (both hired and owned), fertilizer costs and costs on seeds and seedlings are the three major components in the per hectare cost of cultivation in paddy crop. Taken together they constitute more than 90 percent of the total cost of cultivation of paddy in the state. Hence the extent and growth rates in these cost components are separately analysed in this part.

a. **Labour Costs**

Labour costs in paddy cultivation consist of hired human labour costs, imputed value of family labour and costs on animal and machine labour. During the period 1980-81 to 1989-90, hired labour costs on an average amounted to 74.56 percent of the total labour costs while the shares of house hold labour, animal labour and machine labour costs were 7.79 percent, 11.36 percent and 6.32 percent respectively (Table 5.1).

Inspite of a positive growth rate of 4 percent per year, the proportion of animal labour costs in total labour costs declined from 15.48 percent in 1980-81 to 9.49 percent by the year 1989-90. Meanwhile the proportion of per hectare machine labour costs had increased from 3.52 percent to 7.92 percent showing a growing tendency in favour of mechanisation in paddy farming. Within a period of ten years per hectare costs on machine labour increased by 428.57 percent and the average annual rate of growth had been as high as 35.27 percent.

Table 5.2

Percentage Share of Hired Human Labour in Paddy Farming According to Farm Sizes and Seasons

Year	Farm Sizes			Seasons		
	Small	Medium	Large	Autumn	Winter	Summer
1980-81	78.86	93.45	98.60	93.39	92.38	88.12
1981-82	70.72	89.14	95.62	90.12	88.50	82.67
1982-83	67.92	87.84	95.02	90.94	87.53	75.12
1983-84	87.21	91.63	95.13	92.86	90.17	90.28
1984-85	86.53	91.91	96.74	92.01	91.13	88.61
1985-86	87.20	92.02	96.48	92.29	90.71	57.36
1986-87	86.28	90.02	97.16	90.56	90.63	88.39
1987-88	84.89	91.36	96.25	91.26	91.20	86.99
1988-89	81.78	90.65	98.10	91.85	91.69	80.41
1989-90	87.46	91.51	97.51	91.49	91.39	90.06
Annual average	81.89	90.95	96.66	91.65	90.53	82.80

Source : DES, *Report on the Cost of Cultivation of Important Crops in Kerala* (Various issues)

During this period imputed value of family labour per hectare of paddy fields in the state had increased from Rs. 92 to Rs. 348 showing an overall increase of 266.32 percent. Average annual growth in the value of household labour, which is estimated as 11.68 percent is found to be higher than the rate of increase in the cost of hired human labour (9.25 percent). It indicates the growing tendency among paddy farmers in the state to depend more and more on self labour.

However, since paddy crop is highly labour intensive and a lion's share of the labour days needed in its cultivation are required during the peak sowing and harvesting seasons, even small paddy farmers depend heavily on hired human labour.[5] On an average, during the period 1980-81 to 1989-90 small farmers in the state had been depending on hired labour to meet more than 80 percent of their total human labour requirements in paddy farming. Compared to small and medium farmers, dependency of large farmers on hired labour is found to be substantially higher. Average annual hired labour use in medium and large farms are estimated as 90.95 percent and 96.66 percent respectively (Table 5.2).

Season wise analysis of the percentage dependency on hired labour shows that the average dependency have been highest during Autumn season (91.65 percent) which is closely followed by Winter season (90.53 percent). Compared to these two seasons, proportion of hired human labour use is found to be considerably lesser during the Summer season which is estimated as 82.80 percent.

During this period the average annual growth rate of labour costs in paddy cultivation in Kerala is found to be lesser than that of the daily wages of paddy field workers. It shows that the volume of labour hours employed in paddy farms per hectare

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5. Land holdings of less than 0.4 hectares are considered as small, between 0.4 and 2 hectares are regarded as medium and greater than or equal to 2 hectares are taken as large.

Table 5.3

Average Daily Wages of Paddy Field Workers in Kerala (1980-81 to 1989-90)

Year	Daily Wages (in Rs.)	
	Male	Female
1980-81	11.13	7.91
1981-82	12.78	8.83
1982-83	13.29	9.55
1983-84	15.86	11.02
1984-85	23.60	11.89
1985-86	26.08	15.10
1986-87	28.36	16.39
1987-88	30.36	17.68
1988-89	31.95	18.59
1989-90	33.31	19.63
Growth rate	13.68	10.85

Source : SPB (1993), *Economic Review - 1992* Table 3.10, p.19.

had been declining in the state over the past years.[6] Within a period of ten years from 1980-81 to 1989-90, average daily wages of paddy field male labourers had increased from Rs. 11.13 to Rs. 33.31 and that of female labourers from Rs. 7.91 to Rs. 19.63. The average annual growth rates in wages of male and female labourers are estimated

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6. The phenomenon of declining per hectare labour use in paddy cultivation was earlier pointed out by S. Natarajan. According to his findings per hectare labour hours in paddy farms had declined from 1458 man hours in 1970-71 to 1423 man hours by the year 1979-80. See,

Natarajan S. (1982), "Labour Input in Rice Economy in Kerala - An Inter Regional, Inter Temporal Analysis" in,

Pillai P.P. (ed), *Agricultural Development in Kerala, op. cit.*

Table 5.4

Season wise Distribution of Labour Costs in Paddy Cultivation

(Costs in Rs./ha.)

Year	Seasons			W.A.M. of 3 Seasons
	Autumn	Winter	Summer	
1980-81	1768 (62.17)	2138 (63.48)	2245 (65.64)	1989 (63.22)
1981-82	2367 (62.27)	2526 (62.76)	2841 (61.35)	2504 (62.46)
1982-83	2348 (62.98)	2646 (63.18)	3508 (63.63)	2616 (63.37)
1983-84	2949 (65.97)	2745 (60.01)	3435 (62.26)	2916 (62.84)
1984-85	2964 (64.60)	3222 (64.23)	3926 (68.60)	3185 (63.80)
1985-86	2737 (60.97)	3742 (67.15)	4081 (65.05)	3371 (64.81)
1986-87	3472 (65.58)	3938 (63.87)	4002 (63.90)	3745 (64.56)
1987-88	3956 (66.63)	4148 (67.34)	4450 (63.58)	4109 (66.61)
1988-89	4322 (69.03)	4936 (66.18)	5657 (66.83)	4775 (67.28)
1989-90	4505 (68.43)	4682 (66.39)	5341 (65.75)	4670 (66.85)
Annual average	3139 (65.40)	3472 (64.80)	3949 (64.92)	3388 (65.05)
Growth rate	9.47	9.23	8.37	9.25

Note : Percentages to total costs are given in parantheses.

Source : DES, *Report on the cost of Cultivation of Important Crops in Kerala* (1980-81 to 1989-90)

as 13.68 percent and 10.85 percent respectively (Table 5.3). Meanwhile per hectare labour costs in paddy cultivation in the state had increased at a comparatively lesser rate of 9.25 percent only.

In paddy cultivation wide inter seasonal variations are observed in per hectare labour costs and its growth rates. On an average per hectare labour costs for Summer paddy during the period 1980-81 to 1989-90 is found to be 13.73 percent higher than that of Winter crop and 25.79 percent higher that that of Autumn crop. However, labour costs had increased at a comparatively lower rate during the Summer season. While the average annual growth rates in labour costs for Autumn and Winter crops were 9.47 percent and 9.23 percent respectively for Summer paddy it was only 8.37 percent. Inspite of these variations, proportion of labour costs to the total per hectare costs of paddy for all the three seasons are found to be more less the same (Table 5.4).

b. **Fertilizer costs**

The second largest component of the total cost of cultivation in paddy crop is the cost of manure which includes both the costs on chemical fertilizers and farm yard manures. Per hectare cost of manure ranged between 14 percent to 20 percent of the total cost in paddy cultivation in the state during the period 1980-81 to 1989-90 and the average annual growth rate is estimated to be 6.91 percent. It is also observed that the proportion of manure costs had shown a marginal decline during the second half of 1980's compared to the first half (Table 5.5).

Season wise analysis shows that the average annual cost of manure for the Summer crop had been 17.27 percent higher than that of Autumn crop and 6.17 percent higher than that of Winter crop. In absolute terms manure costs per hectare of Autumn

Table 5.5

Season wise Distribution of Manure Costs in Paddy Cultivation

(Costs in Rs./ha.)

Year	Seasons			W.A.M. of 3 Seasons
	Autumn	Winter	Summer	
1980-81	560 (19.69)	623 (18.50)	514 (15.03)	582 (18.50)
1981-82	627 (16.50)	735 (18.26)	854 (18.44)	704 (17.56)
1982-83	632 (16.95)	702 (16.76)	910 (16.51)	693 (16.79)
1983-84	714 (15.97)	856 (18.71)	947 (17.17)	804 (17.33)
1984-85	793 (17.28)	966 (19.26)	913 (15.95)	884 (18.00)
1985-86	893 (19.89)	976 (17.52)	976 (15.80)	942 (18.11)
1986-87	1007 (19.02)	957 (15.52)	970 (15.49)	980 (16.72)
1987-88	949 (15.98)	951 (15.44)	1071 (15.30)	964 (15.63)
1988-89	1000 (15.90)	1106 (14.83)	1224 (14.46)	1078 (15.19)
1989-90	1048 (15.92)	1207 (17.14)	1262 (15.54)	1147 (16.42)
Annual average	822 (17.13)	908 (16.94)	964 (15.85)	878 (16.85)
Growth rate	7.33	6.47	7.00	6.91

Note : Manure costs include costs on chemical fertilizers and farm yard manure.
Percentages to total costs are given in parantheses.

Source : DES, *Report on the cost of Cultivation of Important Crops in Kerala* (1980-81 to 1989-90)

(estimated)

Table 5.6

Season wise Distribution of Costs on Seeds and Seedlings in Paddy Cultivation (1980-81 to 1989 90)

(Costs in Rs./ha.)

Year	Seasons			W.A.M. of 3 Seasons
	Autumn	Winter	Summer.	
1980-81	217 (7.63)	313 (9.29)	216 (6.32)	259 (8.23)
1981-82	277 (7.29)	317 (7.88)	276 (5.96)	295 (7.36)
1982-83	286 (7.67)	408 (9.74)	259 (4.70)	338 (8.19)
1983-84	338 (7.56)	375 (8.20)	407 (7.38)	362 (7.80)
1984-85	345 (7.52)	358 (7.14)	334 (5.84)	350 (7.13)
1985-86	344 (7.66)	415 (7.45)	413 (6.68)	385 (7.40)
1986-87	351 (6.63)	386 (6.26)	407 (6.50)	373 (6.43)
1987-88	388 (6.54)	399 (6.48)	416 (5.94)	397 (6.44)
1988-89	427 (6.82)	463 (6.61)	460 (5.43)	448 (6.31)
1989-90	457 (6.94)	457 (6.48)	462 (5.69)	458 (6.56)
Annual average	343 (7.23)	389 (7.38)	365 (6.02)	367 (7.14)
Growth rate	6.89	3.75	7.88	5.48

Note : Percentages to total costs are given in parantheses.

Source : DES, *Report on the cost of Cultivation of Important Crops in Kerala* (1980-81 to 1989-90)

paddy increased from Rs. 560 to Rs. 1048 during this period showing an overall increase of 87.14 percent and annual growth rate of 7.33 percent. In the case of Summer paddy, inspite of an overall increase of 145.33 percent in absolute manure costs, the average annual growth rate is found to be 7 percent. Meanwhile Winter paddy has shown a still lower growth rate of 6.47 percent in per hectare manure costs.

c. **Costs on seeds and seedlings**

Nearly 80 percent of the seeds and seedlings used in the cultivation of paddy in Kerala is home made and the balance is purchased. Costs of seeds and seedlings account for more than 7 percent of the total costs involved in paddy cultivation in the state. During the period 1980-81 to 1989-90 it had shown an average annual increase of 5.48 percent. (Table 5.6)

During this period the average annual costs on seeds and seedlings were more or less the same for the three seasons- Autumn, Winter and Summer. Yet per hectare costs are found to be marginally higher during the Winter season. Since the annual growth rates in costs on seeds and seedlings had been relatively lower compared to the growth rates in per hectare total costs, percentage share of it had declined over the years. Wide inter seasonal variations are found in the average annual growth rates in seeds and seedlings costs which had been estimated as 6.89 percent, 3.75 percent and 7.88 percent for the three seasons, Autumn, Winter and Summer respectively.

