IMPACT OF INSTITUTIONAL CREDIT ON AGRICULTURAL PRODUCTION IN KERALA

By

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(2010-15-101)

THESIS

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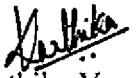College of Co-operation, Banking & Management

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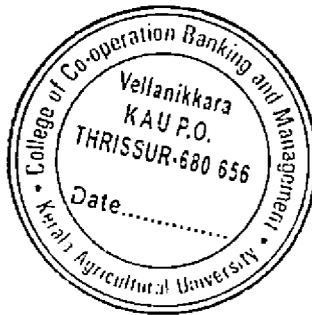
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Karthika Venugopal

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LIST OF ABBREVIATIONS

AGDP   : Gross Domestic Product from Agriculture and allied activities

AGSDP   : Gross State Domestic Product from Agriculture and allied activities

CAGR   : Compound Annual Growth Rate

GDP   : Gross Domestic Product

Ha   : Hectare

IC   : Institutional Credit

KCCs   : Kisan Credit Cards

KCCS   : Kisan Credit Card Scheme

LT   : Long Term

MT   : Medium Term

MKWh   : Million Kilo Watts per Hour

NABARD   . : National Bank for Agriculture and Rural Development

PACS   : Primary Agricultural Credit Societies

RBI   : Reserve Bank of India

RIDF   : Rural Infrastructure Development Fund

REC   : Rural Electrification Corporation

RRBs   : Regional Rural Banks

SCBs   : Scheduled Commercial Banks

ST   : Short Term

VFPCK   : Vegetable and Fruits Promotion Council, Keralam

Introduction

CHAPTER 1

INTRODUCTION

Agriculture provides significant support for the economic growth and social transformation of a country. As one of the world's largest agrarian economy, agriculture plays a crucial role in ensuring food security while also accounting for a significant share of India's Gross Domestic Product (GDP). Though its contribution to the overall GDP of the country has fallen from about 30 per cent in 1990-91 to less than 15 per cent in 2011-12, a trend that is expected in the development process of any economy, agriculture yet forms the backbone of development of the country. (Ministry of Finance, Government of India, 2012)

Having achieved self sufficiency in foodgrain production, India changed its position from being the net importer to becoming the net exporter of agricultural commodities. It engages almost two-third of the workforce in gainful employment. Agriculture, a major source of rural livelihood in India provides direct employment to 52 per cent of the country's work force (Government of India, 2010). Several industries such as, textiles, jute, food and milk processing depend upon agricultural production for their requirement of raw materials. On account of its close linkages with other economic sectors, agricultural growth has a multiple effect on the entire economy.

Three main factors that contribute to agricultural growth are increased use of agricultural inputs, technological change and technical efficiency. With savings, being negligible among small farmers, agricultural credit appears to be an essential input along with modern technology for higher productivity. An important aspect that has emerged in the last three decades is that credit is not only obtained by marginal and small farmers for survival but also by the large farmers for enhancing their income. Hence, since independence, institutional credit has been occupying an important place in the strategy for development of agriculture.

1.1 Significance of the study

In the first two decades after independence, the conduit for institutional credit to agriculture was the co-operative sector. Although sound in concept, the co-operative sector failed to live upto expectations. With the nationalisation of commercial banks, the decade of 1970s marked the entry of commercial banks into agricultural credit. This period saw the introduction of the Lead Bank Scheme and regulatory prescription of priority sector lending – two landmark development policies that survive even today. The 1970s also witnessed pilot experiments in specialised agency approach for directing credit to small and marginal farmers. The economic reforms of the 1990s, which started with the first Narasimham Committee of 1991, emphasised financial soundness and operational efficiency of the financial sector – including rural financial institutions. The Reserve Bank gradually deregulated the interest rate regime to aid improvement in the operational efficiency of banks. The next two decades witnessed several important innovations in agricultural credit.

Both direct and indirect credit to agriculture was recognized as priority sector, *albeit* with some ceiling on indirect credit. The purposes included under direct and indirect agricultural credit have been revised from time to time in keeping with the changing requirement. Starting 1995, banks that fell short of their target of priority sector/agriculture/weaker sections lending were required to deposit the shortfall amount in the Rural Infrastructure Development Fund (RIDF) set up by National Bank for Agriculture and Rural Development (NABARD). Since 1994-95, commercial banks have been required to prepare Special Agricultural Credit Plans with prescribed annual growth rates. In 1998-99, NABARD introduced the Kisan Credit Card (KCC) which a farmer could use to draw credit for all production needs, almost as if on tap, throughout the production cycle. The KCC has thus, been a powerful mechanism for cutting down transaction costs both for farmer and the bank. In 2004, a "Comprehensive Credit Policy" was announced with a mandate to step up institutional credit to agriculture by 30 per cent every year. Also banks were enjoined to ensure that every branch finances at least 100 farmers, i.e., five million farmers at the aggregate level, and at least two or three agricultural projects every year. The policy also included a host of debt relief measures such as debt restructuring, one-time settlement and loans to pay off borrowing from moneylenders.

An interest subvention scheme was introduced in 2006-07 on the short-term credit extended to farmers. The budget for 2011-12 announced an additional subvention of three per cent for prompt repayment by farmers. The last decade has been seen significant financial innovation in terms of financing farmers through Joint Liability Groups (JLGs), 'aggregation models' and developing Primary Agricultural Credit Societies (PACS) into multi-service centres especially to meet the credit and non-credit services required by small and marginal farmers.

In the Union Budget Speech Finance Minister has proposed to raise the target for agricultural credit in 2012-13 to Rs. 5,75,000 crore, an increase of Rs. 1,00,000 crore over the target of the current year. The interest subvention scheme for providing short term crop loans to farmers at seven per cent p.a. would be continued in 2012-13. An additional subvention of three per cent will be available to prompt paying farmers. A short term RRB Credit Refinance Fund is being set up to enhance the capacity of Regional Rural Banks (RRBs) to disburse short term crop loans to the small and marginal farmers. Finance Minister has proposed to allocate Rs. 10,000 crore to NABARD for refinancing the RRBs through this fund. KCC is an effective instrument for making agricultural credit available to the farmers. KCC scheme is being modified to make KCC a smart card which can be used at ATMs.

In this context of increasing significance attached to institutional credit by policy makers, a study on the impact of institutional credit on agricultural production in India and Kerala will be of contemporary significance.

1.2 Statement of the problem

An assessment by the Reserve Bank of the relationship between institutional credit to agriculture by co-operatives, SCBs and RRBs evidences positive and statistically significant elasticity – every one per cent increase in real agricultural credit results in an increase in real agricultural GDP by 0.22 per cent with a one-year lag. Over the last 40 years, there has been a striking increase in the credit intensity of agriculture as measured by the ratio of agricultural credit to agricultural GDP. The credit intensity increased from 12 per cent in early 1970s to 67 per cent by 2010-11. (Rao, 2012)

On the other hand, despite enormous expansion of flow of formal credit through commercial banks and credit co-operatives in the rural areas, there are however, increasing evidences indicating that the flow of credit has been confined to 'better off' sections of rural society, leaving the small farmers and rural poor continuously dependent for large portion of their production and consumption credit requirement on the informal agencies. The lower access to credit to small and marginal farmers for short and medium/ long term credit has in turn influenced the use of current inputs and fixed capital investment in agriculture, creation of income earning assets and ultimately the income of rural households.

In the context of different opinions and findings with regard to the flow of credit and the impact of it on farmers, an attempt is made in this study to assess the impact of institutional credit provided to farmers on agricultural production at all India level and at the state level of Kerala, using secondary data, and in one of the panchayats of Kerala, viz., Pananchery, with primary data. While analysing the impact of institutional credit on agricultural production, effort is also made to assess the source – wise and purpose – wise credit to farmers at all levels and the pattern of utilisation of credit, so as to identify the gaps in the provision of credit to farmers. Agricultural production in India, Kerala and Pananchery Panchayat has been predicted using the best fit models.

1.3 Objectives of the study

The objectives of the study are:

(i) To assess the source-wise and purpose-wise credit flow to agriculture

(ii) To compare the performance of various institutions in the provision of agricultural credit

(iii) To examine the impact of institutional credit on agricultural production, and

(iv) To analyse the pattern of utilisation and impact of credit on farmers with respect to Pananchery Panchayat of Thrissur district

1.4 Utility, scope and limitations of the study

Institutional credit delivery system for agriculture as evolved over the years through experience and changing needs has become a huge edifice of credit structure spread over the length and breadth of the country and the state of Kerala. But in the recent scenario of liberalisation, reports of suicides of farmers and policy decisions of the Government, there is more pressure on the commercial banks and other institutions for provision of credit to farmers. Banks are also on the process of revamping their agricultural departments or divisions for catering to the needs of farmers. The examination of the impact of institutional credit on agricultural production will help to identify the extent to which credit can contribute to agricultural production in the country and in Kerala. In other words, it will be possible to predict the extent of increase in agricultural production by one unit increase in institutional credit (IC), which would be of immense use to policy makers, bankers, farmers, and the people of the country.

Although the study is basically related to the impact of institutional credit on agricultural production, the impact of other variables, such as, gross cropped area, agricultural labour force, fertiliser consumption, availability of seeds, electricity consumption for agricultural purposes and net irrigated area is also considered.

The major limitation of the study is with respect to non - availability of uniform data for India and Kerala. The study period for India was 1984-85 to 2007-08, while for Kerala it was 1990-91 to 2011-12. But for fitting Cobb Douglas model the study period is up to 2007-08 for both India and Kerala.

In certain years data of institutional credit was found to be different when collected from different sources. In such cases, utmost care has been taken to rely on the most authenticated source.

1.5 Organisation of the thesis

The report of the study has been presented in five chapters. The first chapter discusses the significance of the study, statement of the problem, objectives and utility, scope and the limitations of the study. The second chapter reviews the available literature on the topic under investigation and provides the theoretical orientation of the study. The third chapter details the methodology adopted in the process of investigation and analysis. The fourth chapter is earmarked for results and discussion of the study. The last chapter highlights the summary of findings and the conclusion followed by references, appendices, and abstract of the thesis.

Review of Literature

CHAPTER 2

REVIEW OF LITERATURE

Institutional credit has a vital role in ensuring sustainable agricultural production. One of the avowed purposes of institutionalisation of agricultural credit system is to release the farmers from the clutches of usurious moneylenders by providing cheaper and timely credit. Implicit in this objective is the intention to bring all farmers who are in need of credit under the orbit of institutional credit. Access to institutional credit to all farmers and in appropriate quantity along with quality of agricultural credit is crucial for realising the full potential of agriculture as a profitable activity.

Review of literature is the part and parcel of all scientific investigations which would enable the researcher to understand the research gap and justify the study. Hence any research begins with an enquiry into the studies already conducted in and the related fields of study. This chapter discusses the available literature relating to institutional credit for agriculture so as to develop and establish a theoretical framework for the study, based on ideas and concepts expressed by various authors and researchers. The studies reviewed have been classified under four heads taking into consideration the main objectives of the study, and presented below.

2.1 Significance of institutional credit for agriculture

2.2 Pattern of utilisation of agricultural credit

2.3 Impact of agricultural credit

2.4 Problems of agricultural credit and suggestions

2.1 Significance of institutional credit for agriculture

Adequate, untied and timely credit support to farmers is essential for sustaining farm productivity, especially when it comes to small and marginal farmers. Easy and timely financial support provided to farmers can help in adoption of improved management practices including resource conservation technologies, diversification, and post harvest value addition processes which would contribute to reducing risks and enhancing farm incomes. Facilitating and providing credit to the needy small and

marginalised farmers will also facilitate them to manage the additional risks arising from climate change in a sustainable manner. Realising the importance of agricultural credit in fostering agricultural growth and development, institutional framework for agricultural credit is being emphasised since the beginning of planned development era in India. Research studies which focus on the role and significance of institutional credit to agriculture are reviewed in this section.

Desai *et al.* (1987) studied the relationship between the degree of agricultural progress and institutional credit, and that between the proportion of area covered under High Yield Varieties (HYVs) of foodgrains and (a) the density of Rural Financial Institutions (RFIs), (b) various types of agricultural credit, and (c) default rate of direct agricultural credit from the co-operatives. These relationships were examined by utilising cross sectional data of ten states in India for three years. The results revealed that the degree of agricultural progress was positively associated with the density of RFIs and overall amount of credit per hectare. The paper also found that the default rate of direct co-operative credit for agricultural production sub-system was inversely related to the share of agricultural input sub-system credit in indirect credit. The paper made recommendations about how to increase the share of these three types of credit in dry farming areas. These recommendations were made because, these types of credit had direct bearing on improving factor productivities, loan recoveries, growth rate in agricultural production and value-added, and viability of RFIs.

Rath (1989) analysed the performance of the credit institutions in India in providing crop and term loans. The review of short-term credit to agriculture showed that financial institutions met cultivator's needs for purchases of farm inputs to lesser extent in the Sixth Plan period. The problem of medium- and long term credit in agriculture was also reviewed. The induction of nationalised banks and subsequently of the RRBs into the field of agricultural credit has not restored regional equality; instead it has worsened. There was greater dependence on personal savings in developed regions while in underdeveloped regions very little financial resources were demanded and used. And he suggested that by making the much needed improvement in the organization and methods of advancing credit, the co-operative financial institutions could be made to serve the farmers in a better way.

Dandekar and Wadia (1989) reviewed the development of institutional finance for agriculture in India. Institutional finance for agriculture goes back to 1793 when the system of taccavi loans was introduced. Subsequent landmarks were the Land Improvement Loans Act (1883), the Co-operative Credit Societies Act (1904), the Report of the Rural Banking Enquiry Committee (1950) and the Report of the Committee of Direction of All India Rural Credit Survey (1954) which advocated state participation in co-operation at all levels, establishment of the State Bank of India with major state participation in 1955, nationalization of the 14 largest commercial banks in 1969, the establishment of 48 Regional Rural Banks in 1976-1977 and of the National Bank of Agriculture and Rural Development in 1982. His study revealed that by 1985, 40 per cent of rural credit was provided by these institutions, while 60 per cent was still supplied by moneylenders. By 1985, the health of agricultural credit institutions, both co-operative and commercial banks, was in a poor state in many parts of the country. Willful default and overdues got mounted; writing off of agricultural loans and providing subsidies from the exchequer has set a bad precedence.

The main objective of the paper by Surjeet, (1990) was to assess the credit extended to the marginal and small farmers in comparison with that available to medium and large farmers. The analysis was given importance to specific aspects like, the role of different credit institutions, major purposes for which credit was extended and the credit status of different categories of farmers in different states. The amount was analysed with reference to its flow as well as stock dimensions. The referred period for analysis was July 1986 – June 1987 for the flow of credit and June 1987 for the stock of credit. The study suggested that absolute number of farmers served by the credit institutions was huge. Marginal and small farmers did not appear to face any specific discrimination against them in terms of credit allocation. In terms of relative coverage of farmers by the credit institutions, the situation was not encouraging. The relative share of the co-operative and commercial banking sectors in total farm credit generated some management problems for the implementation of the service area approach to rural lending. The problem of farm credit was reflected in poor coverage of all the farmers put together. The study opined that, in some states that were otherwise poor, the coverage by all institutions needed to be enhanced through careful planning and management.

Malik *et al.* (1991) provided evidence on the role of institutional credit on agricultural output, and the determinants of access to institutional credit, using household level data from the Rural Credit Survey of Pakistan, 1985. The sample selectivity bias was offset through the use of Mill's inverse ratio. Ordinary least squares estimates were done for identifying the determinants of total output, thus highlighting the relative importance of institutional credit on agricultural output. Maximum likelihood estimates of a Probit Model for determining access to institutional credit were also analysed. In this study, the country was divided into eight agro-climatic zones, and one tehsil representing each zone was randomly selected. A total of 2026 farm households were studied. The study provided statistically significant evidence of the importance of the role of institutional credit in the determination of agricultural output. Education, farm size, electrification, mechanization and mean level of village credit had a significant positive effect on access to credit, but dependency, tenant status and attitude created constraints.

Patel (1996) made an indepth study on the role of commercial banks in priority sector lending in the state of Gujarat using both primary and secondary data. Data were collected on population group-wise number of bank offices, deposit mobilization and deployment of credit by commercial banks in Gujarat from the year 1983 to 1993. Secondary data served as a tool to study priority sector lending by commercial banks at macro level. The study revealed that, there was a clear tendency of the percentage of outstanding agricultural term loan repaid to decrease, with increase in the operational land holding of households. While the marginal farm households had repaid their entire amount of outstanding crop loan, the small farmers had repaid the lowest proportion of their total outstanding loan amount. 64 per cent of the sample farm households considered their farm loan as adequate, and 87 per cent have availed their loan in time. The greatest stumbling block in contracting loan from commercial banks was the procedures involved which was reported by about half of the sample farm households. The study also revealed that the formal procedure to avail loan was time consuming. This was more faced by small holding group households. It was also found that the quality of loan applications recommended to bank was not up to the mark.

Yazdani and Kisan (1998) examined the impact of credit on investment, output and income and the contribution of farmer characteristics towards their borrowing behaviour. Data were gathered through two surveys for an identical sample of farmers in

two states of Iran. A multivariate discriminant analysis methodology was used to identify the factors that were likely to influence farmer's borrowing behaviour. The performance of institutional credit-using farms, i.e., borrowers, was found to be significantly higher than that of non-borrowers in terms of both output per farm and output per hectare. It was also revealed that credit from the Agricultural Bank in Iran was mainly directed towards large size, high income farmers and those who were more educated.

Meenakshi and Sharmitha (1998) made an analysis of institutional and non-institutional credit in agriculture in West Bengal which had experienced high growth of agricultural productivity since the late 1970s. The period had also witnessed a growth of informal credit market with a new lending class comprising traders of HYV, fertilizers and pesticides, catering to the working capital needs of farmers. A survey in Tarakeswar block, Hugli district consisting of a sample size of 60, based on the results of a pilot study where a large proportion of villagers gathered to convey their views, showed a high dependence of small and marginal farmers on the informal credit market. Deprived of the relatively cheaper credit from the formal institutions these farmers were compelled to depend on high interest bearing loans for productive purposes and faced the risk of falling into a vicious cycle of perennial indebtedness. The study highlighted the role banks can play in breaking this vicious cycle.