In addition to the labour costs, manure costs and costs on seeds and seedlings, paddy farmers have to bear some other costs such as plant protection costs, land tax, irrigation cess, repair and maintenance charges etc., together which constitute nearly 10 percent of the total costs.

Present analysis of the three major components of the cost of cultivation of paddy in Kerala for the period 1980-81 to 1989-90 shows that the annual growth

Table 5.7

Season wise Distribution of the Cost of Cultivation of Paddy Crop in Kerala During the Period 1980-81 to 1989- 90

(Costs in Rs./ha.)

Year	Seasons			W.A.M. of 3 Seasons
	Autumn	Winter	Summer	
1980-81	2844	3368	3420	3146
1981-82	3801	4025	4631	4009
1982-83	3728	4188	5513	4128
1983-84	4470	4574	5517	4640
1984-85	4588	5016	5723	4912
1985-86	4489	5572	6179	5201
1986-87	5294	6166	6263	5801
1987-88	5937	6160	6999	6169
1988-89	6261	7459	8465	7097
1989-90	6583	7052	8123	6986
Annual average cost	4800	5358	6083	5208
Growth rate	8.32	8.42	8.28	8.30

Source : DES, *Report on the cost of Production of Important Crops in Kerala* (Various issues)

(Estimated values)

rates in labour costs had been higher than the costs of manure and planting materials. Season wise study shows that while labour and manure costs were comparatively higher during the Summer season, all the three major cost components were lesser for Autumn paddy.

Per hectare cost of cultivation of paddy in Kerala had increased from Rs. 3146 to Rs. 6986 within a period of ten years from 1980-81 showing an overall increase of 122.06 percent and an average annual growth rate of 8.30 percent. Season wise analysis reveals that the average annual cost during the Summer season was 13.53 percent higher than the cost of Winter crop and 26.73 percent higher than that of Autumn crop. However, the average annual growth rate in the cost of cultivation of Summer crop, which is estimated as 8.28 percent, had been relatively lower than the growth rates for Autumn and Winter crops, estimated as 8.32 percent and 8.42 percent respectively (Table 5.7).

During the last dacade, per hectare productivity of paddy in Kerala had increased by 23.25 percent. Inspite of this increase, cost of production of paddy per quintal had shown a remarkable increase during the period due to a more than proportionate increase in per hectare cost of cultivation.[7] Average cost of cultivation of paddy in the state had increased from Rs.112 per quintal in 1980-81 to Rs. 207 per quintal by the year 1989-90 showing an overall increase of 84.82 percent and an average annual growth rate of 6.20 percent. Among the different seasons cost of production on an average is found to be higher for Autumn paddy (Rs. 172 per quintal) compared to Summer (Rs. 170 per quintal) and Winter (Rs. 162 per quintal) crops. Similarly, annual growth rate in cost of production is also found to be relatively higher during the Autumn season. Annual growth rates costs of production for the Autumn, Winter and Summer crops during the period 1980-81 to 1989-90 are estimated as 7.14 percent, 6.11 percent and 3.44 percent respectively. (Table 5.8)

7. Per quintal costs are estimated by dividing per hectare cost of cultivation with productivity after deducting the value of by-product from costs.

Table 5.8

Season wise Cost of Production of Paddy in Kerala During the Period 1980-81 to 1989-90

(Costs in Rs./Quintal.)

Year	Seasons			W.A.M. of 3 Seasons
	Autumn	Winter	Summer	
1980-81	111	103	147	112
1981-82	152	143	130	145
1982-83	132	136	161	137
1983-84	166	152	206	165
1984-85	148	147	151	148
1985-86	164	179	157	170
1986-87	191	187	164	186
1987-88	189	188	191	189
1988-89	245	184	196	210
1989-90	219	198	196	207
Annual average cost	172	162	170	167
Growth rate	7.14	6.11	3.44	6.20

Source : DES, (1987), *Statitics for Planning 1986*
SPB, *Economic Review* (Various issues)

(Estimated values)

5.1.2. Analysis of Value of Output

In the case of paddy crop total value of per hectare output implies the sum of the values of the prime product, paddy and byproduct, straw. Between the years 1980-81 and 1989-90, per hectare value of output of paddy crop in Kerala had shown an overall increase of 75.36 percent with a positive annual growth rate of 8.74 percent. On an average value of straw accounted for 19.25 percent of the total value of output. Again it is seen that the rate of increase in the per hectare value of straw had been higher than that of paddy. Annual growth rates in the value of straw and paddy in the state during the period 1980-81 to 1989-90 are found to be 10.01 percent and 8.42 percent respectively.

Compared to Autumn and Winter crops, Summer paddy is better placed in terms of per hectare value of product. Value of output from Summer crop on average

Table 5.9

Season wise Distribution of Average Annual Value of Output in Paddy Crop and Growth Rates in Output Value (1980-81 to 1989-90) in Kerala

(Annual Averages in Rs./ha., Growth rates in percentage)

Seasons	Annual average value			Growth rates		
	Paddy	Straw	Total	Paddy	Straw	Total
Autumn	4598	972	5570	7.56	9.26	7.86
Winter	5252	1467	6719	9.12	8.54	8.93
Summer	6470	1193	7668	7.99	15.12	8.87
All Seasons	5125	1224	6176	8.42	10.01	8.74

Source : Estimated from,

DES, *Report on the Cost of cultivation of Important crops in Kerala.* (1980-81 to 1989-90).

had been 37.67 percent higher than that of Autumn crop and 14.42 percent higher than that of Winter crop (Table 5.9). Meanwhile the relative shares of the value of straw in the total value of output amounted to 17.45 percent, 21.83 percent and 15.62 percent for the Autumn, Winter and Summer crops respectively. Average annual growth rate in the value of output for the Winter crop (8.93percent) during the period 1980-81 to 1989-90 had been comparatively higher than the growth rates of Summer crop (8.87 percent) and Autumn crop (7.86 percent). However, the average annual growth in the value of product had shown an impressive rate of 15.12 percent during the Summer season while growth rates during the Autumn and Winter seasons were 9.26 percent and 8.54 percent respectively.

Again, per hectare value of out put show wide temporal variations in all the three seasons.Coefficient of variation of the value of output for the Autumn, Winter, Summer seasons are found to be 22.68 percent, 25.81 percent and 27.12 percent respectively indicating that the variability has been comparatively lesser during the Autumn season.

5.1.3. Profit and Profitability Trends

Absolute profits involved in paddy farming and its growth trends are obtained by comparing the per hectare cost of cultivation in successive years with the respective value of output. Profitability is estimated as the ratio of absolute profits and cost of cultivation per hectare. Since profits and profitiability vary according to seasons, absolute profits are estimated and profit trends are analysed separately for the three seasons - Autumn, Winter and Summer.

During the period 1980-81 to 1989-90 average per hectare profit of paddy crop in Kerala had increased from Rs. 490 to Rs. 1817 and through out the period profits are found to be positive. However, while average absolute profits increased at the annual rate of 10.46 percent, profitability of paddy increased at a lesser rate of

Table 5.10

Season wise Distribution of Profits and Percentage Profitability in Paddy Cultivation

(Profits in Rs./ha.)

Year	Autumn		Winter		Summer		WAM of all seasons	
	Profit	Profitability	Profit	Profitability	Profit	Profitability	Profit	Profitability
1980-81	356	12.52	431	12.80	1175	34.36	490	15.48
1981-82	330	8.68	905	22.48	1104	23.84	679	16.99
1982-83	905	24.28	1452	34.67	1533	27.81	1220	29.55
1983-84	1387	31.03	1567	34.26	359	6.51	1344	28.97
1984-85	821	17.89	1263	25.18	812	14.19	1017	20.70
1985-86	1295	28.85	959	17.21	1831	29.63	1209	23.25
1986-87	584	11.03	1221	19.80	1836	29.32	1069	18.43
1987-88	557	9.38	1369	22.22	1579	22.56	1070	17.34
1988-89	94	1.50	2412	32.34	3084	36.43	1758	24.77
1989-90	1369	20.80	2030	28.79	2547	31.36	1817	26.01
Annual average	770	16.60	1361	24.98	1585	25.60	1167	22.15
Growth rates	(-)0.75	(-)9.16	11.81	3.38	12.13	3.85	10.46	2.06

Note : Profitability is estimated as the percentage of perhectare profit-cost ratio.

2.06 percent. Profitiablilty had been highest during the year 1982-83 (29.55 percent) and lowest in the year 1980-81 (15.48 percent). On an average paddy farmers in the state had acquired a profit of Rs. 1167 per season for each heactare of land they had sown and every hundred rupees they had spent as cost of cultivation brought them Rs. 22.15 as profits (Table 5.10).

Compared to Autumn and Winter crops performance of Summer crop had been better both in terms of per hectare profits and profitability. On an average per hectare profit of Summer crop was 16.46 percent higher than that of Winter crop and 105.84 percent higher than that of Autumn crop. Again during this period absolute profit of Summer paddy increased at the annual rate of 12.13 percent and profitability increased at the rate of 3.85 percent per year. Meanwhile absolute profit and profitablility of Winter crop had also shown positive annual growth rates of 11.81 percent and 3.38 percent respectively.

However, growth trends in absolute profit and profitability of Autumn paddy, area of which constitute nearly 45 percent of the total area under paddy crop in Kerala, are found to be negative. Inspite of an annual average profit of Rs. 770 per hectare, absolute profit from Autumn paddy had declined at the annual rate of (-)0.75 percent during the period 1980-81 to 1989-90. Profitability of Autumn crop had also shown a negative annual growth rate of (-)9.16 percent during this period.

Decline of area under paddy in Kerala can be partially explained by the differences in per hectare profits and its growth rates during the various seasons. Present analysis regarding the absolute per hectare profit and profitability of paddy crop reveals that during the period 1980-81 to 1989-90 profits had shown positive growth trends during the Winter and Summer seasons while for the Autumn crop it had been negative. Eventhough area under paddy in all the three seasons had declined in the state during this period, the rate of decline in area under Autumn paddy

had been relatively higher. Overall decline in area under Autumn paddy during the period was 1.05 lakh hectares, while for Winter and Summer crops, both of which had shown relatively better profitability, the loss in area were only 0.86 lakh hectares and 0.27 lakh hectares respectively. Percentage decline in area under Autumn crop (30.09 percent) is also found to be higher than those of Winter crop (24.27 percent) and Summer crop (27.73 percent). Similarly, the proportion of area under Autumn paddy to the total area under paddy crop in the state had declined from 43.56 percent in 1980-81 to 41.85 percent by the year 1989-90. Meanwhile the relative share of Winter crop had increased from 44.18 percent to 45.97 percent.

Farm level area allocation decisions are not only influenced by absolute profits and profitability, but also by the stability of returns.[8] Coefficient of variation in per hectare absolute profit of paddy crop during the period 1980-81 to 1989-90 is found to be 33.65 percent. Lack of consistency in profit is more explicit when temporal variations in profits for the three seasons are considered separately. Compared to the other two seasons instability in profit is found to be higher for the Autumn crop (Table 5.11).

Table 5.11

Variability in Costs, Value of Output and Profit of Paddy Crop (1980-81 to 1989-90)

Seasons	Variability in		
	Costs	Value of output	Profit
Autumn	23.83	22.68	57.19
Winter	23.95	25.81	39.95
Summer	23.65	27.12	48.01
All Seasons	23.71	24.69	33.65

Note : Variability is measured in terms of coefficient of variation.

8. Kannan K.P., Pushpangadan K (1990), op.cit., p-41.

It is also observed that variability in profit had been comparatively higher than the variability in the cost of cultivation of paddy in Kerala. While the estimated coefficient of variation of profit for the Autumn, Winter and Summer crops were so high as 57.19 percent and 48.01 percent respectively, in the case of per hectare costs the corresponding values were 23.83 percent, 23.95 percent and 23.65 percent respectively. Instability in per hectare profits also had acted as a contributing factor for the decline of area under paddy in the state.

5.2. RELATIVE PROFITABILITY OF PADDY CROP AND CONVERSION OF PADDY FIELDS FOR THE CULTIVATION OF ALTERNATIVE CROPS

During the second half of 1970's decline in area under paddy crop in Kerala had been accompanied by a simultaneous increase in area left as current fallow. Area under current fallow in the state had increased from 37 thousand hectares to 44 thousand hectares during this period and its proportion to the total geographical area of the state had increased from 0.94 percent to 1.3 percent (Table 3.1). This phenomenon suggests that the negative growth trends in paddy prices on the one hand and the mounting cost of cultivation on the other hand had prompted paddy farmers in the state to leave either a portion or whole of their fields as fallow for a short period.[9] As P.S. George and Chandan Mukherjee observe, "when prices and wages turn out to be unfavourable, before a permanent shift is contemplated, farmers may keep their land fallow for the current year."[10]

During the early years of 1980's extent of current fallow in the state began to decline and area under garden crops, plantation crops and some annual crops like banana began to increase suggesting that after the initial hesitation many of the paddy farmers had made up their mind in favour of a permanent shift from paddy crop to alternative crops. Since reliable and continuous data at the state level regarding the reallocation of paddy fields among competing crops were not available, "it is the conversion of paddy land to coconut that is often mentioned in the Kerala context."[11] Again the change in area under paddy had been usually "explained by the change in the price of paddy relative to that of coconut."[12]

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9. During the period 1975-76 to 1980-81, average farm prices of paddy in the state had declined from Rs. 182.98 to Rs. 152.06 per quintal. See,
Pillai P.P. (1984), *op. cit.*, p.89.

10. George P.S., Mukherjee Chandan (1986), *op. cit.*, p.47.

11. *Ibid.*

12. Kannan K.P., Pushpangadan K. (1988), *op. cit.*, p.16.

Table 5.12

Annual Growth Rates in Average Farm Prices and Area of Paddy and Coconut in Kerala

Period	Growth Rates in Farm Prices		Growth Rates in Area	
	Paddy	Coconut	Paddy	Coconut
1960-61 to 1975-76	10.44	13.21	0.79	1.54
1975-76 to 1985-86	2.79	0.62	(-)2.53	1.13
1985-86 to 1990-91	6.13	19.21	(-)3.78	4.31
1960-61 to 1990-91	7.12	9.79	(-)1.10	1.86

Source : Estimated from
DES, *Statistics for Planning* (Various issues)
SPB (1993), *Economic Review 1992.*

However, a close look at the trends in the farm prices of paddy and coconut for the different periods shows that in Kerala farm level decisions regarding the reallocation of paddy fields for alternative crops can not be fully explained by the changes in the relative prices of paddy and coconut. For example, during the period 1975-76 to 1985-86 annual growth rate in the average farm prices of paddy in the state is found to be 2.79 percent while coconut prices had shown a comparatively lesser growth rate of 0.62 percent per year. Inspite of it area under paddy showed a negative growth rate of (-)2.53 percent and area under coconut crop showed a positive annual growth rate of 1.13 percent during this period (Table 5.12).

Farm level acreage allocation decisions can be better explained by comparing the profitability of different competing crops, in which changes in costs are equally important as the changes in the farm prices of products. A state government sponsored sample survey conducted by the Statistical Institute taking 1992-93 as the reference year has revealed that paddy is grown only in 58 percent of land classified under it in Kerala. Out of the remaining 42 percent of land demarcated for paddy

cultivation, 23.9 percent had been converted for the cultivation of cash crops, 8.5 percent for cultivating annual crops like banana and plantains and the remaining 7.6 percent for the cultivation of seasonal crops like pulses, vegetables and tapioca.[13]

In this section of the study, inorder to explain the conversion of paddy fields for the cultivation of alternative crops, profitability of paddy crop is compared with the profitability of three of its competing crops viz, coconut, tapioca and banana.[14] For comparison purpose, competitive crops were so selected that each of them represent the three categories of crops viz, cash crops, annual crops and seasonal crops. Selection of crops is also in accordance with the availability of time series data.

5.2.1. Relative Profit and Profitability of Paddy and Coconut Crops

Coconut crop, which is widely regarded as the major competitive crop of paddy, occupies nearly 30 percent of the total cropped area in the state. Area under this crop had increased from 6.5 lakh hectares in 1980-81 to 8.76 lakh hectares by the year 1989-90.

Labour costs (including the imputed value of household labour) and costs on manure (both chemical fertilizers and farm yard manure) together constitute more than 80 percent of the total costs involved in coconut cultivation. During the period 1980-81 to 1989-90, average annual labour costs in coconut cultivation had been Rs.1889 per hectare which amounted to 52.69 percent of the total cost of cultivation (Table 5.13). Meanwhile the relative share of manure costs on an average is found to be 30 percent. Annual growth rates in labour costs and manure costs are estimated as 5.59 percent and 8.63 percent respectively which shows that the rate of increase in

13. As reported in
The Indian Express (Kochi), July 18, 1995.

14. It is assumed that two crops are raised annually from the paddy fields in Kerala. Accordingly, per hectare annual profits of paddy lands are estimated by doubling the W.A.M. of profits per season.

Table 5.13

Cost of Cultivation and Value of Output of Coconut Crop in Kerala (1980-81 to 1989-90)

(in Rs./ha.)

Year	Costs			Value of Product		
	Labour Costs	Manure Costs	Total Cost	Product	ByProduct	Total
1980-81	1457 (51.67)	822(29.15)	2820	7698	287	7985
81-82	1646 (53.58)	775 (25.23)	3072	6651	321	6972
82-83	1732 (56.42)	699 (22.77)	3070	7767	327	8094
83-84	1555 (50.45)	948 (30.76)	3082	7254	349	7603
84-85	1663 (53.56)	908 (29.24)	3105	8688	487	9175
85-86	1907 (53.30)	1163 (32.50)	3578	7600	632	8232
86-87	1868 (54.91)	952 (27.98)	3402	9535	672	10207
87-88	2241 (50.12)	1445 (32.32)	4471	10165	609	10774
88-89	2340 (54.29)	1291 (29.95)	4310	11970	766	12736
89-90	2481 (50.23)	1745 (35.33)	4939	10789	534	11323
Annual average	1889 (52.69)	1075 (29.99)	3585	8812	498	9310
Growth rates	5.59	8.63	5.90	5.57	10.31	5.80

Note : Percentage to toal costs are given in brackets.

Source : Estimated from,

DES, *Report on the Cost of Cultivation of Important Crops of Kerala* (1980-81 to 1989-90)

manure costs had been comparatively higher. During the period of this analysis total costs involved in coconut cultivation per hectare had shown an overall increase of 86.06 percent and an annual growth rate of 5.90 percent.

In the per hectare value of output in coconut crop, contribution of byproduct on an average amounts to nearly 5 percent of the total value. During the period 1980-81 to 1989-90 per hectare value of output had increased from Rs.7,985 to Rs. 11,323 showing an overall increase of 41.80 percent and its average annual growth rate is found to be 5.80 percent. Thus the annual growth rate in value of output had been marginally less than the growth rate in cost of cultivation.

Annual average profit of coconut crop during the period 1980-81to 1989-90 is estimated as Rs. 5,725 per hectare while for paddy it was only Rs. 2,334 per hectare. Thus on an average, per hectare profits from coconut gardens had been 145.29 percent higher than that of paddy fields. Similarly, during this period profitability of coconut crop on an average is found to be 139.03 percent higher than that of paddy crop. While paddy farmers in the state received only Rs. 22.15 as profits for every hundred rupees they had spent as cost, coconut farmers were able to get a profit of Rs.161.18 for an equal amount of cost. Thus both in terms of absolute per hectare profits and profitability, coconut farming is found to be more attractive than paddy cultivation in the state (Table 5.14).

5.2.2. Per Hectare Profits and Profitability of Tapioca Compared to Paddy

Area under tapioca, the only tuber crop widely cultivated in Kerala, had been steadily declining in the state since early seventies. During the year 1960-61 tapioca occupied 10.31 percent (24.22 million hectares) of the total cropped area in the state. By the year 1991-92, proportion of area under tapioca came down to 4.70 percent (14.19 million hectares). Due to non availability of continuous data regarding

Table 5.14

Profits and Profitability of Coconut and Paddy Crops

(Profits in Rs./ha.)

Year	Profit			Profitability (Percentage)		
	Coconut	Paddy	% difference	Coconut	Paddy	Difference
1980-81	5165	980	427.04	183.16	15.48	167.68
1981-82	3900	1358	187.19	126.95	16.99	109.96
1982-83	5024	2440	105.90	163.65	29.55	134.10
1983-84	4521	2688	68.19	146.69	28.97	117.72
1984-85	6070	2034	198.43	195.49	20.70	174.79
1985-86	4654	2418	92.47	130.07	23.75	106.82
1986-87	6805	2138	218.29	200.03	18.45	181.60
1987-88	6303	2140	194.53	140.98	17.34	123.64
1988-89	8426	3516	139.65	195.50	24.77	170.73
1989-90	6384	3634	75.67	129.26	26.01	103.25
Annual average	5725	2334	145.29	161.18	22.15	139.03
Growth rates	5.69	10.46	---	(-)0.20	2.06	---

Source : Estimated from,

DES, *Report on the Cost of Cultivation of Important Crops of Kerala* (1980-81 to 1989-90)

its cost of cultivation and value of product, period of the present analysis pertaining to the relative profits and profitability of the crop is restricted to four years from 1986-87 to 1989-90.[15]

Labour and manure costs taken together constitute nearly 80 percent of the total costs involved in tapioca cultivation.Unlike paddy and coconut crops, no valuable by products are obtained from its cultivation. During the period 1986-87 to 1989-90, labour costs on an average constituted 60.62 percent of the total cost of cultivation of tapioca, while for paddy it amounted to 66.39 percent of the total costs (Table 5.15). However, the percentage share of manure costs in tapioca cultivation (21.62 percent) is considerably higher than that of paddy which is estimated as 15.81 percent. The average annual per hectare total costs involved in tapioca cultivation during the period had been less than the per hectare costs in paddy farming. Again it is seen that the average per hectare value of output in tapioca was only 60.97 percent of the value of output raised from paddy fields.

Eventhough the annual growth rate of profit in paddy had exceeded the respective growth rate in tapioca cultivation, average annual profit of tapioca had been 18.38 percent higher than that of paddy crop. Profitability is also found to be comparatively higher in tapioca cultivation. During the period 1986-87 to 1989-90, while tapioca farmers in the state on an average earned Rs. 53.86 as profits for every hundred rupees they had incurred as cultivation costs, paddy farmers on average received only Rs 21.64 as profit for an equal amount of cost. Out of the four years for which relevant data are available, per hectare profit of paddy compared to tapioca had been higher only in one year (1988-89). To sum up, the present analysis shows that both in terms of per hectare profits and profitability tapioca is better placed than paddy.

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15. Eventhough Department of Economics and Statistics (GOK) had estimated and published data regarding the cost aspects of tapioca crop from 1980-81 onwards, value of product had not been estimated during the first 3 years. Again in their report on the cost of cultivation of important crops for the year 1984-85, tapioca was not included.

Table 5.15

Cost of Production, Value of Product and Profitability of Tapioca and Paddy Crops in Kerala (1986-87 to 1989-90)

(in Rs./ha.)

Variables		Years				Annual Average	Growth Rates
		1986-87	1987-88	1988-89	1989-90		
Labour Costs	Tapioca	3180	3606	4078	4418	3821	11.09
	Paddy	7490	8214	9552	9340	8649	8.58
Manure Costs	Tapioca	896	1414	1502	1638	1363	18.70
	Paddy	1960	1828	2156	2294	2060	6.37
Total Costs	Tapioca	5062	6446	6576	7127	6303	10.46
	Paddy	11602	12338	14194	13972	13027	6.98
Value of Product	Tapioca	8246	9098	9512	11884	9685	11.41
	Paddy	13740	14478	17710	17606	15884	9.45
Profit	Tapioca	3184	2652	2936	4757	3382	13.06
	Paddy	2138	2140	3516	3634	2857	20.88
Percentage Profitability	Tapioca	62.90	41.14	44.69	66.75	53.86	---
	Paddy	18.43	17.34	24.77	26.01	21.64	---

Source : Estimated from,

DES, Report on the Cost of Cultivation of Important Crops in Kerala (1980-81 to 1989-90)

5.2.3. Profit and Profitability of Banana Crop in Comparison with Paddy Crop

During the period 1983-84 to 1988-89 area under banana in the state increased from 15, 185 hectares to 18, 848 hectares and the proportion of area under the crop to the total cropped area in the state had increased from 0.53 percent to 0.65 percent.[16]

Costs on labour and manure together constitute nearly 70 percent of the total cost of cultivation of banana. While the percentage share of labour costs on an average accounted for only 38.12 percent of the total cost of banana cultivation , in the case of paddy it is found to be so high as 65.35 percent. However, the proportion of manure costs involved in banana cultivation is found to be comparatively higher than that of paddy. Again compared to paddy , the average annual total cost of cultivation had been 104.76 percent higher in banana cultivation. Similarly the value of per hectare output is also found to be substantially higher in banana crop. During the period, 1983-84 to 1989-90, per hectare value of product in banana cultivation on an average had been 148.11 percent higher than that of paddy (Table 5.16).