Reddy (1999) focused on the performance, strength and weakness of the financial institutions providing agricultural credit in India. Commercial banks emerged as major players in purveying term credit. The share of co-operatives in credit disbursed for agriculture had declined steadily from 56.6 per cent in 1993-94 to 44 per cent in 1997-98. The credit co-operatives were faced with a serious situation on account of mounting overdues. Improvement of recovery performance is crucial for the expansion of agricultural credit as well as for the agricultural credit system. Innovative resources for mobilization of deposits are needed, and confidence among the depositors. According to the author, commercial banks will have to be persuaded to vigorously target priority sector lending to the agricultural sector.

Singh *et al.* (1999) examined the impact of co-operative credit on income and employment of households, in Jaunpur district, Uttar Pradesh. Data were collected from 40 borrower and 40 non-borrower farmers in Soetha Kalan block, for the years, 1990-91

and 1991-92. Tabular analysis was used to compare cost of cultivation, net income, and human labour utilisation of the three size groups of borrower and non-borrower farms. It was concluded that credit played an important role in increasing employment and income.

A paper by Shete (2002) highlighted the performance of public sector banks (PSBs) in India under the priority sector credit during the post-reform period 1991-2001. The study was based on secondary data source of information. It showed that the process of financial sector reforms had bypassed the agricultural sector in general and weaker sections in particular. The flow of credit to the priority sector had declined and a large number of PSBs were not able to reach the prescribed target of lending to agriculture and weaker sections. The priority sector or agricultural finance suffered from a dichotomy in purpose and direction in view of the increased concern about the food situation as a result of population growth and accelerated food demand. Dynamic and conflicting changes appeared to be operating in curtailing the current supply of priority sector credit, while at the same time, financial requirements of agriculture and other activities were increasing in rural areas. The study concluded with the requirement of attention on the removal of distortions in the priority sector lending by commercial banks for agriculture and rural sectors.

The study by Yazdani (2005) examined the progress made by the Islamic credit system in Iran, farmer's attitude towards the new system, and the extent to which it had altered farmer's borrowing behaviour since it was introduced. The Islamic credit system offered the prospect of lifting part of the risk off the shoulders of farmers through the provision of profit - and - loss - sharing loans. Such loans, not only avoid the magnification of risk associated with debt-financed under a western-style, or interest-based credit system, but also carries a share of the production risk. Data for the analysis were collected from three sources, viz., 200 farmers, 30 Agricultural Bank branches and national - level data from the Agricultural Bank itself for the year 2002-03. An examination of the performance of the Agricultural Bank supported the hypothesis that funds would shift towards financing productive investment as compared to consumption under the Islamic system. The evidences failed to support the proposition that credit would be redistributed towards small farmers under the Islamic system. Analysis of the attitudinal data revealed that the majority of small farmers preferred credit provided in the form of profit-and loss-sharing loans under the Islamic credit system over the interest-

bearing loans under the conventional credit system. Farmer's preferences for taking out loans from the Islamic credit system were found related to a number of factors, including risk sharing and the religious acceptability of the profit-and-loss-sharing loans under the Islamic credit system over the interest-bearing loans under the conventional credit system.

Sahu and Rajasekhar (2005) analysed the total outstanding credit provided by commercial banks to the Indian agricultural sector during the period 1981-2000. The results of the study showed that, the share of credit to agriculture in the total net bank credit declined after the introduction of banking sector reforms; the provision of credit subsidy adversely affected the supply of agricultural credit; increased lending rate was not a suitable measure to reduce the rate of credit subsidy; interest rate served the usual allocative role of equating supply and demand for loanable funds; and the closure of rural bank branches resulted in the reduction of credit flow to agriculture.

Rakesh (2006) made a historical overview of agricultural credit in India and assessed its progress. It delineated the changing face of agriculture and then highlighted the elements of a new approach in agricultural credit. A review of the performance of agricultural credit in India revealed that though the overall flow of institutional credit had increased over the years, there were several gaps in the system like inadequate provision of credit to small and marginal farmers, paucity of medium and long-term lending, limited deposit mobilization and heavy dependence on borrowed funds by major agricultural credit purveyors. The study suggested the need for strong and viable agricultural financial institutions to provide the financial requirements for building the necessary institutional and financial structure.

Ilavbarhe and Ahmadu (2007) focused on the sources of finance to the agricultural sector in Edo South Senatorial District, Nigeria. Data were collected using a structured questionnaire administered to 100 randomly selected farmers from the district. Simple descriptive statistics and t-test were used for data analysis. The results revealed that formal and informal financial institutions were the sources of funds available to farmers in the study area. The formal financial sources were found efficient, as they contributed 69.13 per cent of the total fund to the farmers while the informal financial sources contributed only 30.87 per cent. However, a majority of the farmers (88%) patronised the informal sources and only a few farmers (12%) patronised the formal ones. The reason

adduced for this was the difficulties of getting loans from the formal sources. The study suggested that the formal financial institutions should simplify their cumbersome method of loan disbursement.

Anjani *et al.* (2007) studied the performance of rural credit flow in India and identified the factors that influence the choice of credit and the possession of Kisan Credit Cards by rural households. The study was carried by NSS data for the years 1991-92 and 2002-03, and it was found that access and distribution of rural credit increased, but it was skewed in favour of more developed states and within these towards better-off households. The poorer households were more dependent on non-institutional sources of finance. The use of Kisan Credit Card was encouraged and its distribution was less skewed. Age, male-headed households, household size, farm size, level of education, and self-employment in agriculture appeared as significant variables which positively determined the choice of institutional sources of credit and the possession of Kisan Credit Cards.

Sahu (2007) examined the extent of inter-state variations in the supply of institutional credit for agriculture in India using data for the period 1981-2000. The analysis was confined to 14 major states. The study results revealed that the growth rate of agricultural credit was higher during the pre-reform period compared to the reform period in most of the states. The study also found that the growth rate of agricultural credit was uneven during the sub-periods as well as across the states. The proportion of irrigated area to gross cropped area and the density of the bank branches per thousand farmers were identified as the most important factors influencing the supply of agricultural credit across states. An increase in credit-deposit ratio need not necessarily ensure more supply of credit to the agricultural sector.

The contribution of institutional credit to agricultural growth has been estimated in the state of Punjab by Sidhu *et al.* (2008). The demand and supply situation under different scenario and change therein over a decade period has also been examined. A simultaneous (four) equation model had been used to estimate the contribution of institutional credit towards the use of production inputs, private investments and agricultural growth. The study has revealed that supply of production credit doubled after more than 15 years from 1984-85 to 2000-01, and that of investment credit increased by

about 80 per cent during the period 2001-02 to 2003-04. It was also found that the relationship between use of variable inputs and production credit disbursement was significant. Higher use of inputs was ushered by favourable input-output pricing policy along with easy and cheap short-term credit availability in the State. Private capital formation has also helped in increasing the use of variable inputs in the crop sector. The contribution of investments has been found positive. The demand-supply situation in terms of short-term institutional credit has undergone a change over time, with the demand exceeding supply by 49 per cent in 1995-96, but later the supply has been found exceeding demand by 122 percent in the year 2005-06. He suggested that, first, the demand for agricultural credit in each state/region should be assessed, depending on the crop patterns, current inputs and capital requirements in relation to targeted output growth-rate and then, policy frame work should be put in place to meet those requirements, instead of increasing the credit supply uniformly across the board in all the states/regions of the country.

In a study on the role of agricultural credit in the growth of livestock sector, in Faisalabad, Abedullah *et al.* (2009) observed that, credit availability expanded the livestock sector more than double by economies of size, which increased per family per month income from livestock sector by 181 per cent. The study employed stratified random sampling approach to collect the input-output and socio-economic data set to make out the impact of credit on the growth of livestock sector in rural areas. The income elasticity of meat and livestock products was the highest compared to all other food items except fruits, defining the future role of livestock sector in our food basket. The elasticity of family size was also found to be high, followed by credit and literacy rate indicating that, adequate potential exists that can be explored to utilize unemployed untrained rural labour in the agriculture sector. The study also revealed that, credit supply not only helped to expand the economies of size, but also helped to increase the productivity of livestock sector from the available resources.

Akudugu *et al.* (2009) has examined women farmers' access to credit from Rural Banks (RBs) in the Upper East Region of Ghana. He examined the nature of credit supply by the rural banks to their customers and the proportion that goes to women over a ten year period. The study also aimed to expand the frontiers of rural and agricultural financing as well as the integration of gender interest in the financial sectors of

developing countries. 200 women farmers were randomly selected and information on socio-economic, technical and institutional issues solicited from them. Ratio analysis were carried out and the logistic regression used to model the socio-economic, technical and institutional factors that have influence on access to credit from RBs by women farmers. The study revealed an empirical evidence of close gender parity in terms of credit supply by RBs in Ghana. About 44 per cent of the credit portfolios of RBs in Ghana go to women and the remaining 56 per cent goes to men. Education, application procedures, access to land, income level, farm size, membership to economic associations, savings, type of crop grown, interest rate and distance to RBs are the socio-economic, technical, and institutional factors that influence women farmers' access to credit.

Rahman and Sheereen (2009) attempted to analyse the changes in trends and composition of multi-agency network - Co-operatives, SCBs, and RRBs - in issuance of credit to agriculture sector during the post-reform period by using time series data from 1975 to 2005. The analysis revealed that the trend of direct - short and long term - and indirect institutional credit to agriculture sector has increased significantly during the post-reform period. As far as the composition is concerned, the share of SCBs as percentage of total direct institutional credit has increased significantly where as the co-operative's share has decreased. The contribution of RRBs has been almost constant.

A study by Boni and Zira (2010) examined the relationship between credit supply and farm revenue among the members of farmers' group linked to banks for credit delivery in Mubi region of Nigeria. The main objectives of the study were, to identify the source of credit and outreach to group members and to examine the relationship between agricultural credit supply and other production input factors. The analysis results revealed that the credit group members were predominantly of middle age between 30 and 44 years. Five commercial banks were found to be their major source of credit at an average interest of 30 per cent per annum. The result of correlation analysis showed that there was a weak relationship between credit supply and farm revenue, while the regression analysis showed that credit supply, cost of credit, cost of fertilizer, seeds and family labour had positive and significant relationship with farm revenue. A decrease in returns to scale was found to exist in the farm enterprise of credit group members in the region. On the basis of a positive and significant but weak relationship between credit supply and farm

revenue, the study recommended for larger volume of credit be made available to farmers' credit groups for enhanced agricultural productivity.

A study by Asiedu and Fosu (n.d.) investigated the importance of agriculture in terms of volume and trend of agricultural credit disbursed by the state owned Ghana Commercial Bank (GCB). To achieve this objective, the time profile of the volume of agricultural credit delivered over the period, 1970-2003 is considered. Both a logit model analysis and a time profile analysis was adopted to further understand the importance of agricultural credit, considering the major contribution of agriculture to the Ghanaian economy. Results from the study showed that there has been a decline in the volume of credit given to the agricultural sector over the period of the study. The share of, GCB's agricultural credit in the bank's total credit, the share of GCB in total commercial bank's credit and in total commercial and secondary bank's agricultural credit declined during the period. Results from the logit model also indicated the impact of financial liberalisation (structural adjustment) on agricultural credit delivery. The mean of the real volumes of GCB's agricultural credit and the share of GCB during the post-financial liberalisation period tended to be less than those for the pre-liberalisation period as demonstrated by the conventional t-test.

The above studies bear evidence to the significant role of institutional credit in the determination of agricultural output. Institutional credit has played an important role in increasing employment and income in the agricultural sector. But the lesser coverage and the failure of formal institutional agencies, in fulfilling the credit demand of the farmers, forced them to depend more on non-institutional sources of credit. Major discrepancy noticed in the disbursement of credit was with respect to educational level of the farmers. Some authors suggested for strong and viable agricultural financial institutions to meet the financial requirements and also recommended to simplify the procedures of loan disbursement

2.2 Pattern of utilisation of agricultural credit

Credit supply though inadequate in its coverage and volume has been properly utilised to increase production, productivity, employment, income, savings, assets, and standard of living has been a matter of enquiry of many researchers. This is to ensure that

the utilisation of credit is in conformity with the basic objective of such credit supply, to ensure the betterment of the beneficiaries and the agricultural economy of the nation. Further, proper utilisation mostly if not always leads to timely repayment of institutional credit and this helps in efficient recycling of funds and adequate flow of agricultural credit. On the other hand, misutilisation, normally leads to default and overdue of credit. In brief, proper utilisation of agricultural credit is as important as its availability. Hence studies which have enquired into the pattern of utilisation of institutional credit for agriculture are reviewed here.

Narayana (1990) studied about the supply of investment funds, cost of credit, evidence of credit shortage and the particular problems confronting smallholders in obtaining credit from the Primary Co-operative Agricultural Development Banks (PCADBs). One hundred and fifty borrowers were selected from the list of customers of five PCADBs, 50 per cent of whom were small holders. Another group of 50 non-borrowers were included as a control measure. Demand for investment was mainly for minor irrigation purposes, sericulture and the purchase of tractors. The real cost of borrowing was high, partly due to the added cost of prolonged transaction. The inadequacy of the investment funds disbursed motivated their diversion to unintended purposes.

Singh (1996) conducted a study with the objectives of finding out the extent of co-operative agricultural credit utilisation on the basis of certain selected variables; analyzing the differences in the pattern of co-operative agricultural credit utilisation on both productive and unproductive purposes on the basis of certain selected variables, and studying the attitudes of different types of borrowers towards the management of PACS and their impact on credit utilisation. A sample of 300 borrowers was selected out of the borrowers who took agricultural credit from Primary Agricultural Co-operative Societies of Himachal Pradesh using multi-stage sampling method. Both primary and secondary sources of information were used for carrying out the study. It was observed that PACs are the main source of agricultural credit. It was revealed that 38.3 percent of the borrowers utilized the credit fully, while 43.4 percent of them misutilised. The study further indicated that among the productive purposes, purchase of agricultural inputs and implements, and purchase and development of land were the first two major purposes for which about 45 per cent and 24 per cent of the borrowers respectively utilised their credit.

They spent the credit availed on unproductive purposes, constituting 49 per cent on social and religious ceremonies and 26 per cent on purchase of essential commodities. It was found that large farmers utilized the credit more than small and marginal farmers, and the tendency of partial utilisation was higher among small farmers. There was no significant relationship found between types of farmers and extent of credit utilisation. But farmers with low size of income utilised the credit significantly less than farmers having high income. Misutilisation was significantly less among high income group farmers than low income group farmers.

Sarthak and Prabuddha (2001) conducted a study during the financial year 1998-99, in the Katwa-I block of Burdwan district, West Bengal, with the objectives of analysing the distribution pattern of loans sanctioned by the co-operative banks – sector - wise and gender - wise, examining the sectoral and gender dimensions in the repayment behaviour of borrowers, and analysing the reasons for defaulting. The study results revealed that there was gender discrimination against women in providing loans, borrowers in the agricultural sector were not generally defaulters, and that the eagerness to repay was more in female borrowers than male borrowers. The study identified problems like, the increased expenditure of farming operations along with non-commensurate price levels of farm products, crop failures, illusions of government loan waiving schemes, and misuse of the loan amount for non-productive purposes.

Udayakumar and Thattil (2002) studied the utilisation and repayment of agricultural credit disbursed by primary agricultural credit societies in Kerala, conducting a survey of 300 borrowers. Members utilized credit mainly for operational purposes such as purchasing seeds and fertilizers; the rate of misutilisation of agricultural loan was generally low and majority of the members enjoyed flexibility in repayment. The default rate in repayment was as high as 80 per cent. Only members who had alternative sources of income were prompt in making repayment. The main reason for default in repayment was inability to generate adequate income from agriculture.

Rudra and Mukherjee, (2003) examined the dynamics of a village credit market in Burdwan district of West Bengal. Primary data were collected in 1998-99 from a sample of 46 farm households. The study concluded that the institutional source of finance had helped small and marginal farmers to a great extent but professional money lenders

played their role in catering to the credit needs of large farmers. While medium and large farmers utilized loans mainly for production purposes, small and marginal farmers diverted a considerable portion of loans towards consumption purposes, which affected their repayment performance.

The main focus of the paper by Satish (2005) was to identify the characteristics that distinguish commercial bank and co-operative sector borrowers. Data were collected in 2002 from a sample of 160 farm households, equally divided among bank and co-operative borrowers in Punjab. The differences in characteristics were studied in terms of land ownership, ownership of capital assets, farm expenditure, technology adoption, ownership of financial and other assets, and non-farm and subsidiary agricultural employment. The study revealed that co-operative borrowers were mainly small and marginal farmers with limited land and capital. Commercial bank borrowers, on the other hand, were mainly commercial farmers who have larger landholdings and higher amounts of capital.

Miah et al. (2006) in their paper investigated the requirements, utilisation pattern and repayment system of credit and its effect on modern rice cultivation, at Mithapukur upazilla of Rangpur district and Rzarhat upazila of Kurigram district in Bangladesh. These two districts were purposively selected based on the higher percentage area under HYV rice. A total number of 60 rice growers who obtained credit from Rajshahi Krishi Unnayan Bank (RKUB-30 borrowers) and Grameen Bank (GB- 30 borrowers) were interviewed. Another 60 farmers who did not take credit from other sources were also studied. Data were collected during the Boro season, 2004. The results revealed that the client farmers of RKUB and GB used about 78 and 72 per cent credit, respectively for Boro rice production and the rest was used for consumption. Loan users achieved 1.21 times higher rice yield compared to loan non-users. The analysis of resources-use-efficiency which was estimated by Cobb-Douglas function model revealed that both credit users and non-users rice growers had failed to use inputs efficiently, either the production inputs were overused or underused. Unavailability of credit and weekly instalment system of repaying loan were the main constraints faced by 38 per cent RKUB and 53 per cent GB credit users. Small farmers were found to avoid cumbersome procedure of obtaining loan from the institutional sources and were more comfortable in borrowing loan from NGOs. The results showed that the utilisation pattern of agricultural

credit of RKUB was more productive than that taken from GB because the farmers of RKUB were more resourceful than the farmers of GB.

A study by Ponnuswamy and Jancy (2006) determined the credit utilisation, decision-making pattern and marketing behaviour of farmers in different coastal farming systems for which they studied eight coastal villages of Tamil Nadu, from January to June, 2005. In the study villages, cropping, dairying, backyard poultry, horticulture, fisheries and sheep and goat farming were identified as the major farm enterprises which were practised in different combinations by the farmers. Majority of the farmers borrowed money from different sources such as primary agricultural co-operative banks, nationalized banks and private money lenders. Only 11.33 per cent of respondents utilized their own money for farming purposes. The study also found that few enterprising farmers in Tiruvallur district processed paddy into rice, which was packed in bags of five kilograms and sold directly to groceries in Chennai, and earned a higher profit for their produce.