Compared to paddy crop, banana cultivation is found to be more profitable in Kerala. During the period of the present analysis the average annual per hectare profit from banana and paddy crops are found to be Rs 11,062 and Rs 2,489 respectively. Thus on an average per hectare profit of banana crop had been nearly four times higher than that of paddy. Similarly, annual growth rates in profits are also found to be higher in banana cultivation. On an average, while banana cultivators in the state obtained annual profit of Rs. 48.68 for each hundred rupees they had spent as cost of cultivation, profit earnings of paddy farmers for an equal amount of cost was only Rs. 22.24.

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16. Cosidering the availability of secondary data, period of the present analysis is restricted to 1983-84 to 1988-89 in the case of the banana crop.

Table 5.16

Cost of Production, Value of Product and Profit of Banana and Paddy Crop (1983-84 to 1988-89)

(in Rs./ha.)

Year	Costs		Value of Output		Profit		% Profitability	
	Banana	Paddy	Banana	Paddy	Banana	Paddy	Banana	Paddy
1983-84	16380	9280	24991	11968	8611	2688	52.57	28.97
1984-85	15652	9824	24031	11858	8379	2034	53.53	20.70
1985-86	25697	10402	38815	12820	13118	2418	51.05	23.25
1986-87	26231	11602	39214	13740	12983	2138	49.49	18.43
1987-88	26941	12338	39036	14478	12095	2140	44.89	17.34
1988-89	27599	14194	38785	17710	11186	3516	40.53	24.77
Annual average	23083	11273	34145	13762	11062	2489	48.68	22.24
Growth rates	12.17	8.34	10.47	7.51	6.84	3.92	---	---

Source : Estimated from,

DES, *Report on the Cost of Cultivation of Important Crops in Kerala* (1983-84 to 1988-99)

To sum up, comparative analysis regarding the per hectare profit and profitablility of paddy crop and three of its alternative crops viz., coconut, tapioca and banana invariably shows that paddy cultivation is relatively less remunerative for the farmers in the state. During the period of three years from 1986-87 to 1988-89,[17] compared to paddy, per hectare profits of coconut, tapioca and banana crops on an average had been 176.29 percent, 12.55 percent and 365.28 percent higher respectively. Among the four crops, profitability had been highest for coconut and lowest for paddy. While paddy farmers in the state on an average got Rs. 20.18 only for every hundred rupees they had spent as cost of cultivation, their counterparts engaged in the cultivation of coconut, tapioca and banana were able to get Rs.178.84, Rs.49.58 and Rs. 44.97 respectively for an equal amount of cost during this period. It is also observed that compared to its alternative crops, instability in profits had been highest for paddy crop (Table 5.17).

Table 5.17

Per hectare Profits and Profitability of Paddy, Coconut, Tapioca and Banana Crops in Kerala

Crops	Profits (in Rs./ha.)	% Variability in Profits	%Profitability
Paddy	2598	24.99	20.18
Coconut	7178	12.62	178.84
Tapioca	2924	7.43	49.58
Banana	12088	6.07	44.97

17. It is the period for which relevant data regarding all the four crops examined in the present study are available.

It is taken for granted that the assumption of economic rationality holds good in the case of paddy farmers in the state and they always try to maximise profits from their land holdings. The extent of per hectare profit and profitability differentials that exist between paddy and its alternative crops and the high level of variability in profits involved in paddy cultivation naturally induce paddy farmers to shift their area from the cultivation of paddy to more profit yielding crops. However, the extent of conversion of paddy fields to alternative crops is often restricted by a number of constraints such as the topography and nature of soil, amount of initial investment needed for conversion, jestation period of crops etc. Inspite of these constraints it is observed that considerable portion of land area once used for the cultivation of paddy in Kerala had already been converted for the cultivation of perennial crops such as coconut and rubber and seasonal or annual crops like vegetables, banana and tapioca. It can be reasonably concluded that one of the prime causes for the conversion of paddy fields for the cultivation of alternative crops is the comparative advantage of the latter in terms of profits and profitablility.

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Chapter 6

PUBLIC DISTRIBUTION SYSTEM AND OTHER FACTORS AS CAUSES FOR THE DECLINE OF PADDY CULTIVATION

In addition to the cost and yield factors, certain other factors like the Public Distribution System of the state, high prices of land and price differences between lands under different crops, growing number of absentee land owners in the state and the extensive use of paddy fields for non agricultural purposes have also adversely affected the performance of paddy sector in Kerala. Role of these factors in the decline of area under paddy in the state is examined in the present chapter.

6.1. Role of Public Distribution System as a Price Stabilising Factor

The twin objectives of the Public Distribution System (PDS) in Kerala are to maintain price stability and to ensure the availibility of essential commodities at reasonable prices to the consumers. Since Kerala is a food deficit state, in order to meet the ever growing food requirements of its population large quantities of rice and wheat are distributed through the PDS at subsidised rates every year. Annual import of rice on state accounts far exceeds the availability of rice for consumption from internal production in the state. During the year 1992-93 availibility of domestic rice for consumption after allowing ten percent of the total output for seed, feed and wastage was 9.76 lakh tonnes while the amount of rice distributed through PDS amounted to 17.43 lakh tonnes. In addition to rice more than 2.5 lakh tonnes of wheat was also distributed through PDS in that year.

Kerala has a well established PDS which covers more than 95 percent of its population. As on 30-11-1993, there were 13,309 retail outlets for the distribution of rice and wheat to the 54.48 lakh ration card holders in the state.[1] Amount of rice distributed through ration shops in Kerala had increased from 2.40 lakh tonnes in 1961 to 16.49 lakh tonnes by the year 1993 at the compound growth rate of 6.21 percent per year. During the period 1971 to 1993, amount of wheat distributed through PDS had also increased substantially from 0.55 lakh tonnes to 2.19 lakh tonnes. In order to supplement the PDS, Kerala State Civil Supplies Corporation is also engaged in the distribution of rice and other essential commodities through a large number of Super Markets, Mini Super Markets, Maveli Stores, Haritha Stores etc.

The efficient operation of the PDS in Kerala has damp down the rate of increase in paddy prices and has prevented it from wide variations over the past years. During the period 1980 to 1992, while the whole sale price of rice had shown a two fold increase, prices of all other agricultural commodities in the state had increased more than three times. Again, while the whole sale prices of plantation crops, oil seeds and condiments and spices had increased at the annual rates of 8.52 percent, 8.56 percent and 11.02 percent respectively, rate of increase in the whole sale price of rice was only 6.34 percent (Table 6.1). The growth rate differentials between the price of rice and other agricultural commodities can be attributed to the efficient operation of PDS in the state.

A well developed system of public distribution that exists in the state has also played a key role in regulating variations in the price of rice over the past years. During the period 1980 to 1992, compared to the prices of other agricultural products, paddy prices are found to be more stable. Variability, measured in terms of coefficient of variation, of the whole sale prices of oil seeds, plantation crops, fruits and vegetables

1. Government of Kerala (1994), *Economic Review 1993*, State Planning Board, Thiruvananthapuram, p. 21.

Table 6.1

Annual Growth Rates and Variabililty of the Whole Sale Price Indices of Agricultural Commodities in Kerala (1980-92)

Group of Crops	Annual Growth Rate	Variability
A. Food Crops	7.70	28.49
1. Food grains (rice)	6.34	23.04
2. Molasses	6.59	28.16
3. Condiments and spices	11.02	47.13
4. Fruits and Vegitables	7.69	30.88
B. Non Food Crops	8.55	35.02
1. Oil seeds	8.56	36.17
2. Plantation crops	8.52	33.04
C. All Crops	8.16	31.29

Source : Estimated from,
SPB, *Economic Review 1988, 1993.*

and condiments and spices for the period are estimated as 36.17 percent, 33.04 percent, 30.88 percent and 47.13 percent respectively, but for rice it is found to be 23.04 percent only.

6.2. Land Prices and Decline of Area Under Paddy

Compared to all India level, density of population is much higher in Kerala. Per capita net area sown in the state during the year 1990-91 is estimated as 0.08 hectares while at the all India level it is found to be 0.17 hectares. Due to the increased pressure on land area, land prices are also found to be much higher in Kerala.

Huge sums of money coming to the state every year in the form of foreign remittances also push up land prices in Kerala. According to the Housing and Employment Survey -1980, 5.1 lakh persons had migrated either to other states or to foreign countries from Kerala.[2] By the year 1992-93 total number of emigrants from the state incresed to 11.92 lakhs and 56.2 percent of them were foreign migrants. More than 95 percent of the total foreign migrants are employed in Gulf countries.[3] From Arab region alone total remittances to Kerala amounted to be well over Rs. 10,000 crores during the period 1975-76 to 1987-88.[4] Since land is a safe asset with fair liquidity in the state, a considerable portion of foreign remittances are used for the purchase of land which results in a hike in land prices. It is found that nearly 15 percent of the emigrant household savings have been spent for the purchase and improvement of land property.[5]

In Kerala land prices are so high that if interest on land value is added to the operational costs of cultivation none of the major crops cultivated in the state are

2. Government of Kerala (1994), *Report on Migration Survey 1992-93*, Department of Economics and Statistics, Thiruvananthapuram, p. 14.
3. *Ibid.*, p. 15.
4. Gopinathan Nair P.R. (1994), "Migration of Keralites to the Arab World" in, Prakash B.A. (ed), *Kerala Economy, op. cit.*, p. 108.
5. *Ibid.*, p. 110.

economical. For example, during the year 1989-90, total cost of cultivation per hectare of paddy fields in the state (including the interest on land value at 10 percent per annum) for the three seasons, Autumn, Winter and Summer are found to be Rs. 12,509, Rs. 12,740 and Rs. 12,482 respectively. However, during the same year the total value of per hectare output were only Rs. 7,952, Rs. 9,082 and 10,672 respectively showing negative profitabilityin all the three seasons. In the case of other seasonal crops and commercial crops negative returns are found to be still higher. As an example, during the year 1989-90, while the per hectare total cost of cultivation of coconut crop amounted to Rs. 43,752, value of per hectare output was Rs. 11,323 only.[6] It shows that in Kerala land is not always treated as a means of production, but is regarded as an asset that can be used for speculative exchange. Therefore many speculative investors without any genuine farming interest have already entered the land market of the state to purchase land for the purpose of selling it later at higher margins. This observation is vindicated by the fact that after the crash of share market in early nineties, land prices in Kerala had skyrocketed.

Land prices are not only very high in Kerala, but it also show considerable variations according to the varieties of crops cultivated. Generally, price of land under paddy crop is found to be substantially lesser than the prices of land under other seasonal crops and commercial crops. During the period 1985-86 to 1989-90, average price of land under coconut crop had been more than three times higher than the price of paddy fields. Again compared to paddy land prices, average per hectare price of lands under tapioca and banana were 175.88 percent and 147.74 percent higher respectively during this period (Table 6.2). It is also observed that the prices of land under plantation crops and other garden crops are also much higher in Kerala compared to the price of paddy lands.

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6. Per hectare costs and value of output for paddy and coconut crops are quoted from, Governement of Kerala (1991), *Report on the Cost of Cultivation of Important Crops in Kerala 1989-90*, Department of Economis and Statistics, Thiruvananthapuram.

Table 6.2

Average Price of Land Under Paddy and Its Competing Crops in Kerala (1985-86 to 1989-90)

(Land prices in Rs./ha.)

Year	Name of Crops			
	Paddy	Coconut	Tapioca	Banana
1985-86	104470 (00.00)	359080 (243.72)	NA ---	267460 (156.02)
1986-87	105330 (00.00)	382290 (262.95)	299990 (184.81)	243700 (131.37)
1987-88	118860 (00.00)	361100 (203.80)	295400 (148.53)	216140 (73.43)
1988-89	113440 (00.00)	361530 (218.70)	304470 (168.40)	357470 (215.12)
1989-90	100190 (00.00)	381980 (281.26)	310000 (209.41)	NA ---
Annual Average	108458 (00.00)	369196 (240.40)	302465 (175.88)	268693 (147.74)

Note : Percentage differences in land prices compared to paddy lands are given in parantheses.

Source : Estimated from,

DES, *Report on the Cost of Cultivation of Important Crops in Kerala* (1985-86 to 1989-90)

The present analysis thus shows that the conversion of paddy fields to the cultivation of alternative crops in itself enhances land prices and thereby increase the property value of paddy farmers in the state. In this way land price differentials act as an inducement for the conversion of paddy fields. Relatively lower prices of paddy fields also attract speculative investors who purchase tracts of paddy fields and convert it into salable plots either by filling it with soil or by converting it to the cultivation of garden crops or plantation crops which would fetch them higher prices.

6.3. Conversion of Paddy Fields for Non Agricultural Purposes

The ever growing demand of land for non agricultural uses in a thickly populated state like Kerala and the comparatively lower prices of paddy lands had naturally led to the widespread conversion of paddy fields for non agricultural uses. Between the years 1975-76 and 1990-91 land put to non agricultural use in Kerala had increased from 2.53 lakh hectares to 2.97 lakh hectares showing an overall increase of 17.39 percent (Table 3.1). Eventhough data regarding the extent of conversion of paddy fields for the various non agricultural uses are not available, it is observed that throughout the state, particularly in suburbs and road sides, stretches of lands demarcated as paddy fields are being used for the construction of residential buildings, factories, commercial establishments, health and education institutions etc. It is found that out of the estimated eleven lakh houses built in the state during the last decade (1980-81 to 1989-90) more than half are built in paddy fields after filling it with soil.[7]

Again, in order to make country bricks mud from paddy fields with clayey soil is used which also leads to the destruction of paddy fields in the state. Every year after monsoon thousands of brick kilns mushroom in paddy fields in some regions of

7. Venugopal P. (1944), "Paddy Fields Fast Becoming Housing Plots", *The Indian Express (Kochi)*, February 16.

the state and they are left as worthless pits after summer. During the next monsoon, due to soil erosion, the fertile upper layer of soil from the adjoining paddy fields move into these pits making the nearby fields unsuitable for paddy cultivation. Owners of these infertile fields are left with the only option of selling their lands to the kiln owners.[8] In areas like Amballur, Kodakara, Ollur and Marathakkara in Thrissur district and on the banks of the rivers Periyar, Meenichilar and Pamba in Ernakulam and Kottayam districts vast stretches of paddy fields have already been destroyed forever by digging out clay to make country bricks.

In a limited scale in some areas of the state, especially in Alappuzha and Kottayam districts, paddy fields are being converted for inland fish cultivation. With the objective to increase inland fish production and to create more employment opportunities in rural sector, the state government had established Fish Farmers Development Agencies (FFDA) in eleven districts during the Seventh Plan period. Encouraged by the technical and financial assistanace rendered by this agency many paddy farmers in the state had started fish cultivation in their fields. Eventhough not in a big way it had also led to the decline of area under paddy in the state.

6.4. Role of Absentee Land Owners in the Decline of Paddy Cultivation in Kerala

Secondary and tertiary sectors of the state economy taken together contributes more than two third of the Net Domestic Product and absorb the lion's share of labour force in Kerala. A considerable portion of the workers employed in these two sectors and many of the emigrant labourers from the state own agricultural lands and retain it even if they are living away from their land holdings. Compared to plantation crops and garden crops seasonal crops in general and paddy crop in particular

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8. Process of this transition is discussed in detail in,
Davis N.V. (1995), "Paddy Fields that Would Yield Bricks", *The Indian Express (Kochi)*, January 25.

need proper care and personal supervision. Therefore the absentee land owners who possess paddy fields either keep it fallow or convert it for the cultivation of perennial crops that need only lesser care and supervision. Thus the decline of area under paddy in the state can be partly attributed to the growing number of absentee land owners in Kerala due to the expansion of secondary and tertiary sectors.

To sum up, the Public Distribution System in the state had played a key role in keeping paddy prices low by influencing the supply side of domestic rice market and thereby reduced the profitability of the crop. Again it had a positive role in keeping paddy prices relatively stable over the past years. Growing pressure on land and the resultant increase in land prices along with the use of paddy lands for non agricultural purposes had also led to the decline of area under paddy in the state.

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Chapter 7

PROBLEMS OF PADDY CULTIVATION IN KUTTANAD - FINDINGS OF A FIELD INVESTIGATION

In order to identify the current problems of paddy cultivation in Kerala we have conducted a field investigation in Kuttanad region which is regarded as the 'rice bowl' of the state. The investigation was conducted during the months of May and June in 1996 and its major findings are given in this chapter which is divided into three parts. In the first part a brief account of the study area and the process of sample selection is given. Second part deals with the main features of paddy farming in the study area. Major problems involved in paddy cultivation in the study area are presented in the third part.

7.1. Study Area and Selection of Sample Farmers

Kuttanad region represents the low lying lands measuring about 25 kilometers east-west and 60 kilometers north-south of the west coast of Kerala. The region comprises of a total area of 875 square kilometers and a major portion of it lies 1 to 2.5 meters below the sea level.[1] Soils of Kuttanad area are grouped into Kayal soil, Karappadam soil and Kari soil, all of which are suitable for paddy cultivation. Before the construction of Thanneermukkom salt water barrier, low lying lands in Kuttanad region were periodically inundated with salt water and a single crop was raised in a year from the paddy fields. However, since the completion of Thanneermukkom bund in 1976, a good percentage of fields are converted into double

1. Kerala Agricultural University (1984), *Status Report - Region of Problem Areas*, National Agricultural Research Project, Vellanikkara, Thrissur, p. 28.

cropped lands. Major crops cultivated in Kuttanad region other than paddy are coconut, cocoa, and banana.

Kuttanad and Palakkad are the two major rice producing areas in Kerala and over the past few years rate of decline in area under paddy had been comparatively higher in Kuttanad. Hence it was chosen as the study area. Eventhough Kuttanad region is spread over the three districts of Alappuzha, Kottayam and Pathanamthitta, paddy growing areas in this region are mainly located in the first two districts. Therefore for the purpose of field investigation Kuttanad taluk from Alappuzha district and Kottayam taluk from Kottayam district were identified and five villages from each of these taluks were selected. The villages thus selected from Kuttanad taluk were Kavalam, Neelamperoor, Veliyanad, Ramankari and Champakulam and the villages chosen from Kottayam taluk were Nattakom, Chengalam, Kumarakom, Aymanam and Arpookara. Using the method of quota sampling relevant data were collected from ten sample farmers from each of the ten selected villages with the help of a structured interview schedule. (A copy of the interview schedule is given in Appendix).

7.2 Paddy cultivation in the Study Area - Some General Features

7.2.1. Nature of ownership and size of holdings

Depending on the nature of the ownership of fields in which they cultivate, paddy farmers in the study can be grouped into three categories viz.,

(a) farmers who cultivate in their own lands,

(b) farmers who cultivate both in owned fields and fields taken from others on lease and

(c) farmers who cultivate exclusively in leased holdings.

Table 7.1

Area Cultivated by Sample Paddy Farmers According to the Nature of Ownership

(Area in ha.)

Nature of Ownership	Number of farmers	Cultivated Paddy area
Own	70 (70.00)	79.91 (41.92)
Own and lease	28 (28.00)	97.20 (50.75)
Lease	2 (2.00)	14.00 (7.33)
Total	100 (100.00)	191.11 (100.00)

Note : Percentages are given in parantheses.

Our field survey shows that 70 percent of sample farmers in the study area cultivate in their own fields. The proportion of land cultivated by them amounts to 41.92 percent of the paddy lands and the average size of holdings is found to be 1.14 hectares. In addition to their own lands 28 percent of the sample farmers have taken land on lease. More than half of the paddy lands in the study area are cultivated by this category of farmers. The remaining two percent of sample farmers are cultivating exclusively in lands taken on lease and area cultivated by them amounts to 7.33 percent of the total paddy fields in the study area (Table 7.1). Average size of paddy lands cultivated by the three categories of farmers taken together is estimated to be 1.91 hectares.

Table 7.2

Village wise Distribution of Sample Farmers According to the Size of Cultivated Paddy Fields

Village	Size of Paddy Lands			Total
	Small	Medium	Large	
Nattakom	Nil	9 (90.00)	1 (10.00)	10 (100.00)
Chengalam	1 (10.00)	7 (70.00)	2 (20.00)	10 (100.00)
Kumarakom	Nil	3 (30.00)	7 (70.00)	10 (100.00)
Aymanam	Nil	8 (80.00)	2 (20.00)	10 (100.00)
Arpookara	1 (10.00)	8 (80.00)	1 (10.00)	10 (100.00)
Kavalam	Nil	3 (30.00)	7 (70.00)	10 (100.00)
Neelamperoor	2 (20.00)	4 (40.00)	4 (40.00)	10 (100.00)
Ramankari	Nil	6 (60.00)	4 (40.00)	10 (100.00)
Veliyanad	Nil	9 (90.00)	1 (10.00)	10 (100.00)
Champakulam	1 (10.00)	8 (80.00)	1 (10.00)	10 (100.00)
Study Area	5 (5.00)	65 (65.00)	30 (30.00)	100 (100.00)

Note : Percentages are given in parantheses.

Proportion of small paddy farmers who cultivate less than 0.4 hectares of land is found to be much less than those of medium and large farmers in the study area. Nearly two-third of the sample farmers are medium farmers who cultivate 0.4 to 2 hectares of land. While the proportion of large farmers who cultivate 2 or more hectares of land is found to be 30 percent, only 5 percent of them belong to the category of small farmers (Table 7.2).

7.2.2. Cost of cultivation and value of product

Average per hectare cost of cultivation of sample paddy farmers in the study area for the 'Varsha' crop[2] in 1995-96 is estimated to be Rs. 10,374 and the average value of per hectare product is found to be Rs.17998 which is 73.49 percent higher than cost.[3] Village wise analysis shows that the cost of cultivation of paddy is comparatively lesser in the three villages of Aymanam, Neelamperoor and Champakulam while it is found to be relatively higher in Nattakom village. Considering the per hectare value of output the village of Kavalam and Veliyanad, both of which belong to Kuttanad taluk, come in the first and second positions respectively (Table 7.3). On an average, compared to Kottayam taluk, paddy cultivation is found to be more profitable in Kuttanad taluk.

Majority of the sample farmers in the study area believe that in recent years paddy cultivation had become less profitable. While 79 percent of the farmers are of the opinion that profitability has been steadily declining over the past few years the remaining 21 percent think that there is no remarkable change in profitability.

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2. Varsha crop is the main crop raised from paddy fields in Kuttanad and it broadly corresponds to the Autumn crop else where.
3. Cost of cultivation includes the imputed cost of house hold labour but interest on working capital, land value and other fixed assets are excluded. While estimating the value of product, value of by-product is also added.

Table 7.3

Village wise Distribution of Average Cost of Production and Value of Product in Paddy Cultivation

(in Rs./ha.)

Village	Average Cost	Average Value of Output	Profitability (Percentage)
Nattakom	11563	17590	52.12
Chengalam	10125	17107	68.96
Kumarakom	10600	18361	73.22
Aymanam	9650	15115	56.63
Arpookara	10375	18069	74.16
Kavalam	10063	20636	105.07
Neelamperoor	9763	18590	90.41
Ramankari	10675	17067	59.88
Veliyanad	11175	20303	81.68
Champakulam	9750	17146	75.86
Study Area	10374	17998	73.49

7.2.3. Labour requirements and wages

Maintenance of outer bunds, dewatering, clearance and levelling of land for sowing, construction of ridges, sowing, transplanting, weeding, manuring, spraying pesticides, reaping, threshing, and winnowing are the major agricultural operations involved in paddy farming. Out of these operations, repair of outer bunds and dewatering are done jointly by all of the farmers who cultivate in a 'padasekharam' under the supervision of an elected Padasekharam Commitee. Dewatering is done by private contractors who take up the work in auction. Usually individual farmers have to pay Rs. 650 to Rs. 875 per hectare as dewatering charges (Nerma). Outer bund repair costs are shared by the farmers on the basis of the proportion of area they cultivate.

For ploughing, manuring, spraying insecticides and harvesting, piece rates are given. Ploughing charges range from Rs. 750 to Rs. 875 and manuring charges come up to Rs.100 per hectare. On an average, for spraying ten litres of insecticides six rupees are given to the labourers. For harvesting operations one-eighth of the total yield is given as 'patham' and one-fourth of 'patham' is given as 'theerpu'. Together it amounts to 15.63 percent of the total yield.