Sinha *et al.* (2006) studied source - wise and purpose - wise credit flow to different categories of farmers in Hilsa block of Nalanda district in Bihar. The marginal and small farmers together occupied about two-third of the total operating area of the sample as a whole; however their share was only one - third of the total loan advanced. Non-institutional agencies played an important role in providing loan to small and marginal farmers. RRBs provided loan more to the poor farmers whereas commercial banks preferred more loans to big farmer for crop production and milch cattle.

The aim of the study by Oboh and Ekpebu (2010) was to determine the effects of socio-economic and demographic factors on the rate of credit allocation to the farm sector by arable crop farmers in Benue state, Nigeria. Cross-sectional data were obtained from 300 randomly selected loan beneficiaries. Data were analysed using frequency counts, percentages, t-test and multiple regressions. The results showed a statistically significant gap between the amount of loan applied for and the amount received by farmers, which shows the insignificant amount of loan granted. The study also found that only about 56 percent of the loans were invested directly in farm activities implying that the balance of 43 percent of the loan diverted and spent on non-farm activities. The pattern of loan allocation showed that beneficiaries with high loan size tended to allocate more of their

loans to the farm than beneficiaries with low loan size. It was also found that factors that significantly affected the rate of credit allocation to the farm were farmer's age, educational level, farm and household size. Other factors were length of loan delay and visits by bank officials. The paper suggested that government should increase the volume of loan facilities to farmers. In order to reduce the rate of loan diversion, loans should be disbursed on time, and bank supervisors should visit beneficiaries regularly. And finally, pre-disbursement training is recommended for all successful loan applicants for efficient loan allocation and management.

From the review of studies on the pattern of utilisation of credit, it can be inferred that the major purposes for which farmers utilised their loan amount are, purchase of inputs, implements, land development and irrigation. Medium and large farmers utilised institutional credit for production purposes compared to small and marginal farmers who diverted credit for consumption purposes. Utilisation pattern of the farmers are significantly affected by age, educational level, and farm and household size. Some of the authors have also suggested for pre-disbursement training to farmers for efficient allocation of institutional credit.

2.3 Impact of agricultural credit

Easy and cheap credit is the quickest way for boosting agricultural production. The inability of the agriculturist to carry on his business without credit is a fact proved by history and evidenced by poverty and indebtedness of the persons in the business of agriculture. Studies already conducted on the impact of institutional credit on agriculture in India and abroad, which is the core objective of this study are reviewed here which will definitely improve the methodology to be adopted in the present study.

Binswanger and Khandekar (1992) in their study 'the impact of formal finance on the rural economy of India' provided empirical evidence on the relationship between credit and output in the agricultural sector. They found that rural credit led to modest increase in the use of fertilizers and investments in physical capital like tractors, pumps and animal stock. Further they observed that, the expansion of the rural financial system had a positive effect on rural non-farm employment and output.

Ayaya (1997) analysed the influence of macroeconomic monetary and fiscal variables on agricultural credit lending made through Agricultural Finance Corporation (AFC) and commercial banks during the period 1973-92 in Kenya. The results showed a high and significant association between total agricultural lending and government controlled lagged product price of maize, the lagged consumer price of sugar and the annual inflation rate. The results revealed that there were other important variables that influence AFC agricultural lending which are not reflected in the three macroeconomic variables investigated.

A study by Mian *et al.* (1998) aimed at developing a theoretically consistent methodology to measure the impact of institutional credit on food grain production in Bangladesh. The study used time series data covering the period 1974-75 to 1993-94 from various government and non-government sources. A multi equation model consisting of a production function and a set of input demand functions was used to determine the impact of credit on food grain production. Elasticity of production with respect to institutional credit was found positive for all food grains except Boro paddy. The study suggested that credit was a catalyst in production, the increasing flow of which might result in improved per acre productivity.

The paper by Shekar *et al.* (1999) attempted to study the impact of co-operative credit on income and employment generation of farmers (n=45) of Karimnagar District, Andhra Pradesh. The analysis was based on before and after the loan situation. After availing credit from the co-operatives, all the sampled farmers was benefited in terms of increased human and bullock labour employment as well as net income from the farm business. Human labour employment generated was the highest in the case of medium farms. However, bullock labour employment generated was the highest in case of small farms. In addition, the net income increased per hectare land after the loan was the highest in the case of small farms.

Singh and Rawat (2001) made a study on the impact of farm credit on agriculture in Deoria district of Uttar Pradesh. The main objectives of the study were to analyse the magnitude of loan disbursement; to assess the costs and returns of borrowers and non-borrowers under different size of farms; and to examine the resource use efficiency on different size of farms. Data were collected through interview with 66 farmers, classified

into borrowers and non – borrowers, and further classified into three sub-groups based on their size of holdings. The study related to the agricultural year 1998-99. The study showed that crop loan, livestock loan, and pumpset/ tubewell loans were the highest loans disbursed by co-operative societies, RRBs and commercial banks respectively. The highest crop and livestock loan was taken by the smallest groups of farmers. All costs were higher on borrower farms than non-borrower farmers because borrower farms were using more input factors as compared to non-borrower farms. Returns were higher on borrower farms than non-borrower farms.

A paper by Hazarika and Alwang (2003) examined the effect of access to credit from formal sources, on cost inefficiency among Malawian smallholder tobacco cultivators. It used the data from the Malawi Financial Markets and Household Food Security Survey conducted among 4700 rural households in 1995. Farm-specific cost inefficiency was estimated within the framework of stochastic frontier analysis. Access to credit was measured as the sum of household member's self-reported credit limits at credit organisations. It was found that tobacco cultivation was less-cost inefficient per acre on larger plots. While access to credit by itself had no statistically discernible effect on cost inefficiency, it reduced the gain in cost efficiency from a larger plot size.

A study of Iqbal *et al.* (2003) examined the impact of institutional credit on agricultural production in Pakistan, covering a period of 1971-72 to 2001-02. The study analysed various indicators of agricultural credit in Pakistan and presented results of estimated production function using institutional credit as one of the explanatory variables. The authors found that, over the years increased percentage of agricultural GDP had been disbursed as institutional credit. During the study period, disbursement of institutional credit per cropped hectare also depicted an increasing trend in nominal terms. However, it declined from late 1980's to early 1990's. The study also revealed that, Zarai Taraqiati Bank Limited (ZTBL) provided the major share of institutional credit among the selected formal credit sources. The share of production loans in total advanced has been increased during 1980-81 to 1986-87 and after mid 1990's. It showed multiple shifts in credit policy from loans for fixed capital to advances for operational capital during the study period. The Ordinary Least Squares (OLS) estimates of the production function revealed that institutional credit affected agricultural production positively. Water

availability at the farm gate, labour, and cropping intensity were the other important variables that affected agricultural output positively.

Sogo and Olubiyo (2004) examined the impact of agricultural credit on agricultural production in Nigeria between 1970 and 2001, by adopting the production externality approach. The study revealed that agricultural credit was an important factor determining growth of agricultural production and development. However, considering the short-term nature of credit provision of the banking system, in the face of long gestation period for agricultural production, the paper advocated for a policy reorientation that accords greater attention to policy strategies and resource allocation to agriculture, which have the potentials and capabilities of leading the economy to greater growth heights.

A paper by Nasiru *et al.* (2005) examined the impact of Agricultural Credit Guarantee Scheme Fund (ACGSF) in stimulating growth and minimising of risk in agricultural lending in Bauchi state of Nigeria. Forty three farmers were randomly sampled and data collected through the use of structured questionnaire. Data were analysed using descriptive statistics, correlation and multiple regression analysis. The results showed that farmer's farm size increased considerably after taking loan and the farm income also increased after taking the loan for an average of two seasons. The scheme also helped farmers to get access to credit, which hitherto was a major constraint to farmers in the study area. The results also showed that the educational level of the farmers does not affect loan amount directly even though there is strong positive correlation between the level of farmer's education and their ability to meaningfully utilize the credit facility. The major constraints identified with the scheme include, cumbersome procedures in processing the loan, insufficient loan amount and late approval of loan. It was suggested that the Scheme should do more to ease the constraints farmers faced, so as to achieve the objective of the Scheme.

The study of Adinew *et al.* (2006) examined the efficiency of agricultural credit utilisation in Karnataka using secondary data for 1984-85 to 1998-99. The incremental capital-output ratio indicated a positive trend in efficiency of agricultural credit. Analysis of the marginal value product of credit along with other factors using principal

component regression showed that credit significantly contributed to the Agricultural State Domestic Product.

Mishra and Samant (2006) examined the sources of credit for farmers, the shares of long-term versus short-term loans in total borrowings, the efficiency of credit utilization, and the factors influencing credit use by farmers in the Banki-Dompara block of Cuttack district, Orissa, based on a survey of 80 farm households, consisting of 35 small, 29 medium, and 16 large farmers. It was revealed, among others, that large farms benefit more from institutional credit than small and medium farms, and that current farm expenses was the most important variable explaining credit use.

Bashir *et al.* (2007) observed the impact of credit disbursed by commercial banks on increasing the productivity of sugarcane crop in Faisalabad, Pakistan. Data were collected by administering an interview schedule to 114 borrowers in different branches of the United Bank Limited. The study found that credit has a positive impact on the productivity of sugarcane. For bringing better impact of credit on productivity, improvement of the technical know-how of the borrowers with the help of the bank officials, ensuring the proper utilisation of the loan, reintroduction of multi-purpose co-operative societies in the farming communities to look after borrower's interests and to help them to avail and spend the loan; reduction of the interest rate; and initiation of the zero interest lending (Islamic lending) in agriculture using the Musharka or Muzarba instruments of Islamic banking, were suggested by the author.

Mishra and Mishra (2007) examined the impact of institutional finance on the income and productivity of selected farmers in Balianta block, Orissa. The sources of borrowing among different categories of farmers and the nature of the utilisation of borrowed funds were examined as well. Data were obtained from a sample of 80 farmers, divided into institutional borrowers and non-borrowers, during the year 2001. Results of multiple regression analysis revealed that credit-financed inputs, self financed variable inputs, self-financed fixed inputs and percentage of area under HYV rice had a positive relationship with yield and income. The study further revealed that an increase in the yield of borrowing farms was due to the use of credit-financed inputs.

The main purpose of the paper by Akram *et al.* (2008) was to estimate the long term impact of credit on growth and poverty in Pakistan. Data pertaining to agricultural credit relating to the period 1973-2005 were collected from different secondary sources. In this paper, an econometric approach, to help unravel the impact of credit from other factors effecting agricultural growth, farm income and poverty, was used. The study analysed the economic impact of institutional credit on farm productivity, agricultural growth, and alleviation of poverty, with the help of a macro model i.e., time series analysis. The results revealed that all the variables showed unit root and the series were non-stationeries. All the series were co-integrated of order I (1) showing long term relationship. The agricultural credit has a positive impact on the gross domestic product and its effect was more pronounced on agriculture GDP. The impact of agricultural credit in reducing poverty was significant both in the short run and long run. The study recommended that the credit disbursement must be demand driven under the supervised credit scheme. It was also recommended to establish more effective and equitable methods of delivering farm inputs to farmers and, special tripartite agreements among the farmers/private sector or institutions for provision of farm inputs.

Kohansal *et al.* (2008) investigated the effect of credit accessibility of farmers on agricultural investment and policy options in Khorasan Razavi Province of Iran. The study was done on 133 farmers of credit used group from totally 177 farmers, that received loan from agricultural bank by logit model. Results of estimated logit model showed that number of instalments has the most importance in investment of received credit by farmers followed by farm land and previous investment. In addition, effect of policy changes on investment indicated that applying three options of number of instalments, cultivated land area and previous investment simultaneously has the most important effect of investment for increasing productivity and decreasing of poverty in the agricultural sector.

Das *et al.* (2009) examined the role of direct and indirect credit in agricultural production taking care of the regional disparities in agriculture, credit disbursement and agriculture production in an econometric framework using Dynamic Panel Data analysis with Instrumental Variables using Arellano-Bond Regression. The analysis suggested that the direct agriculture credit amount had a positive and statistically significant impact on agriculture output and its effect was immediate. The number of accounts of the indirect

agriculture credit also had a positive significant impact on agriculture output, but with a year lag. The results revealed that even though there were several gaps in the present institutional credit delivery system like inadequate provision of credit to small and marginal farmers, paucity of medium and long term lending and limited deposit mobilization and heavy dependence on borrowed funds by major agricultural credit purveyors, agriculture credit was playing a critical role in supporting agricultural production in India.

A study by Izhar and Masood (2009) attempted to assess the impact of institutional credit on agricultural production by estimating Cobb-Douglas agricultural production function for the pre-reform (1972-91) and post-reform (1992-2005) period in India using time series data. Study also analysed the trends and pattern of institutional credit during pre-reform and post reform period. Annual average growth rate of institutional credit was the lowest during the decade 1990-2000 and was the highest during 1971-80. Institutional credit as percentage of agricultural gross domestic product increased more rapidly during the post reform period. Institutional credit per cultivated area also increased over the period since the total cultivated area remains more or less same over the period. Study also found that sectoral share of total non-food bank credit deteriorated during the post reform period. Cobb-Douglas production function had been estimated to assess the impact of institutional credit on aggregate agricultural production. Model estimated for the overall period 1972-2005 gave the result that institutional credit has significant impact on aggregate agricultural production in India. Cobb-Douglas production function for the pre-reform period (1971-91) gave coefficient which has significant impact on agricultural production. But the model estimated for the post-reform period showed that institutional credit does not affect agricultural production. The study concluded that during post-reform period the sectoral share agriculture sector declined and also the growth rate of agricultural credit deteriorated. During post-reform period institutional credit was not a significant determinant of agricultural production in India.

A study by Thamilarasan (2009) assessed the impact of institutional credit on the farmers who availed credit from co-operatives especially for production purposes in terms of employment generation, creation of asset, income and occupation of the farmers in Dharmapuri district. Random sampling technique was employed to select the Primary Agricultural Co-operative Bank (PACB) and the farmers. A sample of 300 farmers

representing 30 PACBs was selected for the study. The data pertaining to the year 2003-04 was collected by using Bi-polar approach. Paired samples t-test and Mcnemar test were used to study the impact of institutional credit on the selected variables. The analysis revealed that financial assistance from the banking institutions for agricultural operations has created a significant impact on the level of income, and employment in terms of number of man-days both to the land owners and to the agricultural coolies and thereby in the formation of assets. It was also revealed that the impact is little and limited, when it comes to improvement in the extent of land holding or the value of land and the impact has not shown any improvement in the occupational status of the borrowers.

Khalid (2010) analysed how institutional credit affected the productivity of rice crop in the district Lahore of Pakistan. Stratified random sampling technique was adopted to select the sample respondents. The district was divided into three strata: from each stratum two villages were randomly selected and from each village ten loanee farmers were randomly selected from the given list of borrowers. An equal number of non-loanee farmers were also selected. Cobb-Douglas function was used to calculate the impact on rice productivity. It was found that coefficient of credit was significant, which indicated that credit has a positive impact on the productivity of rice, providing a clue that credit is an important tool for improving and increasing the agricultural productivity in general and that of rice in particular.

The major objective of the study by Kidane (2010) was to assess the impact of credit on gross farm income and the living standard of the small farmers. Primary data were collected from purposively selected seven zones in the southern region of Ethiopia in the year 2007. A total of 450 households comprising 288 credit users and 162 non-users were included in the final analysis. In addition, secondary data were collected from relevant organisations, and pertinent documents. Descriptive statistics such as mean, standard deviation and percentages were used for analyzing data, and t-test and chi-square test were also employed to compare credit users and non-users with respect to hypothesised and other related variables. Variance inflation factor (VIF) and the coefficient of contingency were calculated to detect multicollinearity and association among the continuous and discrete variables respectively. The analysis revealed that credit was beneficial to small holder farmers with respect to access to education, access to health centers, clothing, schooling, better diet and meal. Cobb-Douglas production

function was also employed to analyse the contribution of credit on gross farm income. Farm size, education level of the household head and total livestock unit were highly important factors of production contributing to gross farm income where as credit, adult labour and oxen number were the less important variables contributing to gross income.

For studying about the role of credit in the agricultural sector of Pakistan and the impact of credit on agricultural value added, Ahmad (2011) used annual data for the period 1972 to 2008. Agricultural output, cropped land (in million hectares), labour force (in million), disbursement from all institutions (in million rupees) and water availability (in million acre feet) were the main variables used in this study. Agricultural output (value added) was used as dependent variable and output was assumed to be a function of availability of credit, labour force, cropped area, water and all those inputs which are purchased with the help of credit such as seeds, fertilisers, tractors, and tube-wells. The Dickey Fuller (DF)/Augmented Dickey Fuller (ADF) was employed to test the stationarity of all variables in the models. The study results showed that direct credit has positive relation with agricultural output, but has insignificant impact on agricultural output. The risk of institutional credit is more important as it is a source of providing different agricultural inputs which has strong impact on productivity. The author observed that agricultural output is enhanced through three inputs, tractors, tube-wells, and seeds. The study also showed that, long run coefficient of cropped area is highly significant because land is the basic input to agricultural sector. This shows that as the intensity ratio of land increases, it increases the output of this sector. The coefficients of labour and water are also highly significant and positive. The study suggested that the base of agricultural credit should be enhanced to the large proportion of rural population, especially small farmers and also to increase credit supply, when investment in land, water and labour is increased.

Ayaz and Hussain (2011) highlighted the level of production efficiency of the farming sector in the Faisalabad district of the Punjab province of Pakistan. Stochastic Frontier Analysis (SFA) technique was utilized at farm level survey data of 300 farmers for the year 2009. The overall mean efficiency score was 0.84 indicating 16 per cent inefficiency of the sample farmers. The SFA estimation method also illustrated the parameters for the inefficiency. Farming experience, education, access to farming credit, herd size and number of cultivation practices showed constructive and significant effect

on the farmer's technical efficiency. The variable – credit - showed highest coefficient value (-0.14) indicating the importance for agricultural credit and making it clear that the availability of credit to farmers was much more important than any other factor to improve the resource use efficiency in agriculture sector.