Among the various operations involved in paddy cultivation, ploughing, ridge making, manuring and spraying of pesticides are done exclusively by male labourers. Female labourers are used for clearing fields before sowing (Varal), weeding and transplanting. In harvesting, male labourers are employed mainly to bring reaped paddy to threshing grounds.

Nearly 95 percent of the total human labour days required in paddy farming are needed for the preparation of land, weeding and harvesting. It is observed that the proportion of female labour days required in paddy cultivation is much higher than that of male labour requirements. Nearly 45 percent of the female labour days are needed for weeding and more than 50 percent of male labour days are required for the preparation of land (Table 7.4).

Table 7.4

Required Labour Days in Paddy Cultivation

(Labour days per ha.)

Agricultural operations	Labour requirements		
	Male	Female	Total
Land preparation and sowing	8 (53.33)	39 (27.46)	47 (29.94)
Weeding and transplanting	Nil (0.00)	63 (44.37)	63 (40.13)
Harvesting	5 (33.33)	33 (23.24)	38 (24.20)
Other	2 (13.33)	7 (4.93)	9 (5.73)
Total	15 (100.00)	142 (100.00)	157 (100.00)

Note : (i) Preparation of land includes ploughing, levelling, ridge making, removal of decayed weeds.

(ii) Percentages are given in parantheses.

At the time of the present investigation, prevailing daily wages of male and female labourers in the study area for normal farm works were Rs. 100 and Rs. 40 respectively. For head load works male labourers were paid Rs. 150 per day on an average.

7.2.4. Extent of mechanisation

Earlier in Kuttanad region the entire paddy farming operations were exclusively carried out by making use of human or animal labour. At present in all the padasekharams in the study area electrically run pump sets are used for the purpose of dewatering, in the place of manually operated wheels. Similarly for plouhging power tillers and tractors are extensively used in this region. Some of the sample farmers in the study area believe that ploughing is unnecessary in Kayal lands where the texture of soil is silty clay loam with fairly good drainage. The present study shows that 8 percent of the sample farmers do not plough their fields before sowing. It is also found that only 26 percent of them are still depending exclusively on the traditional system of ploughing making use of draught animals, while 30 percent of them are using tractors or power tillers and the remaining 36 percent use draught animals along with power tillers or tractors.

For harvesting, manual labour is used by all the sample farmers in the study area. Eventhough threshing machines have been recently introduced in some areas it has not so far become popular among the paddy farmers. However, for winnowing electrically run fans are used in some of the padasekharams in Kuttanad region.

7.2.5 Varieties of seeds and manures used

All the sample farmers in the study area are at present using HYV seeds in their fields. The most popular variety of seed is 'Jyothi'. A few farmers are using certain other high yielding varieties like 'Pavizham', 'Triveni', 'Kanchana', 'MO-4' and

'Bhadra'. According to the present survey, during the previous season 85 percent of the sample farmers had used 'Jyothi', while 'Pavizham' and 'Triveni' were sown by 7 percent and 3 percent of the farmers respectively. It is also found that 74 percent of the sample farmers had purchased seeds either from private individuals or from the retail out lets of the National Seed Corporation (NSC).

In order to maintain productivity, paddy farmers in the study area are heavily depending on chemical fertilizers and only a small minority of them use organic manures like green manure and cowdung in their fields. According to the estimates of the Kuttanad Water Balance Study Report, during the main crop season alone 4481 tonnes of Nitrogen (N), 2393 tonnes of Phosphate (P_2O_5) and 3144 tonnes of Potash (K) are applied in the paddy fields of Kuttanad region.[4] Present study shows that while the entire sample farmers are using chemical fertilizers like Urea, Potash and Factamfose, only 6 percent of them use organic manures.

In the study area 513 kilograms of chemical fertilizers are used per hectare of paddy land on an average to raise a single crop. Out of it the share of Factamfose alone is 163 kilograms which amounts to 31.77 percent of the total quantity. Village wise analysis shows that the per hectare application of chemical fertilizers is highest in Nattakom and lowest in Champakulam. On an average per hectare use of chemical fertilizers in the villages belonging to Kottayam taluk is 25.89 percent higher than the villages in Kuttanad taluk (Table 7.5).

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4. Government of Kerala (1989), *Kuttanad Water Balance Study Report*, Thiruvanthapuram, December, Annex C, Table 1, p. 40.

Table 7.5

Village wise Distribution of the Average Use of Chemical Fertilizers in Paddy Cultivation

Village	Chemical Fertilizer (in Kg./ha.)				
	Factam fose	Urea	Potash	Mussoorie	Total
Nattakom	183 (24.33)	183 (24.33)	173 (23.00)	213 (28.32)	752 (100.00)
Chengalam	243 (50.73)	133 (27.77)	103 (21.50)	Nil	479 (100.00)
Kumarakom	160 (28.37)	128 (22.70)	143 (25.35)	133 (23.58)	564 (100.00)
Aymanam	145 (24.13)	118 (19.63)	118 (19.63)	220 (36.61)	601 (100.00)
Arpookara	175 (38.21)	148 (32.31)	110 (24.08)	25 (5.46)	458 (100.00)
Kavalam	145 (30.98)	138 (29.49)	115 (24.57)	70 (14.96)	468 (100.00)
Neelam-peroor	98 (16.87)	128 (22.03)	130 (22.38)	225 (38.73)	581 (100.00)
Ramankari	168 (39.62)	93 (21.93)	130 (30.66)	33 (7.78)	424 (100.00)
Veliyanad	155 (33.70)	105 (22.83)	100 (21.74)	100 (21.74)	460 (100.00)
Champakulam	158 (47.31)	83 (24.85)	93 (27.84)	Nil	334 (100.00)
Study Area	163 (31.77)	126 (24.56)	122 (23.78)	102 (19.88)	513 (100.00)

Note : Percentages are given in parantheses.

7.3. Problems of Paddy Cultivation in the Study Area

Some of the major problems involved in paddy farming as revealed by the present investigation are the following:

7.3.1. Decline in the number of full time and dedicated paddy farmers

At present, to the majority of farmers in the study area, paddy cultivation is merely a subsidiary occupation to supplement their other sources of income. As they are not full time farmers, they often lack genuine interest in paddy farming. All over the study area large number of businessmen, traders, government servants, employees in private establishments, inland fishermen and retired employees are indulged in paddy cultivation alongwith full time farmers. As our field study shows, only 40 percent of the sample farmers in the study area are full time farmers who are

Table 7.6

Distribution of Sample Farmers on the Basis of Occupation

Occupation	Number of Farmers	Percentage
Full time farming	48	48.00
Labour	7	7.00
Inland Fishing	7	7.00
Skilled Labour	5	5.00
Permanent Employees	9	9.00
Business/Trade	15	15.00
Retired /Ex-Service	9	9.00
Total	100	100.00

depending exclusively on agricultural incomes for their living. Excluding the number of ex-service men and retired employees, for 43 percent of persons who are presently engaged in paddy cultivation, it is only a part time job (Table 7.6). Paddy as a crop needs much personal care and supervision which can be expected only from full time farmers. It is one of the reasons why many of the paddy farmers in the study area opt for a single crop eventhough it is possible to raise a second crop in their fields.

7.3.2. Aversion of younger generation to paddy farming

Another factor that adversly affects the prospects of paddy cultivation in Kuttanad region is the growing aversion of new generation to paddy farming. Throughout the study area youngsters have developed a sort of aversion to take up paddy cultivation as their occupation. It is evident from the age composition of paddy

Table 7.7

Distribution of Sample Paddy Farmers According to Age

Age group	Number of farmers	Cumulative Distribution	
		Age	Percentage
30 - 34	5 (5.00)	≥ 30	100.00
35 - 39	9 (9.00)	≥ 35	95.00
40 - 44	16 (16.00)	≥ 40	86.00
45 - 59	13 (13.00)	≥ 45	70.00
50 - 54	10 (10.00)	≥ 50	57.00
55 - 59	18 (18.00)	≥ 55	47.00
60 - 64	16 (16.00)	≥ 60	29.00
65 - 70	13 (13.00)	≥ 65	13.00
Total	100 (100.00)	---	---

Note : Percentages are shown in parantheses

farmers which shows that the majority of them belong to higher age groups. According to the sample survey 13 percent of the sample farmers are 65 or more years old and 47 percent of them fall in the age group of 55 or above. None of the sample farmers are below 30 years and only 14 percent of them are below 40 years. Average age of paddy farmers in the study area is estimated as 52.35 years (Table 7.7).

7.3.3. Farmer's reluctance to take second crop

After the completion of Thanneermukkom salt water barrier and construction of permanent outer bunds, it is possible for the paddy farmers to take a second crop during the Summer season in Kuttanad region. Inspite of it only 37 percent of sample farmers had taken the second crop during the year 1995-96. Possibility of crop failure due to saline intrusion, non availability of required number of hired farm labourers and the comparatively lesser profitability of Summer paddy had induced paddy farmers to keep their lands fallow during the second crop season.

7.3.4. System of giving paddy lands on lease

In order to avoid the problems and risks involved in paddy cultivation many of the paddy land owners in the study area give out their land on lease for cultivation. Usually paddy land is given for single crop and rent is collected in advance. Per hectare rent amounts to Rs. 4000 to 5250 in Kottayam taluk and Rs. 4500 to Rs. 6000 in Kuttanad taluk. Nearly one third of the sample farmers in the study area are cultivating in paddy fields taken on lease.

Present field investigation shows that nearly 40 percent of the total area cultivated by the sample farmers are lands taken on lease. It is also observed that the proportion of leased holdings is comparatively higher in Kuttanad taluk where it amounts to 50.21 percent (Table 7.8).

Table 7.8

Village wise Distribution of Cultivated Paddy Lands and Paddy Fields on Lease

(Area in hectares)

Village	Cultivated Paddy Area	Area on Lease	Percentage Area on Lease
Nattakom	14.22	2.80	19.69
Chengalam	10.49	3.20	30.51
Kumarakom	21.70	3.20	14.75
Aymanam	19.78	7.20	36.40
Arpookara	9.40	2.00	21.28
Kavalam	62.80	43.20	68.79
Neelamperoor	16.12	8.00	49.63
Ramankari	14.50	3.60	24.83
Veliyanad	10.88	1.60	14.71
Champakulam	11.22	1.60	14.26
Total	191.11	76.40	39.98

Since paddy lands are given on lease only for a single crop and afterwards transferred to some other persons, farmers who cultivate in those fields are reluctant to undertake any kind of permanent land improvement measures which involves considerable capital investments such as construction of proper bunds, levelling of fields etc. Lesser use of farmyard manures in paddy fields of the study area can be partially attributed to the system of land lease.

7.3.5. Labour shortage

Since paddy farming is highly labour intensive and the supply of household labour is not substantial, hired labour requirements are very high in Kuttanad region. According to 97 percent of the sample paddy farmers, the single biggest problem involved in paddy farming is the non availability of sufficient number of farm labourers in right time. Till a few years back majority of the paddy farmers in the study area were primarly depending on outside labourers. However, the inflow of outside labourers had been steadily declining over the past years and at present 63 percent of the sample farmers are exclusively relying on local labourers. While, according to 45 percent of paddy farmers the problem of labour shortage becomes more severe during the harvesting season, the remaining 55 percent feel that the problem is equally acute for all the agricultural operations involved in paddy farming.

The worsening situation of labour shortage in Kuttanad region can be attributed to the following factors

a. **Growing employment opportunities in other sectors**

The successful implementation of the various poverty alleviation programmes envisaged by the government such as the Integrated Rural Development Programme (IRDP), Training Rural Youth for Self Employment (TRYSEM), Jawahar Rosgar Yojna (JRY) and Development of Women and Children in Rural Areas (DWCRA) have created large amount of employment opportunities to the people out

side the farm sector. Eventhough there is only little industrial development in Kuttanad, more than one hundred registered industrial units are located in this region.[5] Most of these units are agriculturally based rubber plants and coir factories in which large number of rural labourers are employed. Again the fast growing service sector alongwith the hectic construction works going on in and around the study area absorb a major portion of the new generation of rural labourers and thereby reduce the supply of farm labourers.

b. **Aversion of new generation from agricultural labour households to paddy cultivation**

Since the social status of agricultural labourers is comparatively lesser, new entrants to labour market from rural households prefer more colourful jobs even at lower wages. Again a large portion of unemployed youth from agricultural labour families are well educated and they prefer to remain jobless till they get a permanent job elsewhere rather than to work in paddy fields as casual labourers. Elder generation of agricultural labourers also encourage their youngsters to take up any other jobs which need lesser physical strain and effort.

c. **Low wages**

Compared to construction workers, head load workers and other skilled labourers in rural areas, daily earnings of paddy farm labourers are considerably low. For example, while female labourers can earn up to 75 rupees per day in road construction work , their counterparts who work in paddy fields earn only a little more than half of it. Similarly while a male head load worker in the study area earns 150 to 250 rupees per day, the prevailing daily wage of male agricultural labourer for ordinary farm work is less than half of it. This type of wage differentials induce more and more farm labourers to adopt alternative jobs.

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5. *Ibid.*, p. 27.

d. **General improvement in the economic status of rural house holds**

Over the years the economic status and thereby the living conditions of the rural households in Kuttanad region had greatly improved. A large number of persons from the poor and lower middle class families which had been the traditional suppliers of farm labourers, are at present employed in other sectors. Some of them are working either in other states or in foreign countries as emigrant labourers. Since their earnings and remittances are sufficient to meet the whole household expenses, other members of their families who used to work in paddy fields are not presently turning up for agricultural works. Successful adoption of family planning programmes and the resultant decline in the dependency load had also helped the poor rural families in this region to improve their economic status which in turn had resulted in the decline of agricultural labour supply.

e. **Nature of payments**

For all other major agricultural operations paddy farm labourers in the study area receive payments in cash, but for harvesting it is given in kind as a fixed proportion of the harvested crop. Payments in terms of paddy causes two types of inconveniences to the labourers. Firstly, they receive their due share of paddy only after threshing and the time gap between reaping and threshing often goes up to 30 days or even more. Secondly, as the price of paddy decreases drastically during the harvest season, labourers who are badly in need of money to meet their day to day household expenses, are forced to sell their share of paddy at very low prices. Due to the above reasons many of the paddy farm labourers are least interested in harvesting once they earn enough paddy for their annual household consumption. Thus the mode of payment is one of the major reasons for the acute labour shortage during the harvest season.

f. **Changes in the ownership pattern of paddy lands**

During the last few decades the pattern of paddy land ownership had undergone drastic changes in Kuttanad region. After the introduction of land reform measures, big land lords who possessed hundreds of hectares of paddy fields had to surrender their excess lands which were later distributed among land less labourers and small peasants. Again, many of the agricultural labourers have recently purchased small plots of paddy lands or have taken land on lease for paddy cultivation. This new category of farmers who were once paddy farm labourers, with their enhanced social and economic status, are not usually available as hired labourers.

g. **Nature of work and work conditions**

Compared to many other jobs paddy farm works are more laborious and tiresome. Often farm workers are exposed to scorching heat or incessant rain for many hours of a day. Again in paddy fields labourers are usually under the strict supervision of farmers while jobs like inland fishing give them more freedom. All the more, since paddy farming is seasonal, for the major part of the year workers have to remain idle and they have no job security. It is natural that they will leave paddy fields for the sake of any permanent jobs with better service conditions.

h. **Simultaneous farming in adjoining padasekharams**

Usually during any paricular season, in all the nearby padasekharams in the study area sowing is done simultaneously. As a result of it transplanting, weeding and harvesting are also to be done in all the adjoining paddy fields at the same time.It puts more pressure on the locally available labour force and thereby aggrevates the problem of labour shortage.

i. **Inter regional marriages**

Inter regional marriages also play a role in reducing the supply of farm labourers in Kuttanad region. Whenever a female agricultural labourer is married outside the region she will not be further available for farm works. Most of the young brides coming to the area from outside, either lack the skill needed in various farm operations or are not willing to work as labourers. Many of the young bridegrooms also consider it awkward to send their wives to paddy fields as farm labourers.

The problem of labour shortage has become so acute in the study area that in order to attract labourers paddy farmers have to provide refreshments and conveyance charges to the workers in addition to the prevailing wages. The present investigation shows that 87 percent of the sample farmers in the study area had given daily refreshments worth 5 to 10 rupees to their labourers during the previous crop season. Conveyance charges are usually paid to labourers coming from other locations and it range from 2 to 8 rupees. During the previous season 26 percent of the sample farmers had given conveyance charges to their workers. If the crop in a particular season happens to be poor, in order to get it harvested, farmers are forced to pay extra wages that range from 20 to 30 rupees per day to the labourers in addition to the prevailing rate of 'patham'.

7.3.6. Abnormal increase in input costs

Another major problem that confronts paddy farmers in Kuttanad region is the abrupt and abnormal increase in the cost of inputs such as labour, seeds, fertilizers and pesticides. During the previous one year average daily wages of male labourers had increased by 42.86 percent (from Rs. 70 to Rs.100) and that of female labourers by 33.33 percent (from Rs. 30 to Rs. 40). Meanwhile prices of paddy seeds, insecticides and pesticides had also shown 20 to 30 percent increase.

After the steep rise in the administered prices of chemical fertilizers in 1991, majority of the sample farmers had either decreased the volume of per hectare fertilizer use or began to apply relatively cheaper varieties as substitutes for the costly ones. Present investigation shows that after the increase in fertilizer prices 44 percent of sample farmers reduced the consumption of chemical fertilizers to the extent of 10 percent to 50 percent and 38 percent of them began to use Mussoorie as a substitute for Factamfose.

7.3.7. Dependence on non institutional sources of credit.

In order to meet their capital requirements majority of the paddy farmers in the study area are depending on external sources like commercial banks, co-operative banks, friends and relatives, money lenders etc. Present investigation shows that only 16 percent of the sample farmers have enough household savings to meet their costs in paddy cultivation and 44 percent of them are depending exclusively on loans taken from commercial banks or co-operative societies for the purpose. It is also found that a major portion of the capital requirements of 40 percent of the sample paddy farmers are met by non institutional sources of credit such as money lenders and traders. While the organised banking sector charges only reasonable annual rates of interest that range from 12 percent to 18 percent, village money lenders and traders charge exhorbitant rates of interest that come up to 120 percent per year from their customers.

7.3.8. High rate of crop failures

Recurrence of crop failure is yet another problem for the paddy cultivators in Kuttanad region. During the period of the previous five crop seasons, 91 percent of the sample paddy farmers had at least once experienced 50 percent or more loss in their yields. While for 59 percent of farmers the proportion of crop failure to the number of crops raised was 20 percent, for another 32 percent it was 40 percent or

more. Out of the 128 crop failure cases reported by the one hundred sample farmers, 68 cases (53.13 percent) were caused by floods. Other major causes of crop failures were the incidence of pests and plant diseases (21.88 percent), intrusion of saline water (16.41 percent) and break of outer bunds (7.03 percent).

7.3.9. Lack of proper marketing system

Wide temporal variations are observed in paddy prices in Kuttanad region. During the harvesting season of the previous Varsha crop (September- October, 1995) the prevailing price of paddy had been less than 500 rupees per quintal in the study area. After a lapse of three to four months it improved to more than 600 rupees per quintal. However, in order to clear their debts and due to the lack of storage facilities 74 percent of the sample paddy farmers had sold a major part of their marketable surplus of paddy during the harvesting season itself. It is also found that in few villages like Ramankari and Kavalam agricultural co-operative societies had entered the market and purchased paddy directly from the farmers at a price little higher than the then existing market prices. Later the procured paddy had been sold at higher prices and a portion of the thus earned profits was divided among the farmers. However, direct procurement of paddy was laden with rampant curruption, favouritism and nepotism of concerned authorities and hence failed to give the desired results. All the more only 6 percent of the sample farmers had been beneficiaries of the system.

7.3.10. Failure of research institutions and lack of proper guidance to paddy farmers

Agricultural research programmes in the state have not so far been very successful as far as the needs of paddy farmers in Kuttanad region are concerned. Since the introduction of the HYV seed 'Jyothi' by the Pattambi Rice Research Institute in 1972, no better seed varieties have so far been developed in Kerala. 'Jyothi' has a short duration of 110 to 115 days and yield capacity of 2 to 2.5 tonnes per hectare.

HYV seeds later developed in the Mancompu Rice Research Station such as 'Asha', 'Pavizham', 'Aruna', 'Makam' and 'Kanakam' even with longer durations of 115 to 120 days have already failed to give better yield. At present 85 percent of the sample farmers in the study area are using 'Jyothi' and according to them all the later developed seeds are more vulnerable to plant diseases.

Lack of an effective agency to co-ordinate and supervise paddy farming in Kuttanad region is yet another problem. Often farmers are not properly guided in the application of fertilizers, insecticides and pesticides. They have to wait for more than six months to get the result of soil samples given for testing. Eventhough the state government with a view to revitalise the paddy sector had launched the Group Farming Programme in 1989, a large number of paddy farmers in the study area are not yet covered by this programme.

7.3.11. Inadequate infrastructural development

Kuttanad region still lacks a proper and efficient system of water management conducive to paddy cultivation. Outer bunds are not periodically repaired and bund elevation programmes are going on at a very low pace. In many areas lack of proper roads and boat services make the transportation of inputs to paddy fields and products from fields very difficult. Interruptions in regular power supply during the time of dewatering is another problem faced by many padasekharams.

7.3.12. Other factors

Unwieldy size of some padasekharams which amounts to more than 1000 hectares, high acidity of soil, ingress of saline water, high incidence of pests like brown plant hopper, leaf roller, case worm, stem borer, rice bug etc., plant diseases such as sheath blight, blast, sheath rot and stack burn and growing menace of weeds like salvinia, grasses, sedges etc., also adversely affect the per hectare procuctivity and thereby the profitability of paddy cultivation in Kuttanad region. Failure to adopt

appropriate mechanisation in paddy cultivation, militant trade unionism and strained labour relationships are also responsible for the decline of paddy cultivation in this region.

To sum up, our field investigation shows that the most important problem involved in paddy cultivation in the study area is the shortage of farm labourers, eventhough a host of other problems such as lack of adequate capital, improper marketing system, frequent crop failures, growing menace of plant diseases and pests etc., also create problems to the paddy farmers. Aversion of new generation to take up paddy farming as a full time occupation has made the prospects of the crop bleak in the study area. Thus the findings of the field study vindicate our hypothesis that shortage of factor inputs and aversion of younger generation to paddy cultivation have their contributions in the decline of paddy crop in the state.

* * * * *

Chapter 8

CONCLUSION

Kerala is a food deficit state and paddy is its major food crop. Over the past several years paddy sector of the state had shown declining trends both in area and production. Major objectives of this study were to assess the performance of paddy crop in Kerala since its formation and to examine the economic causes for the decline of the crop. The study also aimed to identify the current problems in paddy farming. With these objectives we have examined the growth trends in area, production and productivity of paddy crop, role of major sources of productivity in improving the per hectare yield of paddy in the state, absolute and relative profitabitability of the crop and other factors affecting its performance.

The study is based on three hypotheses, viz., (i) sources of productivity in paddy crop such as HYV coverage, annual rainfall and proportion of irrigated paddy area, extent of fertilizer use and plant protection measures have not significantly helped to improve paddy productivity in the state, (ii) low level of per hectare profit in paddy cultivation and low profitability of paddy compared to its alternative crops had resulted in the decline of area under paddy and (iii) other factors like the role of public distribution system in stabilising paddy prices, growing pressure on land, land price differentials, shortage of labour and capital, absentee land ownership, extensive use of paddy lands for non agricultural purposes and changing attitude of younger generation towards paddy farming have also contributed to the decline of paddy cultivation in the state.

This study is primarily based on secondary data collected from sources like the publications of the Department of Economics and Statistics, State Planning Board, Land Use Board etc. Primary data collected through a field survey conducted in Kuttanad region in which one hundred sample farmers were interviewed, were used to examine the current problems of paddy cultivation.

Considering the availability of reliable secondary data, period of the study begins from 1960-61 onwards. Overall performance of paddy crop is assessed by examining the growth rates in output and its components - area and productivity. For decomposition of changes in output an additive model in which area and productivity are taken as the pure components is used. Disaggregation is attempted both district wise and season wise. Absolute per hectare profits are estimated as the difference between per hectare value of out put and cost of cultivation. Cost of cultivation is estimated by adding the imputed value of household labour to paid out costs and profitability is estimated as the ratio of profit and cost.

Analysis of the sector wise growth rates in the State Domestic Product shows that the performance of primary sector had been comparatively poor in Kerala during the period 1960-61 to 1991-92. All the major indicators of agricultural development such as the changes in land use pattern and growth rates in area, production and productivity shows that the agricultural sector of the state economy had passed through three distinct stages corresponding to three different periods. During the first period (1960-61 to 1975-76) all the indicators of agricultural development had shown positive growth rates. During the second period (1975-76 to 1985-86) agricultural growth rates turned to be negative. The third period (1985-86 to 1991-92) is one of recovery and positive growth trends. Analysis of changes in cropping pattern shows that since early seventies, there had been a shift in area in favour of commercial crops at the expense of food crops.