Sial *et al.* (2011) explored the role of institutional credit in agricultural production using the time series data for the period 1972 to 2008. The authors collected data from various publications of Government of Pakistan and from Zarai Taraqiati Bank Ltd. (ZTBL) formerly known as Agricultural Development Bank of Pakistan, and other credit institution records. Cobb-Douglas production function was estimated using OLS and all the variables were transformed to per cultivated hectare. The study results revealed that ZTBL and commercial banks added to major share in formal agricultural credit disbursement. Increase in development and production loan portfolio from the entire formal institutions gave boost to agricultural output. Agricultural credit was positively significant to agricultural GDP while, availability of water, crop intensity, agricultural labour force per cultivated hectare were the factors that enhance agricultural GDP. The study recommended that the agricultural credit disbursement particularly to small farmers should be encouraged. Since the uncertainty in agriculture sector is more, crop insurance scheme must be initiated, which will be helpful in getting required recovery rate of agricultural loans. The study also suggested that agricultural credit given to farmers on the basis of productivity will be helpful in targeting the needy persons and this will also shrink the loan losses.

Javed *et al.* (2012) conducted a study during 2008-09 to estimate technical and allocative efficiency of farms in irrigated Punjab and also to investigate the impact of institutional credit and extension services on technical and allocative inefficiency. Technical and allocative efficiency were estimated by non-parametric data envelopment analysis (DEA) of 400 farms for the crop year 2008-09. Tobit Regression Model was estimated to investigate the impact of availability of institutional credit and extension services. The results of Tobit regression model showed that the farmers having access to institutional credit are technically more efficient than their counterparts having no access to credit. Farmers having more contacts with extension agents are having more technical and allocative   efficiency than the farmers having less/no contacts with the extension agents.

Studies revealed that there is significant, positive and immediate impact of agricultural credit on agricultural output. It increases the use of fertiliser consumption and investments in physical assets. Cobb-Doubglas production function was used by many authors to assess the impact of institutional credit on agricultural production. Borrower farmers were employing more inputs to enhance agricultural production than non-borrowers. Technical know-how of the farmers helped them to utilise credit in a better way. It was seen that, large farmers benefitted more from institutional credit than small and marginal farmers.

2.4 Problems of agricultural credit and suggestions

An important character of the agricultural credit market is that access to credit is far easier for some groups than for others. Despite the enormous expansion of formal credit through various institutional sources, there are however increasing evidences indicating that the flow of credit has been confined to better off sections of the society, leaving the small farmers, who are still continuously dependent for large portion of their production and consumption credit requirement on the informal agencies. The problems of farmers with respect to agricultural credit as observed by different researchers are discussed here.

Sarap (1990) used survey data from six villages in Orissa, to locate and analyse factors inhibiting small farmer's access to formal credit, including credit supply, bargaining strength, bureaucratic formalities, asset-based lending policies, informal tenancy contracts, extended processing procedures and caste barriers. The survey data found that a correlation between arrears and larger farm size. The study suggested that policies should be directed both towards reducing the overall transaction costs of formal loans to small farmers, and towards improved collection processes.

Katula and Gulati (1992) traced the evolution of rural credit, the institutional set up, and major problems faced by financial institutions, such as overdues and defaults, in extending credit to the agricultural sector in India. It was estimated that the credit subsidy to agriculture was about 7.36 per cent of outstanding loans during the 1980s; 4.5 per cent of this was due to provision of loans granted at concessional rates of interest, and 2.86 per

cent due to loans which were never repaid. Over the 1980s the amount of loans never recovered has increased by more than a factor of four, adversely affecting rural finance.

The study by Ashok and Seema (2002) dealt with issues relating to the rate of recovery of agricultural loans by rural financial institutions (RFIs) in India, the extent of Non-Performing Assets (NPAs) or overdues in Indian agriculture, the major factors impinging upon recovery of loans and building up of overdues or defaults and policy measures which had been taken to reduce the incidence of defaults and revitalize RFIs, particularly after the financial reforms in 1991 were set in. It was revealed that though the RFIs were progressing in terms of loan disbursements, they were plagued with high levels of NPAs or overdues. This had resulted in high incidence of defaults, which may be written off by banks. The major factors behind a high growth of overdues/NPAs of RFIs identified were natural calamities, inadequate income generation, government policy of lending at subsidised rate of interest and waving of loans on many occasions, high transaction costs, complicated lending and borrowing procedures and provisioning of NPAs. Measures undertaken after 1991 include re-capitalisation of regional rural banks (RRBs), deregulation of interest rates and other measures, which ensured greater autonomy to the RFIs. These measures had helped commercial banks and RRBs in reviving their position. Prospects of agricultural finance through non-banking financial institutions and other agencies were investigated. The study suggested for a clustering approach, whereby all the key players involved in the farm business that linked together for a larger economic and financial benefits.

Ghosh *et al.*, (2002) tried to identify the problems being faced by the small and marginal farmers in getting cheap and adequate credit from the rural financial institutions. They examined the credit flow problems of not only pure cultivating households but also landless households selling labour in the labour market who also belong to the economically weaker sections of the society who could be provided easy and cheap credit under the special line of credit by the financial institutions. The study was based on both primary and secondary data. Primary data were collected from two agriculturally active districts of West Bengal chosen purposively viz., Hooghly and Nadia representing traditional financial institutions and new generation credit institutions respectively. A total of 50 households equally spread over two selected districts constituted the sample size of the study. The study pointed out the issues relating to the accessibility to formal

sector credit accommodation of vulnerable group of landless, small and marginal farm households, legal hurdles and complicated lending procedures followed by formal sector institutions. The study also brought out credit gaps in the existing credit delivery mechanism followed by formal sector institutions, particularly co-operatives.

A questionnaire was administered by Koopahi and Bakshi, (2002) to 149 farmers, in the province of Birjand who had previously received credit from the Agricultural Bank of the Islamic Republic of Iran, to determine the factors affecting repayment performance. Discriminant analysis method was used to discriminate the defaulters from non-defaulters. The results pointed out that the use of machinery, length of repayment period, bank supervision on the use of loan, and the use of loan on current activities had significant positive effects on repayment performance. The study also revealed that the factors such as, incidence of natural disasters, higher level of education of the loan recipient, and length of waiting time for loan reception had significant negative effects on repayment performance.

An examination of the credit situation in West Bengal agriculture and the factors impending credit supply, by Samal (2002) revealed that there existed a substantial gap between the demand for and supply of agricultural credit. The study was based on the primary data for the agricultural year 1996-97, which were collected from 120 farmers and eight branches of commercial, regional rural and co-operative banks operating in North 24 Parganas district. The study suggested for measures to improve credit flow to small and marginal farmers.

The functional structure of loans, credit-deposit ratio, and loan delinquencies of PACS in Haryana, were studied using secondary data for the years 1988-89 to 1997-98 by Aynew et al., (2003). Majority (34 - 40%) of the borrowing members of these societies were small farmers. Current Production Growth and Stability (CPGS) loans constituted 93 - 98 per cent of the credit disbursed. The credit-deposit ratio was greater than unity, indicating that the amount of deposits was very small compared to the amount of loans advanced. Chronic overdues had registered an increasing trend during the period studied. There was no uniformity in the delinquency rates of the PACS as far as lending was concerned.

Deepak (2003) evaluated the functioning of various rural financial institutions operating in the state of Maharashtra with major emphasis on credit co-operatives, commercial banks, regional rural banks, land development banks and self-help groups in extending finances to rural poor. The study aimed at examining the growth trends in various performance indicators of agricultural credit institutions, assessing the financial viability of agricultural credit institutions, evaluating the impact of agricultural financial institutions on beneficiaries, and also assessing the responses of the beneficiaries in terms of facilities extended by their concerned credit institutions and the constraints they encounter in availing such facilities. The study was confined to two districts viz. Sangli and Buldana of Maharashtra encompassing both forward and backward districts. The composite index was computed for each district by using different parameters such as cropping intensity, operational holding, number of commercial banks, per capita bank credit to agriculture etc. The study relied on primary and secondary sources of data. The results indicated a slower growth in institutional finance through rural financial institutions in Maharashtra during the decade of 1991-2000, which was attributed to mounting non-performing assets, high transaction cost and poor repayment performance.

Singh and Anil (2003) examined the credit gap in agriculture in Bikaner district, Rajasthan, using both primary and secondary data for the year 1998-99, collected tehsil-wise. Primary data were obtained from 90 borrower and non-borrower farmers in different size groups. The total credit gap for the district was estimated at 86.38 per cent, which showed a major hindrance to the development of the agricultural sector. The study opined that the government and the policy planners had to pay adequate attention to these problems.

Aminur and Tewari (2004) examined the regional disparities in per hectare flow of institutional credit to different farm-size groups and the share of different farm-sizes in the per hectare institutional credit flow to agriculture covering all the six regions of the country as indicated in RBI publications and was based on the published data for the period 1980-81 to 1999-2000. Their study had revealed that inter-regional disparities in per hectare flow of institutional credit to small as well as to non-small farmers as measured through coefficient of variation exhibited a cyclical trend for small farms and a distinct declining trend for non-small farms during the pre-liberalisation period (1980-81 to 1990-91). During the post liberalisation period (1991-92 to 1995-96), the direction of

change in CV had been found reversed, decreasing in small farms and increasing in non-small farms. It was evident that both flow wise and rate of growth-wise, the southern region had placed well, followed by northern region. The inter-regional disparities in the flow of institutional credit to various farm-size groups increased during the pre-liberalisation period and continued to persist during the post-liberalisation period.

Veni and Sah (2005) found that the growth rate of co-operative banks were relatively lower than the SCBs and RRBs in terms of short term, long term and total credit. The RRBs had recorded the highest growth rates in terms of credit both at aggregate and disaggregate level since their inception in 1975-76 till 2001-02. The SCBs had maintained the second position in terms of short term, long term and aggregate credits during the study period. Further, the Absolute Member Centrality (AMC) with respect to agricultural credit and the Relative Member Centrality (RMC) with respect to the short term credit revealed the gradual decline in the share of credit of co-operative banks. However, the declining trend in the share of co-operative bank's credit was more visible since 1995-96 in terms of AMC and RMC. The study emphasised that the credit to agriculture and allied activities has been slowly moving from co-operatives to SCBs and RRBs. The study suggested for improving the institutional credit especially the share of co-operative banks to save the farmers from financial difficulties, and also integration between the institutions and the state governments, to attend the financial needs of the rural poor.

According to Satish, (2006) since nationalsation of banks and the Green Revolution, institutional credit for agriculture has grown in Punjab. But the growth had not been uniform and in line with the demand for such credit. Indebtedness has also increased in the State, but a large part of the debt has been for non-productive purposes. The incidence of suicides in Punjab has not been higher than the all India average and studies reveal that while indebtedness was indeed one of the major causes of suicides, it was neither the only cause nor the main one. There was thus no direct causal relationship between institutional credit, indebtedness and suicides in rural Punjab. It was suggested that the problems of indebtedness as well as suicides did not merit narrow interpretation or solution, as these were only symptoms of a larger malaise. They had been contextualised in the light of stagnation of agriculture, rising levels of rural unemployment and dissipation of economic and social infrastructure.

Golait (2007) attempted to analyse the issues in agricultural credit in India. The study revealed that the credit delivery to the agriculture sector was inadequate. It was also found that the banking system was hesitant on various grounds to purvey credit to small and marginal farmers. The study suggested for concerted efforts to augment the flow of credit to agriculture, along with exploring new innovations in product design and methods of delivery, through better use of technology and related processes. Credit flow to agriculture can be increased by providing farmers with critical inputs and enabling processing of their produce, by facilitating credit through processors, input dealers, NGOs etc. that are vertically integrated with the farmers and through contract farming.

Harangus (2007) explained the access given to agricultural farms by banks for credit. The access of agricultural farms to bank credit offer was determined by a series of factors that had negative or positive influence, i.e., the financial performance of farms and the efficient management of risks by commercial banks. The movement of agricultural credit from 2004 - 2007 and their percentage in the total bank credit was unsatisfactory and low for the development of a performing agriculture. The study also suggested that banks should take care while advancing credit and implement a flexible credit system

Khan *et al.* (2007) examined the nature and extent of inter-state disparities in per hectare flow of short-term institutional credit to agriculture, and its relationship with average cost of cultivation across states. The study covered all the six regions of the country comprising seventeen agriculturally most important states having about 96 per cent agricultural land in the country. It has revealed that inter-regional disparities in per hectare flow of institutional credit as measured through coefficient of variation had increased during the pre-liberalisation period between 1980-81 and 1990-91. During the post-liberalisation era of 1991-92 to 2001-02, inter regional disparities has got reduced to a great extent. The per hectare institutional credit flow has shown that in most of the states across the country the coverage has increased though in different degrees during the post-liberalisation stage over the pre-liberalisation period. But, the coverage has remained very low, below 20 per cent of cost of cultivation, except in the four states of Southern Region and Punjab and Himachal Pradesh in the Northern Region in 2001-02.

Oluwasola and Alimi (2008) analysed the factors determining the demand for and supply of agricultural loans among small-scale farmers in South Western Nigeria.

Empirical data obtained from 270 farmers who used credit were analysed using descriptive statistics and statistical models. Analysis revealed that farmers who used credit were younger at average age of 47 years, and cultivated farm sizes of average 3.8 ha, which were larger than the national average. The statistical models showed that interest rate, farm expenditure, amount borrowed from alternative sources, farm size and savings were the main determinants of credit demand, while interest rates charged, level of savings of respondents, amount of loan demanded and the proportion of previous loans repaid were the major determinants of credit supply. The study suggested that in order to improve the agricultural sector, formal lending institutions should target younger farmers, including women, use group and social assets as collateral rather than physical assets, charge commercial interest rates, mobilize savings through their rural outposts and give medium-term rather than short-term loans.

Singh *et al.* (2009) made a study based on a random sample of 600 farm households covering 11 districts in Punjab, comprising marginal, small, semi-mediums, medium, 103 large farmers pertaining to the year 2005-06. The total debt per sample farm household from both institutional and non-institutional sources founded Rs.1, 78,934 in the year 2005-06. The institutional and non-institutional sources had contributed about 62 per cent and 38 per cent respectively, to the total debt. The institutional credit had increased during the study period, in Punjab, but it was found inadequate for the productive needs of the farmers in Punjab. A farmer on an average, had to incur Rs. 4016 for obtaining a loan from commercial banks, which amounted to five per cent of the total loan obtained by him. In the case of co-operatives, the transaction cost had been worked out at 1.2 per cent of the loan and the co-operatives were located right in the villages. About 59 per cent farmers had reported the procedure to get loans from the institutional agencies to be complicated and time consuming. On the contrary, availing non-institutional loan has been found easy and was the reason of preference given by 51 per cent farmers to it. Policy implications include issuing of a simple but comprehensive record book to farmers containing information relating to his land record and institutional transactions, computerisation of land records by the state government, simplification of loan application form, maintenance of proper records of loan applications and making disbursement of loan mandatory for lending institutions.

Anjani *et al.* (2010) examined the performance of agricultural credit flow and identified the determinants of increased use of institutional credit at the farm household level in India. The study based on the secondary data compiled from several sources, has revealed that the institutional credit to agriculture in real terms has increased during the past four decades. The structure of credit outlets has witnessed a significant change and commercial bank has emerged as the major source of institutional credit. But, the declining share of investment credit in the total credit constrained the sustainable agricultural growth. The quantum of institutional credit availed by the farming households was affected by a number of socio-demographic factors which include education, farm size, family size, caste, gender, occupation of household, etc. They suggested that simplification of the procedure, could improve the access to agricultural credit by smallholders and less-educated/illiterate farmers.

Devaraja (2011) made an attempt to analyse the issues in institutional credit in India. His study revealed that, credit delivery to the agriculture sector continued to be inadequate and the banking system was uncertain on various grounds to purvey credit to small and marginal farmers. Facilitating credit through institutional sources - commercial banks, co-operative banks and RRBs - that were vertically integrated with the farmers for providing them critical inputs or processing their produce could increase the credit flow to agriculture. The study suggested for augmenting the flow of credit to agriculture, alongside exploring new innovations in product design and methods of delivery, through better use of technology and related processes.

From the studies reviewed, it could be observed that small and marginal farmers are having more problems in accessing agricultural credit compared to other groups of farmers. Adequate and timely credit is still far away from them. This results in demand and supply gap in agricultural credit. Because of the lack of access to formal credit, small and marginal farmers do depend on money lenders for credit. In order to reduce the problem of demand and supply credit gap, authors have suggested for increasing the share of co-operatives in agricultural credit, augmenting the flow of credit and simplifying the loan procedures.

Materials and Methods

CHAPTER 3

MATERIALS AND METHODS

The study entitled, 'impact of institutional credit on agricultural production in Kerala' has been conducted with the objectives of assessing the source-wise and purpose-wise credit flow to agriculture; examining the impact of institutional credit on agricultural production; comparing the performance of various institutions in the provision of agricultural credit; and analysing the pattern of utilisation and impact of credit on farmers with respect to Pananchery Panchayat of Thrissur district. This chapter elucidates the methodology and data sources adopted in conducting the study, which are presented in the following sequence.

3.1 Concepts used in the study

3.2 Locale of the study

3.3 Sources of data

3.4 Selection of the sample

3.5 Statistical tools used for the study

3.1 Concepts used in the study

The major concepts used in the study are explained below:

3.1.1 Tenant farmer

A tenant farmer is one who farms land owned by another and pays rent in cash/in kind.

3.1.2 Marginal farmers

Farmers whose landholdings are less than one hectare (ha) are considered as marginal farmers.

3.1.3 Small farmers

A small farmer is one who possesses a landholding in between one to two ha.

3.1.4 Large farmers

A large farmer is one whose landholding exceeds two ha.

3.1.5 Gross Cropped Area (GCA)/Total Cropped area

GCA represents the total area sown once and/or more than once in a particular year, ie, the area is counted as many times as there are sowings in a year. This total area is also known as total cropped area or total area sown. It is measured in million hectares (ha) in India and thousand ha in Kerala.

3.1.6 Net irrigated area

Net irrigated area is the area irrigated through any source once in a year for a particular crop. It is measured in thousand ha for India and Kerala.

3.1.7 Are

A basic unit of area in the metric system equal to 100 square metres and equivalent of 0.0247 acre. One acre = 40.47 are, one hectare = 2.50 acre.

3.2 Locale of the study

The source – wise and purpose – wise credit flow to agriculture and the impact of institutional credit on agricultural production have been studied both at the all India level and at the state level of Kerala using secondary data.

For examining the last objective of the study, viz., the pattern of utilisation of credit and impact of credit on farmers, Pananchery Panchayat which is coming under the Ollukkara Block has been purposively selected. Ollukkara block is having wide banking network with the presence of branches of public sector banks, private sector banks, RRB, Thrissur District Co-operative Banks (TDCB), Co-operative Agricultural and Rural Development Bank (CARDB), Urban Co-operative Bank and Service Co-operative Banks. Ollukkara Block

stood first with an achievement of 218 per cent of the target for priority sector lending during 2010-11 among the blocks in Thrissur district (Canara Bank 2012). Pananchery is one of the Panchayats in Ollukkara block, which is having the highest number of wards. Since the main profession of the people of the Panchayat is agriculture and it has been adopted by Kerala Agricultural University (KAU) it is purposively selected for the study.

3.3 Sources of data

The study has been based on both primary and secondary data. Analysis has been done with secondary data first, followed by that of primary data. The first three objectives of assessing the source-wise and purpose-wise credit flow to agriculture, examining the impact of institutional credit on agricultural production and comparing the performance of various institutions in the provision of agricultural credit have been done using secondary data. This has been done for both India and Kerala.

Secondary data for India regarding Gross Domestic Product from Agriculture and allied activities (AGDP) and source – wise and purpose-wise flow of credit to agriculture have been collected for the period 1984-85 to 2007-08 from the website of Reserve Bank of India (www.rbi.org.in). Data relating to Gross Cropped Area (GCA) and net irrigated area were collected from Centre for Monitoring Indian Economy Private Ltd (CMIE); agricultural labour force from Agricultural Statistics at a Glance in India; consumption of fertilisers, availability of seeds and electricity consumption for agricultural purposes from indiastat (www.indiastat.com). The data collected for 24 years for India was divided into two sub periods, first sub period covering 12 years, from 1984-85 to 1995-96 and next 12 years from 1996-97 to 2007-08 for the second sub period.

Secondary data for Kerala on all variables except purpose – wise institutional credit have been collected and analysed for the period 1990-91 to 2007-08. Data on Gross State Domestic Product from Agriculture and allied activities (AGSDP) were made available from various issues of Directorate of Economics and Statistics (for the period 1990-91 to 1992-93) and Economic Review (for the period 1993-94 to 2007-08); institutional credit to agriculture and consumption of fertilisers from Economic Review; GCA and net irrigated area from CMIE; agricultural labour force from Statistics for Planning; and electricity consumption for

agricultural purposes from indiastat (www.indiastat.com). Details on seeds were not considered for Kerala because of unavailability of data for the study period. Figures on purpose – wise institutional credit to agriculture have been obtained only for the period 1999 -00 to 2010-11 from Economic Review and hence analysis done accordingly. In Kerala also, the total period under observation have been divided into two sub periods, the first sub period covering nine years from 1990-91 to 1997-98 and second sub period from 1998-99 to 2007-08.

For the purpose of the last objective of the study, namely, pattern of utilisation and impact of credit on farmers, primary data regarding cropping system, various sources of agricultural credit, extent of credit availed for agriculture, utilisation pattern of credit, problems faced by farmers with respect to agricultural production and socio – economic indicators have been collected from 60 farmers of Pananchery Panchayat, using a pre-tested structured interview schedule. The information for the presentation of the general and agricultural profile of Thrissur District and Pananchery Panchayat have been collected from District Credit Plan, Thrissur and Planning Report 2011-12 of Pananchery Panchayat and various issues of the Basic Data of Krishibhavan. The source – wise institutional credit for Thrissur district were made available for the period 2000-01 to 2010 -11 from various issues of Thrissur District Credit Plan and the purpose – wise credit flow details of the District from various issues of the Background Notes for District Consultative Committee for Banking Development.

3.4 Selection of the sample

Stratified random sampling was used for selection of the sample from Pananchery Panchayat. Stratified random sampling is a method of sampling that involves the division of a population into smaller groups known as strata. The strata are formed based on member's shared attributes or characteristics. A random sample from each stratum is taken and then pooled to form the total sample. In this study, farmers were classified into different strata, based on their landholdings, as tenant farmers, marginal, small and large. Only those farmers who had availed institutional credit and were involved in intensive farming operations for the

last three years were selected for the study. From each group, farmers were randomly selected to form the sample size of 60.

3.5 Statistical tools used for the study

The statistical tools were employed separately for the study of India, Kerala and Pananchery Panchayat. The source-wise and purpose-wise credit flow to agriculture and allied activities were analysed using ordinary line graph and Compound Annual Growth Rate (CAGR). To examine the impact of institutional credit on agricultural production, Cobb-Doubglas model was fitted.

Correlation has been found for studying the association ship between AGDP and other independent variables. Simple and multiple linear regression were also fitted for studying the contribution of independent variables to dependent variable AGDP. Cochrane-Orcutt regression method was done to capture the presence of autocorrelation for estimating the model.

3.5.1 Ordinary line graph

Ordinary line graphs were drawn separately for India and Kerala to examine the trend of source-wise and purpose-wise credit flow to agriculture and allied activities and to compare the performance of various institutions in the provision of agricultural credit. Ordinary line graph is the simplest chart showing trend.

3.5.2 Compound Annual Growth Rate (CAGR)

Compound annual growth rate (CAGR) is an average growth rate over a period of several years. It is a geometric average of annual growth rates. CAGR shows the year-over-year growth rate of the variables. It was computed for institutional credit to agriculture, gross cropped area, agricultural labour force, fertiliser consumption, availability of seeds, electricity consumption for agricultural purposes and net irrigated area for India and for all these indicators except availability of seeds for Kerala. It is calculated by taking the nth root of the total percentage growth rate, where 'n' is the number of years of the period being considered. This can be written as follows:

$$CAGR = \left(\frac{Ending\ value}{Beginning\ value}\right)^{\frac{1}{no.of\ years}} - 1$$

3.5.3 Correlation

Correlation refers to the linear relationship of two variables. Correlation is the statistical analysis which measures and analyses the degree or extent to which two variables fluctuate with reference to each other. The word relationship is important and indicates that there is some connection between the variables under observation. The connection measures the closeness of the relationship between the variables.

Correlation is the numerical measurement showing the degree of association between two variables. One variable may be called 'subject' (independent) and the other 'relative' (dependent) variable. Relative variable is measured in terms of the subject. Correlation often measured as a correlation coefficient, indicates the strength and direction of a linear relationship between two random variables. The main result of correlation is called the correlation coefficient (r). The value of the coefficient of correlation shall always lie between +1 and -1. When $r = +1$, then there is perfect positive correlation between the variables. When $r = -1$, then there is perfect negative correlation between the variables. When $r =$ zero, then, there is no linear relationship between the variables. The formula of correlation is as follows;

$$r = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{n(\sum X^2) - (\sum X)^2}\ \sqrt{n(\sum Y^2) - (\sum Y)^2}}$$

Where,

n= number of paired observations

$\sum XY$ = summation of individual products of values of X and Y

$\sum X$ = summation of X variable

$\sum Y$ = summation of Y variable.

$\sum X^2$ = the X variable is squared and then summed

$\sum Y^2$ = the Y variable is squared and then summed

$(\sum X)^2$ = the X variable is summed and then squared

$(\sum Y)^2$ = the Y variable is summed and then squared

3.5.4 Mann-Whitney U Test

Mann-Whitney U Test has been done for the pair-wise comparison of growth of institutional credit to agriculture with the growth of gross cropped area, agricultural labour force, fertiliser consumption, availability of seeds (not considered for Kerala), electricity consumption for agricultural purposes and net irrigated area for India and Kerala. For finding out the impact of institutional credit on infrastructural facilities created by the farmers of Pananchery also, Mann-Whitney U Test has been employed.

If ordinal measurement has been achieved, Mann-Whitney U Test can be used to test whether two independent groups come from the same population or not. This is one of the most powerful non-parametric tests which can be used as an alternative to Student's t-test.

Let H_0: $M_x = M_y$

And n_1 and n_2 be the sample sizes where $n_1 < n_2$. To apply this test, first combine the observations of both samples and rank them in order of increasing size i.e., give rank one to the smallest observation, rank two to the next smallest and so on. Let R_1 be the sum of the ranks obtained by the sample having n_1 observations, R_2 be the sum of the ranks obtained by the sample having n_2 observations. The test statistic 'U' is calculated as

$$U_1 = n_1\ n_2 + \frac{n_1(n_1 + 1)}{2} - R_1 \dots (1)$$

Or equivalently,

$$U_2 = n_1\ n_2 + \frac{n_2(n_2 + 1)}{2} - R_2 \dots (2)$$

Equations (1) and (2) give different values of 'U'. The smaller value is taken as the test criterion.

Case 1

When $n_1 < n_2 < 9$

Pr (U≤U') where 'U' is the observed value of 'U' and are tabulated for various values of n_1 and n_2. If this observed probability is less than or equal to the value given in the Statistical Tables we reject the hypothesis.

Case 2

When $9 \le n_2 \le 20$

The critical values of 'U' are tabulated for various values of n_1 and n_2 and at different levels of significance. If the observed value is less than or equal to the value given in the Statistical Tables we reject the hypothesis.

Case 3

$n_2 > 20$

As n_1 and n_2 increase in size, the sampling distribution of 'U' approaches to normal distribution with

$$Mean = \frac{n_1 n_2}{2}$$

$$Variance = \frac{n_1 n_2 (n_1 + n_2 + 1)}{12}$$

$$Z = \frac{U - \frac{(n_1 n_2)}{2}}{\sqrt{[n_1 n_2 (n_1 + n_2 + 1)]}} \sim N(0, 1)$$

3.5.5 Regression Analysis

Regression analysis is a very powerful tool in the field of statistical analysis in predicting the value of one variable, given the value of another variable, when these variables are related to each other. Regression helps the researcher to estimate one variable or the dependent variable using the other variables or the independent variables. In other words, it will be able to estimate the value of one variable, provided the value of the other variable is given. The statistical method, which helps to estimate the unknown value of one variable from the known value of the related variable, is called regression.

Regression is the mathematical measure of the average relationship between two or more variables in terms of the original units of the data. In regression analysis, the independent variable is also known as the 'regressor' or 'predictor' or 'explanator' and the dependent variable is known as 'regressed' or 'explained' variable. Regression analysis is used in statistics in all those fields where two or more relative variables are having the tendency to go back to the average.

The coefficient of correlation between the two variables gives an abstract form – a pure number of the amount of relationship between the two variables. Regression analysis is one of the scientific method for making predictions. The regression analysis which is confined to the study of only two variables at a time is termed as simple regression. The regression analysis for studying more than two variables at a time is known as multiple regression.

3.5.5.1 Simple regression equation: Regression equations also known as estimating equations are algebraic expressions of the regression lines. Since there are two regression lines, there are two regression equations - the regression equation of *X on Y* is used to describe the variations in the values of X for given changes in Y and the regression equation of *Y on X* is used to describe the variation in the values of Y for given changes in X.

(a) Regression equation of Y on X

The regression equation of *Y on X* is expressed as follows:

$$Y = a + bX$$

In this equation, Y is a dependent variable, i.e. its value depends on X. X is independent variable, i.e. for any given value of X, value of Y can be computed. 'a' is "Y intercept" because its value is the point at which the regression line crosses the Y- axis, that is, the vertical axis. 'b' is the "slope" of line. It represents change in Y variable for a unit change in X variable. 'a' and 'b' in the equation are called numerical constants because for any given straight line their value does not change.

To determine the values of a and b in the regression equation of Y on X, the following normal equations are required to be solved;

$$\sum Y = na + b \sum X$$

$$\sum XY = a \sum X + b \sum X^2$$

(a) Standard error of the estimate (Simple regression): The scatter diagram is a graph of observed plotted points where each point represents the values of X and Y as a co-ordinate. It portrays the relationship between these two variables graphically. This line is known as the *line of regression*. A measure of variability or scatter around the regression line would determine the reliability of the estimate 'Y'. The smaller the estimate, the more dependable the prediction will be. This measure is known as *standard error of the estimate* and is used to determine the dispersion of observed values of Y about the regression line. This measure is designated by $S_{y.x}$ and is given by:

$$S_{y.x} = \sqrt{\frac{\sum(Y - Y_c)^2}{n - 2}}$$

Where,

Y = observed value of the dependent variable

Y_c = corresponding computed value (predicted) of the dependent variable

n = sample size

n-2 = degrees of freedom

3.5.5.2 Multiple Regression

Multiple regression is a logical extension of simple linear regression analysis and evolves two or more independent variables forming basis for estimating the values of a dependent variable. However, while the linear regression relationship between the two variables in a simple regression is identified by a single straight line, the line of best fit in the case of multiple regression is a line through n dimensional space where, 'n' is the total number of variables.

Multiple linear regression equation describes the relationship between more than two variables. In multiple regression, the equation will be extended by adding one term for each new variable. Formula when 'n' independent variables are as follows;

$$Y = a + b_1 X_1 + b_2 X_2 + \dots + b_n X_n$$

Where,

Y = estimated value corresponding to the dependent variable

$a = Y$ intercept

X_1, X_2, X_n = values of 'n' independent variables

b_1, b_2, b_n = slopes associated with $X_1, X_2 \dots X_n$ respectively.

The values of the constants $b_0, b_1, b_2 \dots b_n$ can be calculated using the principle of least squares.

(a) Standard error of the estimate (Multiple regression): Similar to the standard error of the estimate $(S_{y.x})$, in the case of simple linear regression, the *multiple standard error of the estimate* also measures dispersion around the regression plane, thus indicating the extent of error in estimation of the values of the dependent variable. If the multiple regression equation fits the entire data perfectly, then the prediction made about the value of Y is most accurate and there is no error. The *standard error of the estimate* provides a measure to know the degree of accuracy of prediction.

If we have two independent variables X_1 and X_2 which are forming the basis for predicting the value of the dependent variable Y, then the *multiple standard error of the estimate* (or simply the standard error of the estimate) is given by the following formula:

$$S_{y.12} = \sqrt{\frac{Unexplained\ variation}{Number\ of\ degrees\ of\ freedom}}$$

$$= \sqrt{\frac{\sum(Y - Y_c)^2}{n - 3}}$$

where,

$S_{y.12}$ = standard error of the estimate

The subscript $(_{y.12})$ lists the independent variable Y for which the prediction is being made, then a dot (.) as point of separation and then $(_{12})$ representing the two independent variables X_1 and X_2. If there are three independent variables X_1, X_2, and X_3, then the standard error of estimate would be written as $S_{y.123}$ etc.

$\sum(Y - Y_c)^2$ = unexplained variation

n = number of observations in the sample

n – 3 = number of degrees of freedom [degrees of freedom = number of observations in the sample minus the total number of constants (b_0. b_1, b2) in the regression equation].

In general, for multiple regression analysis, if there are 'k' variables (also constants) so that there are (k-1) independent variables then standard error of the estimate is written as:

$$S_{y.12...(k-1)} = \sqrt{\frac{\sum(Y - Y_c)^2}{n - k}}$$

For fitting the multivariate model, multiple linear regression was used separately for India and Kerala. In order to compare the performance of univariate and multivariate models, multiple linear regression was developed both for India and Kerala by regressing the AGDP on institutional credit to agriculture with, gross cropped area, agricultural labour force, fertiliser consumption, availability of seeds (not considered in Kerala), electricity consumption for agricultural purposes and net irrigated area. For the analysis, data for the period from 1984-85 to 2007-08 and 1990-91 to 2007-08 were used for India and Kerala respectively.

3.5.6 Cobb-Douglas Model

To examine the impact of institutional credit on aggregate agricultural production, Cobb-Douglas production function was fitted using AGDP as dependent variable and institutional credit (IC) for agriculture as one of the independent variables for India and Kerala. Other explanatory variables included in the study besides IC (X_1) were, gross cropped area (X_2), agricultural labour force (X_3), consumption of fertilisers (X_4), availability of seeds (X_5), electricity consumption for agricultural purposes (X_6) and net irrigated area (X_7) in India. Independent variables included for Kerala were, gross cropped area (X_2), agricultural labour force (X_3), consumption of fertilisers (X_4), electricity consumption for agricultural purposes (X_5) and net irrigated area (X_6).

3.5.7 Cochrane – Orcutt Regression Model

The effects of serially correlated residuals on the accuracy of linear regression were considered and remedies were made using Cochrane-Orcutt method. This method remedies the effects of serially correlated residuals and yields more accurate regression coefficients than the ordinary least squares (OLS). Consider the model,

$$y_t = \alpha + X_t\beta + \varepsilon_t,$$

Where y_t is the time series of interest at time 't' β is a vector of coefficients, X_t is a matrix of explanatory variables, and ε_t is the error term. The error term can be serially correlated over time $\varepsilon_t = \rho\varepsilon_{t-1} + e_t,$ $|\rho| < 1$. The Cochrane-Orcutt procedure transforms the model:

$$y_t - \rho y_{t-1} = \alpha(1 - \rho) + \beta(X_t - \rho X_{t-1}) + e_t.$$

Then the sum of squared residuals e_t^2 is minimized with respect to (α, β), conditional on ρ.

3.5.8 Durbin-Watson d- Test

While fitting simple and Multiple Linear Regression, and Cobb-Douglas models for India and Kerala, there may be a chance for autocorrelation. In order to check the autocorrelation in the observations under study, Durbin-Watson statistic is used.

The Durbin-Watson statistic is

$$d = \frac{\sum_{t=2}^{t=n} (\hat{\epsilon}_t - \hat{\epsilon}_{t-1})^2}{\sum_{t=1}^{t=n} \hat{\epsilon}_t^2}$$

Where $\epsilon^\wedge$ are the estimated residuals. It turns out that $d \approx 2\,(1 - \rho^\wedge)$. Thus, if $\rho^\wedge = 0$ i.e. no serial correlation, then $d = 2$. If $\rho^\wedge = 1$ i.e, perfect positive correlation, then $d \approx 0$. If $\rho^\wedge = -1$ i.e perfect negative correlation, then $d \approx 4$. Thus d ranges from zero to four with no serial correlation (the null hypothesis) being $d = 2$. Durbin and Watson were able to derive a lower bound d_L and an upper bound d_U such that if the computed d lies outside these critical values, then a decision can be made regarding the presence of positive or negative serial correlation. The precise values for d_L and, d_U depend on the number of independent variables.

In addition to the above tools, simple percentages have also been computed to find the share of each category of credit to total credit. Pie diagrams have also been used for the graphical presentation of classification of sample respondents and farmers' membership position in different associations or clubs.