Based on the growth trends in the performance of paddy crop, period of this study is divided into Period I (1960-61 to 1974-75) and Period II (1975-76 to 1991-92). During the first period growth rates in area, production and productivity of paddy crop in the state had been positive. Eventhough average annual growth rate in productivity continued to be positive, area under paddy and its production declined substantially during the second period. Disaggrgate analysis at the district level shows that the performance of Northern and Southern districts had been comparatively poor both in terms of the growth rates in area and production of paddy. Season wise analysis shows that during the last three decades, proportion of area under Autumn paddy and its relative share in total output had declined.

Decomposition of changes in output shows that the positive contribution of increase in area had been higher than the yield effect in increasing paddy production in the state during the first period. Eventhough the yield effect continued to be positive during the second period, a relatively higher negative area effect had resulted in the decline of total paddy production.

At the state level none of the major sources of productivity that we have examined had any significant role in enhancing paddy productivity. Area under HYV paddy in Kerala reached its peak level in the year 1977-78 and thereafter it began to decline. Inspite of a decline in area under HYV seeds, average annual growth rate in paddy productivity is found to be comparatively higher during the subsequent years. Rank correlation coefficient of the proportion of area under HYV coverage and per hectare productivity of paddy during the period 1978-79 to 1985-86 is estimated to be 0.1 which is not statistically significant both at 1 per cent and 5 percent level of significance.

Similarly, per hectare application of chemical fertilizers had drastically declined in the state since the substantial increase in its prices in 1991. However, in

subsequent years paddy productivity has shown positive annual growth rates. It is also observed that during the last decade, eventhough the average rate of fertilizer use in Winter season had been comparatively higher, average per hectare productivity of Winter crop is found to be relatively lower. It shows that the role of fertilizer application in improving paddy productivity at the state level is insignificant.

Again it is seen that variations in the amount of annual rainfall had not much affected paddy productivity in the state. Correlation coefficient estimated from the two variables for the period 1971 to 1991 is found to be 0.08 which is statistically insignificant. Like wise the proportion of irrigated paddy area in different districts of the state and district wise per hectare paddy productivity also do not indicate any significant positive relationship. Rank correlation coefficient estimated from the district wise proportion of irrigated paddy area and paddy productivity is found to be 0.21 which is not statistically significant at 1 percent and 5 percent level of significance.

While examining the relationship between the extent of the adoption of plant protection measures and paddy productivity in the state, it is observed that inspite of an average annual negative growth rate of (-)3.57 percent in the per hectare application of pesticides and insecticides during the period 1980-81 to 1992-93, paddy productivity has shown a positive growth rate of 2.02 percent. Similarly, eventhough plant protection costs for Winter crop had been comparatively higher than that of Autumn crop during the period 1980-81 to 1989-90, per hectare productivity of Autumn crop is found to be higher. It shows that an increase in the use of pesticides and insecticides in paddy cultivation need not result in an improvement in its productivity.

Thus, the findings of this study vindicate our hypothesis that none of the different sources of productivity had affected the per hectare yield of paddy in the

state in a significant way. Therefore the increase in paddy productivity observed in Kerala since mid seventies can be attributed to the sustained decline in area under paddy, a process in which marginal paddy lands with comparatively lesser productivity had been going out of cultivation.

Low level of absolute per hectare profits and profitability of paddy crop have played a key role in bringing down the area under the crop in the state. Labour costs, fertilizer costs and costs on seeds and seedlings are the major components in the per hectare cost of cultivation of paddy. Since paddy crop is highly labour intensive, labour costs alone constitute nearly two-third of its total costs. Due to the abnormal increase in the wages of farm labourers, during the last decade annual growth rates in labour costs had been higher than the growth rates in total costs. Season wise analysis shows that compared to Autumn and Winter crops, cost of cultivation had been higher for the Summer crop. Average per hectare value of output is also found to be higher during this season.

Per hectare profit and profitability of paddy crop had been positive in all the three seasons during the period 1980-81 to 1989-90. However, annual growth rates in profits and profitability of Autumn paddy are found to be declining while the respective growth rates for Winter and Summer crops had been positive. Instability in per hectare profit is also found to be higher for the Autumn crop. Eventhough area under paddy in all seasons had declined in the state during this period, rate of decline in area had been more acute during the Autumn season. It supports our hypothesis that the rate of decline in area under paddy crop in Kerala is related to the absolute profit and profitiability of the crop.

Comparative analysis of profit and profitability of paddy with some of its alternative crops shows that paddy cultivation is less remunerative in Kerala. During the period 1980-81 to 1989-90, per hectare average annual profit of coconut, banana

and tapioca crops are found to be much higher than that of paddy. Profitability of alternative crops are also found to be relatively higher. Meanwhile profits had shown greater instability in paddy crop that made its cultivation more risky for the farmers. All these factors have resulted in the conversion of paddy fields for the cultivation of alternative crops in the state.

Public distribution system had acted as a stabilising factor of paddy prices in the state by affecting the supply side. In Kerala annual import of rice on state account far exceeds the availability of rice from domestic production. As a result of it while the whole sale prices of all other major agricultural products in the state had increased more than three-fold within the period 1979 to 1992, overall increase in paddy prices was only two-fold making its cultivation less remunerative. Thus the public distribution system has played major role in the decline of paddy cultivation in the state.

Growing pressure on land and the resultant hike in land prices also lead to the decline of paddy growing areas. In Kerala land is not only regarded as a means of production but also as an asset that can be used for speculative investment. Therefore many speculative investors without any farming interest enter the land market as buyers, only to sell it later at higher margins. Since paddy land prices are comparatively low, conversion of it for the cultivation of alternative crops in itself increases the property value of farmers. Due to the same reason, paddy lands are extensively used for non agricultural purposes. Again as paddy cultivation needs much personal care and supervision, absentee land owners who are employed in other sectors and still possess paddy fields prefer to keep it fallow or convert it for the cultivation of perennial crops which need lesser care and personal supervision. Thus the above findings are in confirmation with our hypothesis that the growing pressure on land, land price differentials and use of paddy lands for non agricultural purposes have resulted in the decline of area under paddy in the state.

Our field investigation shows that nearly two-third of the paddy farmers in Kuttanad region are medium farmers who cultivate 0.4 hectares to 2 hectares of land. Labour costs constitute a major proportion of the cost of cultivation of paddy. More than 90 percent of labour hours needed in paddy farming in the study area are required for the preparation of soil, weeding and harvesting and the proportion of the female labour requirements is found to be much higher than that of male labour requirements. Mechanisation is widely adopted in operations like dewatering, ploughing and threshing. For harvesting wages are given in kind as a fixed proportion of the harvested crop.

All of the sample farmers in the study area are using HYV seeds in their paddy fields. Nearly all of them use chemical fertilizers while a small minority are using organic manures along with chemical fertilizers. Per hectare cost of cultivation during the Varsha (Autumn) crop season in 1995 amounted to more than ten thousand rupees and average value of product is found to be much higher. For their capital requirements a considerable portion of paddy farmers in the study area depend on village money lenders and indigenous bankers. A vast majority of farmers believe that the profitability of paddy cultivation in Kuttanad region has been declining over the past years.

The most important problem involved in paddy cultivation in the study area is the shortage of farm labourers. Growing employment opportunities for the rural work force in other sectors, self employment opportunities, comparatively lower wage rates and poor work conditions of farm labourers, general improvement in the economic status of rural households, growing aversion of younger generation to farm works, implementation of land reforms and the resultant distribution of paddy fields to landless labourers etc., are found to be the major causes for labour shortage in the farm sector.

This study shows that for majority of paddy farmers in the study area, paddy cultivation is only a subsidiary occupation. Many of the sample farmers are engaged in business or are employed in government or private services. Since they are not full time farmers, often they lack genuine interest in paddy farming. Growing aversion of the younger generation from farmer households also adversely affects the prospects of paddy cultivation in the study area. It is observed that 86 percent of the sample farmers fall in the age group of 40 years or above and 13 percent of them are more than 65 years old.

The prevailing system of giving out land on lease is another problem involved in paddy cultivation in Kuttanad region. Nearly one-third of the sample farmers are cultivating in paddy lands taken on lease. Since lands are given for a single crop season, paddy cultivators are reluctant to undertake any permanent development measures in leased lands. It leads to declining productivity in subsequent seasons. Abnormal increase in input prices, high rate of crop failures, hesitation of farmers to raise a second crop from their fields, inadequate infrastructural facilities and lack of a proper system of marketing are some of the other important problems in paddy cultivation in the study area.

Moreover, agricultural research programmes in the state had not been very successful as far as the requirements of paddy farmers in the study area are concerned. Since the introduction of the HYV seed "Jyothi" in 1972, so far no better varieties of seeds were developed by any of the research institutions in the state. Many plant diseases and pests that ruin paddy plants could not be effectively controlled. Menace of weeds like salvinia and sedges also create problems to the paddy farmers. Absence of an effective agency to co-ordinate and supervise the farming operations in Kuttanad region and the strained farmer-labour relations that exists in some parts of the study area also adversely affect the prospects of paddy farming in this region.

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APPENDIX

Interview Schedule

PROBLEMS OD PADDY FARMERS IN KUTTANAD AREA

1. a) District: b) Panchayat:

   c) Ward No: d) House No:

2. Particulars of Family members

Sl. no.	Name	Age&Sex	Occupation*	Education**

*F - Full time P - Part time; **P - Pass, F - Fail, S - Studying

3. Land holding size - Dry: Wet: Total:

4. Area of wet lands kept as fallows:

5. Did you convert paddy lands for other purposes?

   If yes, a) Area: b) Year:

   c) Reasons:

6. Paddy cultivating area - Own : Leased:

   Total:

7. Number of crops raised in a year:

   If second crop is not raised, reasons:

8. Number of crop failures during the past 5 seasons:

   Reasons:

9. Cost of cultivation (including self labour) for the last crop:

10. Amount of paddy obtained from the last crop:

11. Paddy kept for a) Self consumption: b) Seeds:
c) Saleable surplus:

12. Selling price per quintal:

Range of paddy price:

13. Value of a) Paddy: b) Straw: c) Total:

14. Do you think profitability declined in recent years:

15. How many family members are engaged in paddy cultivation -

Male: Female: Total:

16. Type of operations and amount of family labour

(i) (ii) (iii)

(iv) (v) (vi)

17. Operation wise hired labour requirements

(i) Ploughing - Oxen: Tractor/tiller;

(ii) Sowing/transplanting: (iii) Manuring:

(iv) Removal of weeds: (v) Plant protection:

(vi) Harvesting (vii) Other works:

18. For which operations piece rates are given?

Operation	Rates

19. Do you experience shortage of labour?

    If yes, extent of shortage in various operations.

20. Do you give incentives other than wages?

    If yes, details:

21. Are the laboures full time or seasonal?

22. Locality of labour: Local/outside

    If outside, distance:

23. Reasons of labour shortage

    (a) Low wages (b) High edn.status of workers

    (c) Aversion of new generation (d) Other employments

    (e) Other reasons (specify):

24. How far mechanisation can solve the problem of labour shortage?

25. Operations for which mechanisation is adopted.

    (a) Dewatering (b) Ploughing (c) Weeding

    (d) Spraying (e) Reaping (f) Winnowing

26. Variety of seeds used:

27. Change of seeds - year: Variety: Reason:

28. Do you use home made or purchased seed?

    If purchased, source: Rate/Qtl:

29. Manure use per season,

    (a) Farmyard manure: (i) Green manure: (ii) Cowdung:

    (b) Chemical fertilizers (i) Urea (ii) Factamfose

    (iii) Potash (iv) Others:

30. Do you use lime in your fields?

    If yes, quantity:

31. Did you reduce the use of chemical fertilizers after price hike?

    If yes, to what extent?

32. Do you notice any significant change in paddy productivity over the past years?

    If yes, nature and causes of change:

33. Sources of Capital

Source	Amount	Interest
(a) Savings		
(b) Co-op banks		
(c) Com. banks		
(d) Money lenders		
(e) Middle men		
(f) Friends/Relatives		
(g) Others		

34. Do you receive cash subsidies from the government?

    If yes, details:

35. Other problems in paddy cultivation (give details):

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