Results and Discussion

CHAPTER 4

RESULTS AND DISCUSSION

Credit plays an important role in making agricultural sector more productive and efficient in developing economies. Adequate, timely, and hassle free credit help the farmers in their agricultural and livelihood pursuits. The seasonal nature of cash outflows and inflows in agricultural production entails the need for finance to meet the production and consumption requirements of farmers from one harvest to the next. Non-availability of finance from formal sources especially in the case of small and marginal farmers drives them to informal sources which results in greater interest burden. Timely availability of adequate credit at reasonable rate of interest can help the farmers reduce their cost of production and thereby earn reasonable profit. After initiation of financial sector reforms in the early 1990's concerns have been expressed about flow of credit to the agricultural sector as banks have become conscious about interest rate and non-performing assets. This study on impact of institutional credit on agricultural production in India and Kerala has been undertaken with the following objectives:

- To assess the source-wise and purpose-wise credit flow to agriculture
- To compare the performance of various institutions in the provision of agricultural credit
- To examine the impact of institutional credit on agricultural production, and
- To analyse the pattern of utilisation and impact of credit on farmers with respect to Pananchery Panchayat of Thrissur district.

The first and second objectives of assessing the source-wise and purpose – wise credit flow to agriculture and comparing the performance of various institutions in the provision of agricultural credit have been discussed under the second part of this chapter, namely, credit flow to agriculture, followed by the analysis of the impact of institutional credit on agricultural production. The analysis of the pattern of utilisation and impact of credit on farmers with respect to Pananchery Panchayat of Thrissur district forms the last part of this chapter. A brief historical review of institutional credit to agriculture in India and its sources

are discussed under the first part of this chapter as a prelude to the analysis of the impact of institutional credit on agricultural production in Kerala and India. Hence the chapter is arranged under the following sub – heads:

4.1 Institutional credit to agriculture: a prelude

4.2 Credit flow to agriculture: India and Kerala

4.3 Impact of institutional credit on agricultural production: India and Kerala

4.4 Pattern of utilisation and impact of credit on farmers of Pananchery Panchayat of
    Thrissur district.

4.1 Institutional credit to agriculture: a prelude

Agriculture in India has always been heavily dependent on the monsoons. Indigenous systems of credit had to develop as a consequence of seasonal needs and fluctuations in order to facilitate smoothing of consumption pattern of farmers over the year. With the intermittent failure of the monsoons and other customary vicissitudes of farming, rural indebtedness has been a serious and continuous characteristic of Indian agriculture. Because of the high risk inherent in traditional farming activity, the prevalence of high interest rates was the norm rather than an exception, and the concomitant exploitation and misery that often resulted. Development of rural credit systems has therefore, been found to be intrinsically very difficult.

4.1.1 History of institutional credit to agriculture

The problems of institutional credit to agriculture began to engage the attention of even the British Colonial Government as early as the 1870s; the practice of extending institutional credit to agriculture can be traced back to that period when farmers were provided with such credit by the Government during drought years. Finally, the Co-operative Societies Act was passed in 1904 and co-operatives were recognised as the premier institutions for disbursing agricultural credit.

The early years of the twentieth century were characterised by continuous official attention to the provision of rural credit; a new Act was passed in 1912 giving legal

recognition to credit societies, the precursor of micro-finance; the Maclagan Committee on Co-operation in India issued a report in 1915 advocating the establishment of provincial co-operative banks, which got established in almost all provinces by 1930 thus giving rise to the three tier co-operative credit structure; the Royal Commission on Agriculture further examined the program of rural credit in 1926-27; Sir Malcolm Darling submitted another report on co-operative credit to the Government of India in 1935, just before the founding of the Reserve Bank of India. This continuing concern reflected the intrinsic problems of extension of rural credit which, to some extent, find resonance even now. It was then reported that in many provinces credit overdue to these credit co-operative institutions constituted 60 to 70 per cent of the outstanding principal due.

In 1935 the Reserve Bank of India was founded; the Reserve Bank of India Act, 1934 is unusual among central banks to have specific provision for attention to agricultural credit. In a study of agricultural credit activities of Reserve Bank in 1936 and 1937, it was found that almost the entire finance required by agriculturists was supplied by money lenders and that co-operative and other agencies played a negligible part. During the period between 1935 and 1950, the Reserve Bank was very active in continuing the attempt to reinvigorate the co-operative credit movement through a variety of initiatives. Besides providing financial accommodation to the co-operative movement, RBI played a central role in the task of building the co-operative credit structure, which gradually evolved into two separate arms, one for short term credit and another for long term credit. Intense concern with the provision of rural credit continued and more than half a dozen Committees were appointed between 1945 and 1950. Despite all these efforts, even by 1951 the provision of credit through co-operatives remained meagre with only 3.3 per cent of the cultivators having access to credit from co-operatives, and 0.9 per cent from commercial banks. Furthermore, the funds supplied by the money lenders were subject to high interest rates and other usurious practices and accordingly legislation on money lending was advocated to check such malpractices. The foundation for a broader credit infrastructure for rural credit was laid by the Report of the All India Rural Credit Survey (1954). The Committee of Direction that conducted this survey observed that agricultural credit fell short of the right quantity, was not of the right type, did not serve the right purpose and often failed to go to the right people. The Committee also

observed that the performance of co-operatives in the sphere of agricultural credit was deficient in more than one way, but at the same time, co-operatives had a vital role in channeling credit to the farmers and therefore summed up that "Co-operation has failed, but Co-operation must succeed".

The Committee, apart from visualising co-operatives as an exclusive agency for providing credit to agriculture, urged a well defined role for commercial banks in delivering credit for agriculture in specialised areas, such as marketing, processing, storage and warehousing. Towards this end, it recommended establishment of the State Bank of India and through it, extension of commercial banking facilities to rural and semi-urban area. Thus, concern about the inadequate extension of agricultural credit had a significant role in the founding of both the Reserve Bank of India and transformation of the Imperial Bank of India into the State Bank of India.

The inadequacy of rural credit continued to engage the attention of the Reserve Bank and the Government throughout the 1950s and 1960s. The Agricultural Refinance Corporation (ARC) was set up by the Reserve Bank in 1963 to provide funds by way of refinance, but credit co-operatives still did not function too well. Consequently, the All India Rural Credit Review Committee under the Chairmanship of Shri B. Venkatappiah was set up in 1966 to *inter alia,* review the supply of rural credit and to make recommendations for improving the flow of agricultural credit. After a comprehensive review, the Committee recommended that the commercial banks should play a complimentary role, along with co-operatives, in extending rural credit. The social control and the subsequent nationalisation of major commercial banks in 1969 and in 1980 acted as a catalyst in providing momentum to the efforts of leveraging the commercial banking system for extending agricultural credit. The outreach of banks was enlarged considerably within a relatively short period of time. The concept of priority sector was introduced in 1969 to underscore the imperative of financing certain neglected sectors like agriculture. The channeling of credit to the priority sectors was sought to be achieved through the stipulation that a certain proportion of the total net bank credit be deployed in these sectors. Decentralised credit planning through the Lead Bank Scheme was also introduced. In order to emphasise the developmental and promotional role assigned to the ARC in addition to refinancing, the Corporation was renamed as the

Agricultural Refinance and Development Corporation (ARDC) by an amendment to the Act in 1975.

Despite all these efforts, the flow of credit to the agricultural sector failed to exhibit any appreciable improvement mainly due to the fact that commercial banks were not tuned to the needs and requirements of the small and marginal farmers, while the co-operatives, on the other hand, lacked resources to meet the expected demand. The solution that was found was the establishment of a separate banking structure, capable of combining the local feel and familiarity of rural problems characteristic of co-operatives and the professionalism and large resource base of commercial banks. Following the recommendations of the Narasimham Working Group (1975), Regional Rural Banks (RRBs) were set up. Thus, by the end of 1977, there emerged three separate institutions for providing rural credit, which is often described as the 'multi-agency approach'.

Following the recommendations of the "Committee to Review Arrangements for Institutional Credit for Agriculture and Rural Development", the National Bank for Agriculture and Rural Development (NABARD) was set up in 1982 for providing credit for promotion of agriculture. NABARD is the apex institution which has been trusted with a pivotal role in the sphere of policy planning and providing refinance facilities to rural financial institutions to augment their resource base. Since its inception, NABARD has played a central role in providing financial assistance, facilitating institutional development and encouraging promotional efforts in the area of rural credit. NABARD also administers the Rural Infrastructure Development Fund (RIDF), which was set up in 1995-96; the corpus of RIDF is contributed by Scheduled Commercial Banks (SCBs) to the extent of their shortfall in agricultural lending under the priority sector targets.

On the eve of the 1991 reforms, the rural credit delivery system was again found to be in a poor shape. The Report of the Committee on the Financial System under the Chairmanship of Shri. M Narasimham, 1991 provided the blue print for carrying out overall financial sector reforms during the 1990s. Furthermore, weaknesses in the performance of rural financial institutions since 1991 resulted in setting up of various Committees/Working Groups/Task Forces to look into their operations such as: "The High-level Committee on

Agricultural Credit through Commercial Banks" (R. V. Gupta, 1998), "Task Force to Study the Functions of Co-operative Credit System and to Suggest Measures for its Strengthening" (Jagdish Capoor, 1999), "Expert Committee on Rural Credit" (V. S. Vyas, 2001), and "The Working Group to Suggest Amendments in the Regional Rural Banks Act, 1976" (M. V. S Chalapathi Rao, 2002). These Committees/Working Groups/Task Forces made far reaching recommendations having a bearing on agricultural credit.

Financial sector reforms formed an integral part of the overall structural reforms initiated in 1991 and included various measures in the area of agricultural credit such as deregulation of lending rates of commercial banks for loans above Rupees two lakh; recapitalisation of select RRBs; introduction of prudential accounting norms and provisioning requirements for all rural credit agencies; increased refinance support from RBI and capital contribution to NABARD; constitution of the RIDF in NABARD for infrastructure projects; introduction of Kisan Credit Card (KCC) and stipulation of interest rate not exceeding nine per cent for crop loans upto Rs. 50,000 extended by the public sector banks.

Thus, apprehension over the inadequacy of agricultural credit has more than a century of tortuous history. The concern for food security and the need for building up buffer stocks, which guided the Green Revolution, created both enhanced and diversified type of credit requirements for agricultural production. In India, a "supply-leading approach" to the institutional development for agricultural credit has been followed. The agricultural credit system as it has emerged has been a product of both evolution and intervention and symbolises the system's response to the stimuli from continuing dissatisfaction with credit delivery, which is depicted in Figure 4.1.

Fig. 4.1 Agricultural Credit System in India

Government of India

Reserve Bank of India

NABARD

Scheduled Commercial Banks

Regional Rural Banks

Rural Co-operative Credit Institutions

Long Term Credit Structure

Short Term Credit Structure

State Co-operative Agriculture and Rural Development Banks

State Co-operative Banks

District Central Co-operative Banks

Primary Co-operative Agriculture and Rural Development Banks

Primary Agricultural Credit Societies

Depositors and Borrowers

4.1.2 Sources of agricultural credit

Credit is available to the farmers in the form of short term credit for financing crop production programmes and in the form of medium/long term credit for financing capital investment in agriculture and allied activities like land development, poultry, animal husbandry, fisheries, plantation and horticulture. Loans are also available for storage, processing, and marketing of agricultural products. Broadly sources of agricultural credit can be divided into two categories: institutional and non – institutional credit agencies.

4.1.2.1 Institutional credit agencies

The existence of strong and efficient credit institution is more than half the battle won especially for the developing countries and the success of credit-oriented development projects is significantly dependent upon the soundness of the credit structure i.e, of the credit institution and the credit system. Credit should be easily accessible, cheap, and safe as well as productive one. Credit becomes a bottleneck to production if it is not available at the right time, in quantity needed and in the required institutional forms. The major sources of institutional credit agencies identified are:

(a) Co-operative credit societies: The history of co-operative movement in India dates back to 1904 when the first Co-operative Credit Societies Act was passed by the Government. The scope of the Act was restricted to establishment of primary credit societies and non-credit societies were left out of its purview. The shortcomings of the Act were rectified through passing another Act called Co-operative Societies Act, 1912. The Act gave provision for registration of all types of Co-operative Societies. This made the emergence of rural co-operatives both in the credit and non-credit area, though with uneven spatial growth. In subsequent years a number of Committees were appointed and recommendations implemented to improve the functioning of the co-operatives.

Soon after independence, Government of India following the recommendations of All India Rural Credit Survey Committee, 1951 felt that co-operatives were the only alternative to promote agricultural credit and development of rural area. Accordingly, co-operatives received substantial help in the provision of credit from Reserve Bank of India as part of loan

policy and large scale assistance from Central and State Governments for their development and strengthening. Many schemes involving subsidies and concessions for the weaker sections were routed through co-operatives. As a result co-operative institutions registered a remarkable growth in the post-independence India.

The structure of Co-operative Credit in India in general consists of two main wings viz; agricultural credit and non-agricultural credit. In the case of agricultural credit, two separate structures exist – one for short term and medium term credit and the other for long term credit referred as the co-operative credit delivery system. The Co-operative Credit Structure for short and medium-term credit is a three tier and federal one with a State Co-operative Bank at the apex level in each state, the Central Co-operative Bank at the District level and Primary Agricultural Credit Societies /Primary Agricultural Co-operative Banks/Large sized Agricultural Co-operative Banks/Large – sized Agricultural Multi-purpose Societies/ Farmers Service Societies at the base level. A separate institutional structure for providing long term credit in the co-operative sector owes its origin to the Report of the Maclagan Committee (1915). The first Land Mortgage Bank (LMB) was established at Jhang, in the then Punjab, in 1920. Before nationalisation of commercial banks in 1969, the LMBs were the only institutional agency in disbursing long term agricultural credit. With the establishment of Agricultural Refinance and Development Corporation (ARDC) and subsequently NABARD, these banks also undertook the schematic lending. They also started to provide loan for non-farm activities. The nomenclature of the banks changed from LMBs to Land Development Banks (LDBs) and later to Agriculture and Rural Development Banks (ARDBs). The structure for long-term credit in some States is unitary; in others, constituting the majority, the structure comprises of two-tier viz., the State Co-operative Agricultural and Rural Development Bank (SCARDB) at State level and the Primary Co-operative Agricultural and Rural Development Bank (PCARDB) at the primary level.

At the All India level, all the State Apex Co-operative Banks have their own national federation namely National Federation of State Co-operative Banks from the year 1967 at Mumbai. Likewise all the State Agriculture and Rural Development Banks have formed their own National Federation of State Agriculture and Rural Development Banks functioning

from 1967 at Mumbai. These two federations are not undertaking any banking and financial activities but only co-ordination and promotional activities. The co-operative delivery system was designed to serve the rural population primarily for agriculture and rural development. The area of operation and functions at each level of the structure are pre-defined. Service is the main concern and not the returns/profitability to the contributors of the capital funds.

(b) Commercial banks / Scheduled Commercial Banks (SCBs): In early days commercial banks were confined to urban area serving mainly trade, commerce, and industry. Their role in agricultural credit was meagre. The insignificant participation of SCBs in agricultural lending was explained by the risky nature of agriculture due to its heavy dependence on monsoon, unorganised nature and subsistence approach. A major change took place in the form of nationalisation of commercial banks in 1969 and they were made to play an active role in agricultural credit.

(c) Regional Rural Banks (RRBs): It was widely felt that the benefits of the co-operative banking system were not reaching all the farmers in rural areas. A need was felt for an institution in rural and semi-urban area which combines local knowledge and familiarity with the problems being faced by co-operative banks with high degree of organisational ability and resource mobilisation capacity of commercial banks. As a result, RRBs were set up in those regions where availability of institutional credit was found to be inadequate but potential for agricultural development was very high. However, the main thrust of the RRBs is to provide loans to small and marginal farmers, landless labourers and village artisans. These loans are advanced for productive purposes.

4.1.2.2 Non-institutional credit agencies

Non-institutional agencies are coming under the broad category of informal sector. The term informal sector covers the activities of a large number of intermediaries such as professional and non-professional moneylenders, pawn shops, merchants and petty traders, landlords, shop keepers, indigenous bankers and finance corporations. The non – institutional credit agencies are also termed as unregulated or unorganised market or informal finance or indigenous financial market. They are largely beyond the official formalities.

Their operations are on a small scale and are localised; their transactions remain outside the official statistics. Different types of non-institutional agencies identified are as follows:

(a) Traders and commission agents: Traders and commission agents advance loans to agriculturists for productive purposes against their crop without completing legal formalities. It often becomes obligatory for farmers to buy inputs and sell output through them. They charge a very heavy rate of interest on the loan and a commission on all the sales and purchases, making it exploitative in nature. It is an important source of finance in case of cash crops like cotton, tobacco, and groundnut.

(b) Landlords: Mostly small farmers and tenants depend on landlords for meeting their production and day - to - day financial requirements. They offer credit based on the landholdings of farmers. They act as a non-professional moneylender. They occupy the lands of farmer-borrowers who do not repay the amount with interest on time.

(c) Moneylenders: Moneylenders occupy a predominant position among the non-institutional agencies in providing rural finance because the household needs of rural people are not confined to production credit alone. They do not accept deposits, but they simply lend money. They charge high rate of interest. There are two kinds of moneylenders in the villages:

(i) Professional moneylenders whose main occupation is money lending; and

(ii) Non-professional moneylenders or agricultural moneylenders whose subsidiary occupation is money lending.

Both these moneylenders are accessible to farmers whenever they need. They have thorough knowledge of the borrowers so that they lend against land promissory note for high rate of interest. For these groups money lending is the best known source of investment. The All India Rural Credit Survey Committee (AIRCSC) recommended that moneylenders not only have an opportunity of amassing wealth mainly through the snowballing of compound interest charges, but also get innumerable pecuniary benefits by acquiring a thorough grip over the peasant's life. (RBI, 1954).

(d) Friends and relatives: Friends and relatives are the most popular sources of rural credit market. They lend money to fulfill the urgent requirements to the selected persons with or without consideration. But money lending is not a profession for them.

After a brief discussion about the history of institutional credit to agriculture in India and the various sources of credit, the assessment of the source-wise and purpose – wise credit flow to agriculture and the comparison of the performance of various institutions in the provision of agricultural credit in India and Kerala using secondary data are presented in the ensuing section.

4.2 Credit flow to agriculture: India and Kerala

The institutional credit flow to agriculture is discussed under two heads - at the national level and at the state level of Kerala. For better presentation and understanding, these are put under one heading, the indicators being analysed first for India followed by that of Kerala. The first objective of the study is to assess the source – wise and purpose – wise credit flow to agriculture. The second objective of the study is to compare the performance of various institutions in the provision of agricultural credit. Hence in the first part of this section the source – wise or institution – wise flow of credit and the comparison of their performance in the provision of agricultural credit is done. This is followed by the analysis of the purpose – wise flow of credit.

4.2.1 Credit flow to agriculture: source – wise

The institutional sources of agricultural credit are broadly classified into four categories, viz., Co-operatives consisting of short term and long term, Scheduled Commercial Banks (SCBs), Regional Rural Banks (RRBs) and other sources, which comprises of credit from State Government and Rural Electrification Corporation (REC). The total institutional credit to agriculture includes both direct and indirect credit. Direct credit includes short term and medium term/ long term credit. The disbursement of credit at national level by these four categories of institutions for a period of 24 years from 1984-85 to

2007-08 is depicted in Table 4.1. The total period of 24 years is divided into two periods of 12 years each, the first 12 years, 1984-85 to 1995-96 as the first sub- period and the latter 12 years, 1996-97 to 2007-08 as the second sub – period and CAGR found out accordingly, to have a better understanding of the differences in the provision of agricultural credit. Although the financial sector reforms based on the first Narasimham Committee began from the year 1992 -93 onwards, the real impact of it could be identified only a few years later. The starting of the second sub - period coincides with the introduction of banking sector reforms in India as per the second Narasimham Committee Report.

Table 4.1 Institutional credit flow to agriculture in India, 1984-85 to 2007-08

(in Rs. crore)

Year	Co-operatives	SCBs	RRBs	Others	Total
1984-85	6147 (65)	2462 (26)	318 (3)	568 (6)	9495 (100)
1985-86	7417 (66)	2729 (24)	402 (4)	709 (6)	11257 (100)
1986-87	5565 (56)	3333 (33)	476 (5)	650 (6)	10024 (100)
1987-88	7164 (58)	3792 (31)	494 (4)	833 (7)	12283(100)
1988-89	6805 (55)	4007 (33)	431 (3)	1080 (9)	12323 (100)
1989-90	7095 (54)	4490 (34)	656 (5)	1005 (8)	13246 (100)
1990-91	6547 (51)	4876 (38)	342 (3)	1068 (8)	12833 (100)
1991-92	7520 (54)	4940 (35)	607 (4)	927 (7)	13994 (100)
1992-93	8556 (56)	5118 (34)	703 (5)	862 (6)	15239 (100)
1993-94	18560 (71)	5732 (22)	752 (3)	1069 (4)	26113 (100)
1994-95	22212 (68)	7991 (24)	1083 (3)	1374 (4)	32660 (100)
1995-96	29854 (70)	10311 (24)	1381 (3)	1383 (3)	42929 (100)
1996-97	32081 (69)	11968 (26)	1460 (3)	1155 (2)	46664 (100)
1997-98	33916 (67)	13226 (26)	1893 (4)	1738 (3)	50773 (100)
1998-99	35837 (63)	16460 (29)	2403 (4)	2603 (4)	57303 (100)
1999-00	107864 (81)	19861 (15)	2892 (2)	3071 (2)	133688 (100)
2000-01	118632 (81)	20407 (14)	3679 (3)	4396 (3)	147114 (100)
2001-02	114661 (76)	26628 (18)	4546 (3)	4722 (3)	150557 (100)
2002-03	126192 (74)	31517 (19)	5879 (3)	6607 (4)	170195 (100)
2003-04	133615 (70)	45139 (24)	7175 (4)	6017 (3)	191946 (100)
2004-05	159141 (64)	70095 (28)	11926 (5)	7441 (3)	248603 (100)
2005-06	170190 (55)	118350 (38)	15300 (5)	7489 (2)	311329 (100)
2006-07	189759 (51)	154032 (41)	20229 (5)	10733 (3)	374753 (100)
2007-08	203421 (52)	153750 (39)	23838 (6)	12953 (3)	393962 (100)
CAGR 1st Sub period	0.154	0.154	0.145	0.091	0.151
CAGR 2nd Sub period	0.173	0.253	0.268	0.205	0.203

Source: www.rbi.org.in
Note: Figures in parenthesis represent percentage share of each to total

As evident from Table 4.1, co-operatives are the major source of institutional credit to agriculture at all India level throughout the study period, though its share is decreasing in the recent years. The least share of it is in the years, 1990-91 and 2006-07 at 51 per cent. A study by Prabhu and Raheem (2010) has also revealed that the share of loans by co-operatives is declining over the years. Among the institutional sources of credit, co-operatives have been the oldest, and for a long time the dominant source. Starting with the nationalisation of banks, commercial banks have gradually become an important source of agricultural credit. The share of RRBs is very small ranging between two to six per cent. The poor performance of many of the RRBs in the country substantiates this role of RRBs. The share of commercial banks in the provision of agricultural credit has started declining considerably from 1999-2000 onwards, which is after the introduction of banking sector reforms and was the lowest in the year 2000-01 at 14 per cent. It is noteworthy that SCBs have started financing the agricultural sector on an increasing scale in the last five years of the study. Institutional credit flow from 'other sources' reflect a decreasing share in the recent years, though in absolute terms the amount has been increasing.

The three distinct features for the revival of agricultural credit by commercial banks in the recent years can be attributed to a significant increase in indirect finance to agriculture. Indirect finance refers to loans given to institutions that support agricultural production, such as input dealers, irrigation equipment suppliers and Non-Banking Financial Companies (NBFCs) that on-lend to agriculture. Second, a number of changes were made in the definition of agricultural credit under the priority sector. The definitional changes broadly involved the addition of new forms of financing commercial, export oriented and capital intensive agriculture; and thirdly, raising the credit limit of many existing forms of agricultural financing. Much increase in the total advances to agriculture in the 2000s were on account of sharp increase in the number of loans with a credit limit of Rs 10 crore and above, and particularly, Rs 25 crore and above. (Ramakumar and Chavan, 2007).

As revealed from CAGR, co-operatives and SCBs marked similar growth during the first sub period, which was found unlike during the second sub period. Agricultural credit from all sources has registered an increase in the second sub period. The highest growth rate is in the case of RRBs, thanks to the restructuring of RRBs in the recent

years and the lowest growth by co-operatives in second sub period. The announcement of 'Comprehensive Credit Policy' by Ministry of Agriculture, in June 2004, which included the commitment to raise agricultural credit flow by 30 per cent every year has also led to growth in institutional credit to agriculture in general. Growing institutional credit has resulted in a significant increase in the access of rural cultivators to institutional credit and the contribution of informal agencies as credit sources has declined (Kumar *et al.*2010).

Figure 4.2 depicts the trend in the flow of credit to agriculture in India for the period 1984-85 to 2007-08.

Fig. 4.2 Trend in credit flow to agriculture in India, 1984-85 to 2007-08
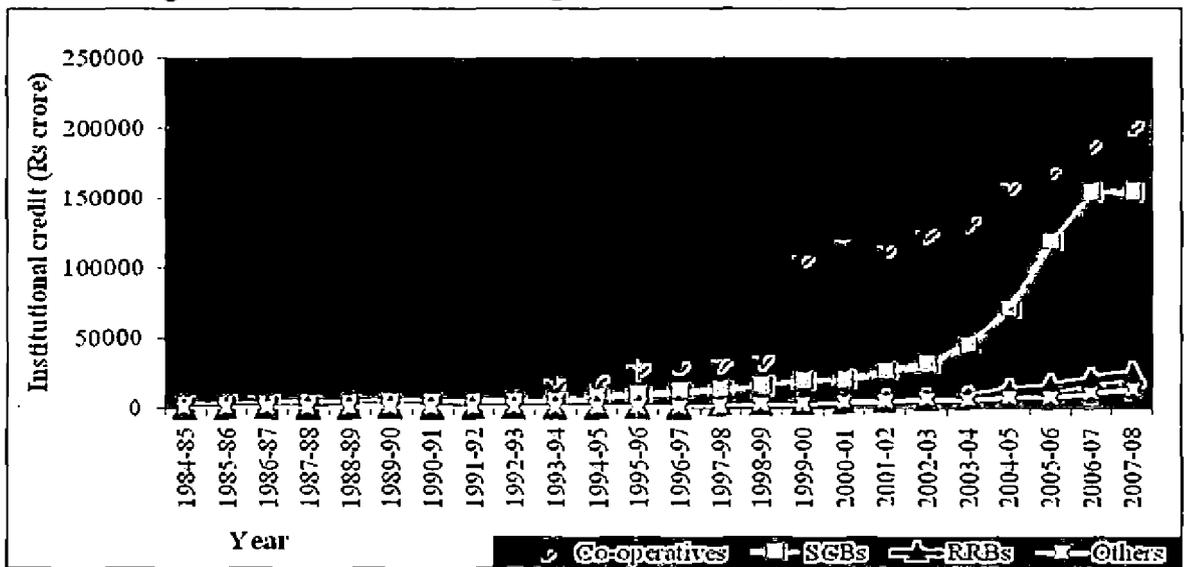
Generally there has been a positive growth in the flow of credit to agriculture by all institutions, although there have been some exceptions in a few years in the case of all institutions. The study by Kumar *et.al* (2010) has also revealed the same trend during this period. The prominence of agricultural credit by co-operatives is very evident from Fig. 4.2. The steep increase in 1999-00 compared to the previous year, which is more than 200 per cent in the case of co-operatives is noteworthy. It is also in this year and the next that the co-operatives touched the largest share of 81 per cent of total credit.

The percentage share of each of the four categories of institutions, namely, co-operatives, SCBs and RRBs in total institutional credit is graphically presented in Fig. 4.3.

Fig. 4.3 Trend of percentage share in total institutional credit in India, 1984-85 to 2007-08
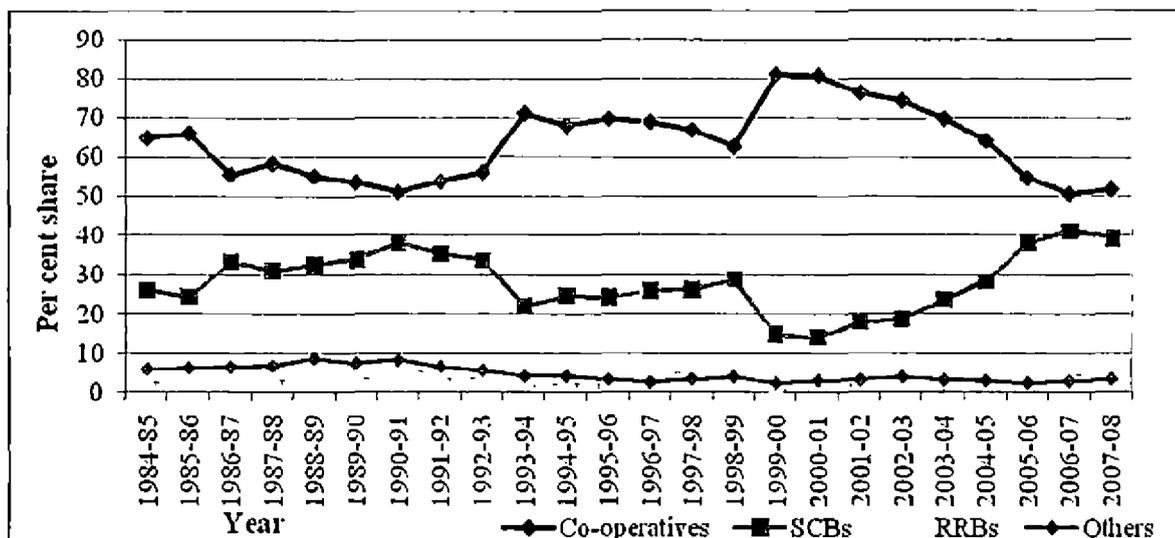
Fig. 4.3 makes it very clear the stagnant share of RRBs in the total institutional agricultural credit of India. Whenever the share of SCBs was less, the share of co-operatives went up. The steep fall in the share of SCBs during the year 1999-00 leading to sharp increase in the share of co-operatives is quite evident.

The institutional flow of credit can be direct or indirect credit. When the loans and advances are disbursed directly to the farmers it is known as direct credit, while when disbursed through institutions or agencies which supply credit or inputs to farmers, it is indirect credit. The disbursement of institutional credit on the basis of this classification is depicted in Table 4.2. Direct credit consists of short term and long term credit, while indirect credit is mostly of long term. In the category of 'others' direct credit is provided by the state governments, while indirect credit is provided by REC.

Table 4.2 Institutional credit flow to agriculture in India: direct and indirect, 1984-85 to 2007-08

(in Rs. crore)

Year	Co-operatives		SCBs		RRBs		Others	
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect
1984-85	3154 (51)	2993 (49)	2462 (100)	0	310 (97)	8 (3)	241 (42)	327 (58)
1985-86	3674 (50)	3743 (50)	2729 (100)	0	402 (100)	0	354 (50)	355 (50)
1986-87	3701 (67)	1864 (33)	3333 (100)	0	476 (100)	0	210 (32)	440 (68)
1987-88	4711 (66)	2453 (34)	3526 (93)	266 (7)	483 (98)	11 (2)	478 (57)	355 (43)
1988-89	4863 (71)	1942 (29)	3813 (95)	194 (5)	420 (97)	11 (3)	275 (25)	805 (75)
1989-90	5407 (76)	1688 (24)	4283 (95)	207 (5)	646 (98)	10 (2)	292 (29)	713 (71)
1990-91	4820 (74)	1727 (26)	4676 (96)	200 (4)	333 (97)	9 (3)	359 (34)	709 (66)
1991-92	5697 (76)	1823 (24)	4750 (96)	190 (4)	600 (99)	7 (1)	339 (37)	588 (63)
1992-93	6483 (76)	2073 (24)	4960 (97)	158 (3)	698 (99)	5 (1)	388 (45)	474 (55)
1993-94	8484 (46)	10076 (54)	5400 (94)	332 (6)	752 (100)	0	377 (35)	692 (65)
1994-95	9875 (44)	12337 (56)	7408 (93)	583 (7)	1083 (100)	0	407 (30)	967 (70)
1995-96	12483 (42)	17371 (58)	9275 (90)	1036 (10)	1380 (100)	1	554 (40)	829 (60)
1996-97	13154 (41)	18927 (59)	10697 (89)	1271 (11)	1459 (100)	1	468 (41)	687 (59)
1997-98	13944 (41)	19972 (59)	11322 (86)	1904 (14)	1887 (100)	6	645 (37)	1093 (63)
1998-99	15099 (42)	20718 (58)	14563 (88)	1897 (12)	2415 (100)	8	400 (15)	2203 (85)
1999-00	25678 (24)	82186 (76)	16050 (82)	3411 (18)	2885 (100)	7	420 (12)	3051 (88)
2000-01	27295 (23)	91337 (77)	16440 (81)	3967 (19)	3679 (100)		387 (9)	4009 (91)
2001-02	30569 (27)	84092 (73)	18638 (70)	7990 (30)	4546 (100)		463 (10)	4259 (90)
2002-03	34040 (27)	92152 (73)	25256 (80)	6261 (20)	5879 (100)			6607 (100)
2003-04	40049 (30)	93566 (70)	36203 (80)	8936 (20)	7175 (100)			6017 (100)
2004-05	45009 (28)	114132 (72)	48367 (69)	21728 (31)	11926 (100)			7441 (100)
2005-06	48123 (28)	122067 (72)	80599 (68)	37751 (32)	15300 (100)			7489 (100)
2006-07	54019 (28)	135740 (72)	115266 (75)	38766 (25)	20229 (100)			10733 (100)
2007-08	57643 (28)	145778 (72)	113472 (74)	40278 (26)	23838 (100)			12953 (100)

Source: www.rbi.org.in/Handbook of Statistics on Indian Economy

Note: Figures in parenthesis represent percentage share of each to total

Table 4.2 reveals that co-operatives which were giving prominence to direct credit to farmers, in the first sub period, has gradually started disbursing indirect credit on a larger scale, and is nearly giving three – fourth of their credit as indirect credit towards the end of the second sub period. Commercial banks which were giving only direct credit, has also switched on to indirect credit and finally only three – fourth of their total credit is given as direct credit. The RRBs are concentrating on diredt credit only at present, although there was a tendeny to give indirect credit during a few years under observation. Since the state governments have stopped financing the farmers directly, there is only indirect finance in the

'others' category since 2002-03. The main reason for increasing the indirect finance by commercial banks is the investment of RIDF of NABARD by way of bonds, for the shortfall in agriculture as part of the priority sector lending. But this tendency of financial instituions to avoid the provision of direct credit to farmers is detrimental to the interests of the farmers.

Once the institutional credit to agriculture at the national level is discussed, the next attempt is to analyse the agricultural institutional credit in Kerala. For want of uniform data, the analysis could be done only for a period of 18 years from 1990-91 for Kerala. The first sub period in Kerala covers nine years from 1990-91 to 1998-99 and second sub period covers next nine years from 1999-2000 to 2007-08. The institution – wise credit flow to agriculture in Kerala along with percentage share of each and the CAGR for the sub periods are depicted in Table 4.3.

Table 4.3 Institutional credit flow to agriculture in Kerala, 1990-91 to 2007-08

(in Rs crore)

Year	Co-operatives	SCBs	RRBs	Total
1990-91	107.1 (13)	607 (75)	92 (12)	806 (100)
1991-92	119 (15)	599(73)	102(12)	820 (100)
1992-93	88 (10)	700 (76)	126 (14)	914 (100)
1993-94	118 (12)	717 (75)	119 (13)	954 (100)
1994-95	115 (10)	950 (79)	133 (11)	1198 (100)
1995-96	69 (6)	1112 (83)	152 (11)	1333 (100)
1996-97	104 (7)	1309 (80)	184 (13)	1597 (100)
1997-98	168 (16)	663 (64)	197 (20)	1028 (100)
1998-99	562 (29)	1154 (60)	212 (11)	1928 (100)
1999-00	782 (32)	1319 (54)	331 (14)	2432 (100)
2000-01	948 (33)	1536 (52)	422 (15)	2906 (100)
2001-02	981 (34)	1466 (51)	414 (15)	2861 (100)
2002-03	1192 (34)	1914 (54)	408 (12)	3514 (100)
2003-04	1215 (27)	2579 (57)	755 (16)	4549 (100)
2004-05	1904 (28)	3884 (57)	1066 (15)	6854 (100)
2005-06	2873 (31)	4988 (55)	1290 (14)	9151 (100)
2006-07	3598 (30)	6618 (56)	1690 (14)	11906 (100)
2007-08	4105 (26)	9924 (62)	1931 (12)	15960 (100)
CAGR 1st Sub period	0.202	0.010	0.088	0.102
CAGR 2nd Sub period	0.262	0.317	0.289	0.265

Source: Economic Review, Various Issues
Note: Figures in brackets represent percentage share of each to respective total

In contrast to the trend seen at the national level, (Table 4.1), SCBs are the major source of institutional credit to agriculture in Kerala. Even the share of RRBs which is meagre at all India level is prominent in Kerala, surpassing the share of co-operatives in some of the initial years under observation. This is due to the efforts of the two RRBs of Kerala, South Malabar Gramin Bank (SMGB) and North Malabar Gramin Bank (NMGB), which are renowned for their performance and adjudged among the best RRBs in the country. The trend of declining share of SCBs in agricultural financing at all India level since 1999-00 is repeated in the case of Kerala also with the difference that in the case of India the lowest share is in the year 2000-01, while it is in 2001-02 in the case of Kerala. This implies that the banking sector reforms in the country had its negative impact on the flow of credit to the farmers of Kerala also, until specific steps were taken by the Government and RBI to overcome this.

During the first sub period SCBs had a poor performance in Kerala as evidenced by a low CAGR of one per cent. It is to be remembered here that the analysis of the institutional credit to agriculture in Kerala starts from the year 1990-91 when India initiated her financial sector reforms. This might be one of the reasons for the low disbursement of agricultural credit by SCBs and low CAGR in the first sub period, i.e., till 1997-98. The tendency of shift in the disbursement of credit from farm to non farm sector has also increased leading to declining flow of credit to agriculture. (Government of Kerala, 2002). But in the second half, especially from 2002-03 onwards, the disbursement of SCBs has improved resulting in high CAGR for SCBs. The graphical presentation of the institutional credit flow to agriculture in Kerala is depicted in Figure 4.4.

Fig. 4.4 Trend in institutional credit flow to agriculture in Kerala, 1990-91 to 2007-08
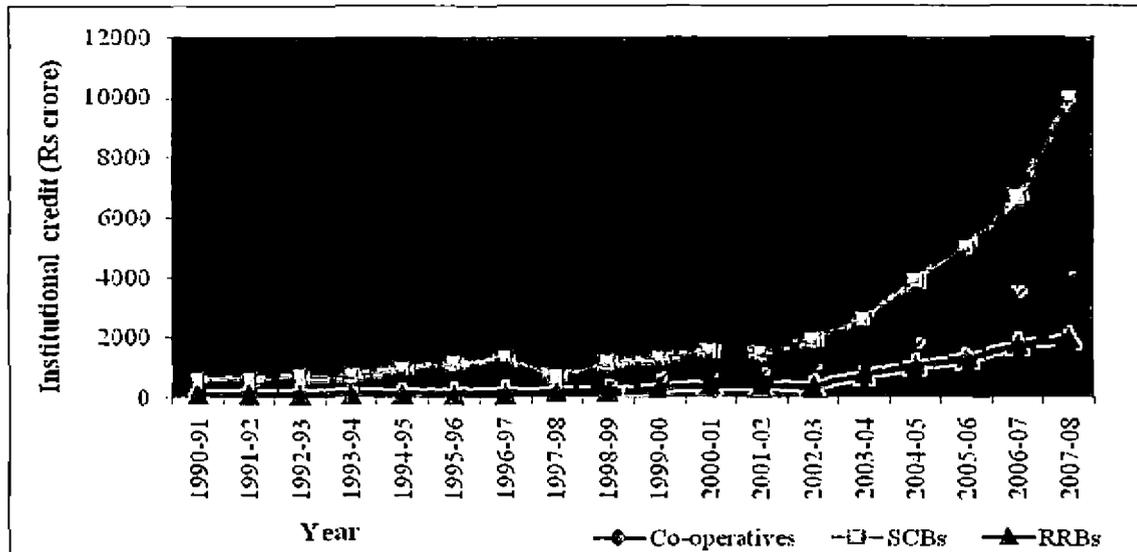
Though SCBs have been above co-operatives and RRBs in the disbursement of agricultural credit, a remarkable increase is seen only from 2002 -03 onwards. There has been a steep decrease in the credit disbursement of SCBs in the year 1997-98, the year in which the banking sector reforms were introduced. The percentage share of the three institutions in the provision of agricultural credit is graphically depicted by line graphs in Fig. 4.5.

Fig. 4.5 Trend of percentage share in institutional credit in Kerala, 1990-91 to 2007- 08
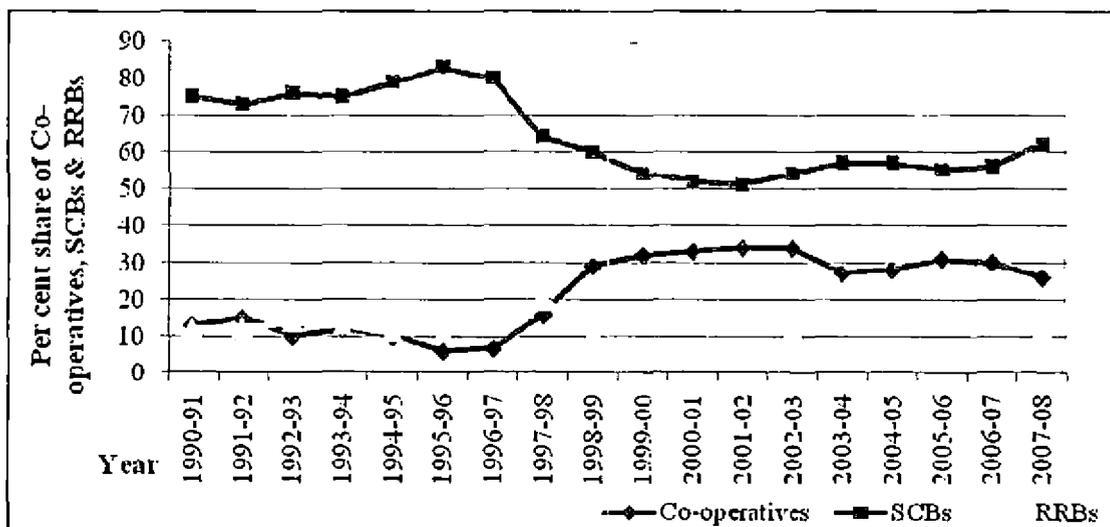
Although co-operatives are having the highest share in agricultural credit at all India level (Fig. 4.3), in the case of Kerala, it is the lowest in some of the years, even with the three tier structure and wide network throughout the State. Singh (1996) has observed that PACS are the main source of agricultural credit in Himachel Pradesh. It is noteworthy that the share of co-operatives has been below the performance of the two RRBs in the State, in some of the years.

The analysis of the source – wise disbursement of credit and its comparison makes it clear that at all India level, co-operatives are the major source of agricultural credit, while in Kerala, it is the commercial banks. The negligence of the co-operatives to address the credit needs of the farmers of Kerala is quite evident here. Although RRBs have only a meagre share in the credit disbursement to farmers at all India level, in Kerala they have a prominent role, though not equal to co-operatives. This achievement can be attributed to the tremendous performance of the two RRBs in the State, which are among the best performing RRBs in the country. The introduction of financial /banking sector reforms in India has adversely affected the disbursement of agricultural credit by commercial banks in India and Kerala as evident from the credit flow during these years. This situation was reversed only after the Government of India and RBI took specific measures to improve the credit flow to the agricultural sector.

4.2.2 Credit flow to agriculture: purpose – wise

The purpose – wise credit ·flow to agriculture is also analysed for both India and Kerala. Due to lack of uniformity of data available, the analysis at the all India level and state level is done taking different methods of classification of credit. For analysing the institutional credit flow to agriculture in India, the classification is into short term, medium term / long term credit and others consisting of indirect credit, while for Kerala, the classification is into production credit and investment credit. Short term purposes are for raising crops and medium term / long term purposes for minor irrigation, land development, farm mechanisation, plantation/horticulture, animal husbandry, fisheries etc. The last column of 'others' consist of credit disbursed by state governments and REC. The purpose – wise credit flow to agriculture of the three categories of institutions along with percentage share

for each purpose in India is depicted in Table 4.4. The percentage share of 'others' in the last column represent the share of it to the total credit flow to agriculture during a particular year.

Table 4.4 Institutional credit flow to agriculture in India: purpose – wise, 1984-85 to 2007-08

(in Rs. crore)

Year	Co-operatives			SCBs			RRBs			Others
	ST	MT/LT	Others	ST	MT/LT	Others	ST	MT/LT	Others	
1984-85	2323 (38)	831 (13)	2993 (49)	1036 (42)	1426 (58)	0	132 (41)	178 (56)	8 (3)	568 (6)
1985-86	2747 (37)	927 (13)	3743 (50)	1252 (46)	1477 (54)	0	176 (44)	226 (56)	0	709 (6)
1986-87	2620 (47)	1081 (19)	1864 (34)	1482 (44)	1851 (56)	0	201 (42)	275 (58)	0	650 (6)
1987-88	3120 (44)	1591 (22)	2453 (34)	1672 (44)	1854 (49)	266 (7)	246 (50)	237 (48)	11 (2)	833 (7)
1988-89	3584 (53)	1279 (19)	1942 (28)	1765 (44)	2048 (51)	194 (5)	250 (58)	170 (39)	11 (3)	1080 (9)
1989-90	3974 (56)	1433 (20)	1688 (24)	1898 (42)	2385 (53)	207 (5)	336 (51)	310 (47)	10 (2)	1005 (8)
1990-91	3446 (53)	1374 (21)	1727 (26)	2048 (42)	2628 (54)	200 (4)	123 (36)	210 (61)	9 (3)	1068 (8)
1991-92	3834 (51)	1863 (25)	1823 (24)	2285 (46)	2465 (50)	190 (4)	337 (56)	263 (43)	7 (1)	927 (7)
1992-93	4394 (51)	2089 (24)	2073 (25)	2432 (48)	2528 (49)	158 (3)	451 (64)	247 (35)	5 (1)	862 (6)
1993-94	6039 (33)	2445 (13)	10076 (54)	2860 (50)	2540 (44)	332 (6)	476 (63)	276 (37)	0	1069 (4)
1994-95	6996 (31)	2879 (13)	12337 (56)	3842 (48)	3566 (45)	583 (7)	688 (64)	395 (36)	0	1374 (4)
1995-96	9243 (31)	3240 (11)	17371 (58)	4628 (45)	4647 (45)	1036 (10)	848 (61)	532 (39)	1 (0)	1383 (3)
1996-97	9389 (29)	3765 (12).	18927 (59)	5625 (47)	5072 (42)	1271 (11)	1034 (71)	425 (29)	1 (0)	1155 (2)
1997-98	10272 (30)	3672 (11)	19972 (59)	6033 (46)	5289 (40)	1904 (14)	1350 (72)	537 (28)	6 (0)	1738 (3)
1998-99	10698 (30)	4421 (12)	20718 (58)	7642 (46)	6921 (42)	1897 (12)	1630 (68)	765 (32)	8 (0)	2603 (5)
1999-00	17255 (16)	8423 (8)	82186 (76)	9705 (49)	6645 (33)	3511 (18)	2185 (76)	700 (24)	7 (0)	3071 (2)
2000-01	18556 (16)	8739 (7)	91337 (77)	10704 (52)	5736 (28)	3967 (20)	2945 (80)	734 (20)		4396 (3)
2001-02	21670 (19)	8899 (8)	84092 (73)	12661 (48)	5977 (22)	7990 (30)	3810 (84)	736 (16)		4722 (3)
2002-03	23629 (19)	10411 (8)	92152 (73)	16825 (53)	8431 (27)	6261 (20)	4834 (82)	1045 (18)		6607 (4)
2003-04	29326 (22)	10723 (8)	93566 (70)	24134 (53)	12069 (27)	8936 (20)	6133 (85)	1042 (15)		6017 (3)
2004-05	31887 (20)	13122 (8)	114132 (72)	29978 (43)	18389 (26)	21728 (31)	9883 (83)	2043 (17)		7441 (3)

2005-06	35624 (21)	12499 (7)	122067 (72)	45644 (38)	34955 (30)	37751 (32)	12816 (84)	2484 (16)		7489 (2)
2006-07	40796 (21)	13223 (7)	135740 (72)	65245 (43)	50021 (32)	38766 (25)	17031 (84)	3198 (16)		10733 (3)
2007-08	47390 (23)	10253 (5)	145778 (72)	68243 (44)	45229 (29)	40278 (26)	20377 (85)	3461 (15)		12953 (3)

Source: www.rbi.org.in /Handbook of Statistics on Indian Economy 2009-10.
Note: Figures in parenthesis represents percentage share of each to total

Table 4.4 reveals that co-operatives are interested to provide indirect loans under 'others' category, while the major credit disbursement of SCBs and RRBs are by way of short term credit. Nearly three-fourth of the total credit flow from co-operatives is to the 'others' category in the recent years. The short term credit of SCBs is around 40 to 50 per cent during the entire study period, while for RRBs its share is continuously increasing reaching 85 per cent in the last year of observation. This implies that institutional credit for medium and long term investment in agriculture is much less. Of the three categories of institutions, SCBs present a better picture at around one – third of the total credit under medium / long term category. Credit disbursement by state governments and REC forms only a meagre portion of the total credit flow to agriculture, ranging between two to eight per cent during the entire study period. The percentage share of each of these three instituions viz., co-operatives, SCBs and RRBs are graphically presented in Fig. 4.6, 4.7 and 4.8 respectively.

Fig.4. 6 Percentage share of institutional credit to agriculture in India by co-operatives: purpose - wise
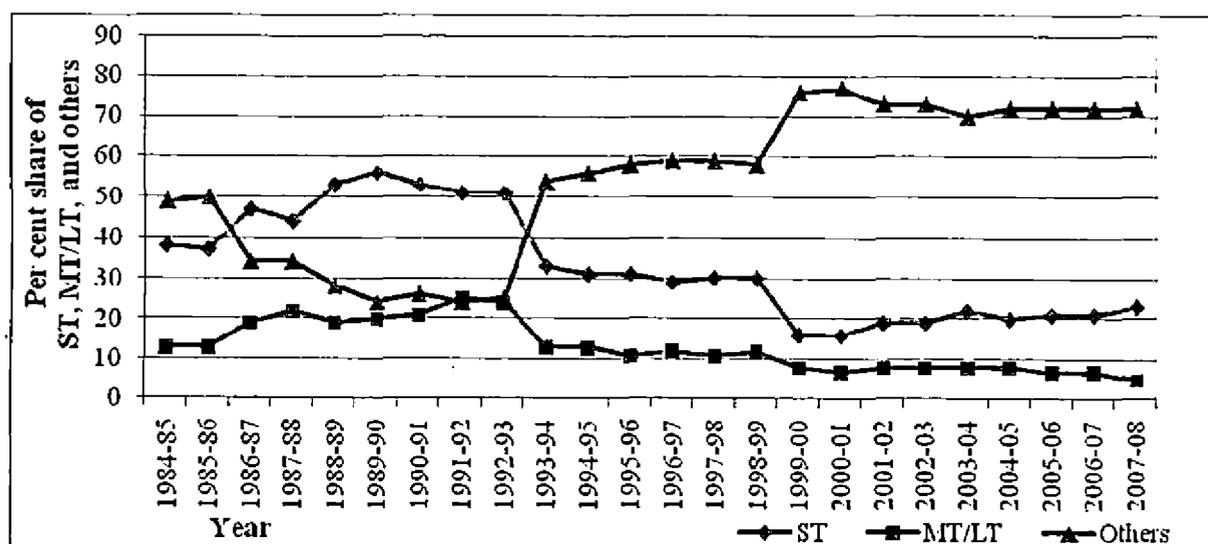
The prominence of indirect credit which is coming under 'others' category in the credit disbursement of co-operatives is very evident from Fig. 4.6. Medium and long term credit for agriculture has the lowest priority for co-operatives, even with the highest share of credit flow to agriculture at all India level. (Table 4.1).

Fig. 4.7 Percentage share of institutional credit to agriculture in India by SCBs: purpose – wise
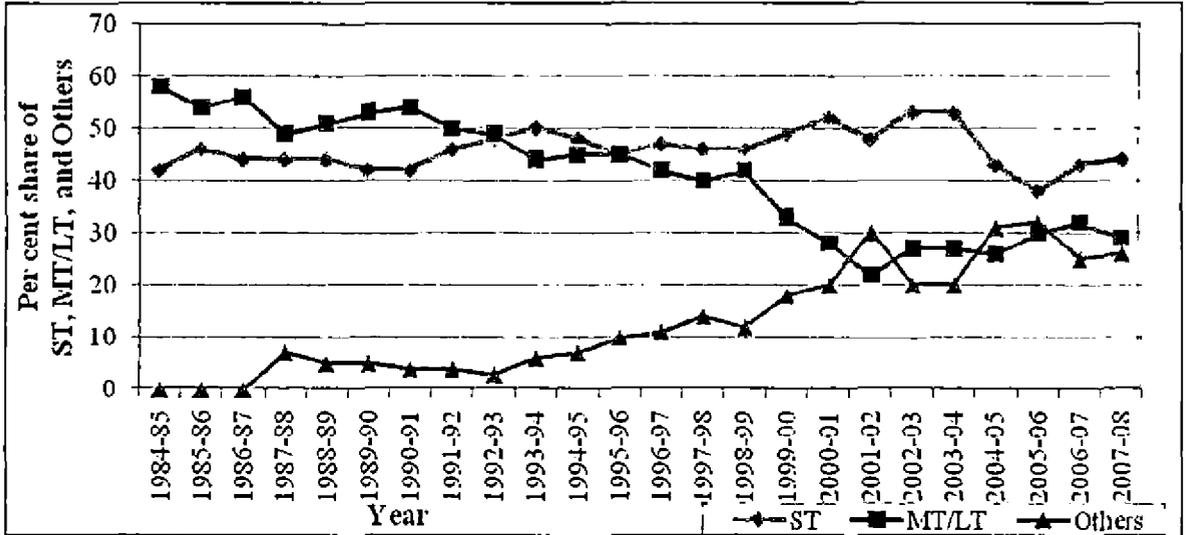
Fig.4.7 reveals the declining prominence of medium and long term credit to agriculture by SCBs. Short term credit is more or less having a stable share except during those years when the indirect credit to agriculure increased especially during 2005-06.

Fig. 4.8 Percentage share of institutional credit to agriculture in India by RRBs: Purpose - wise
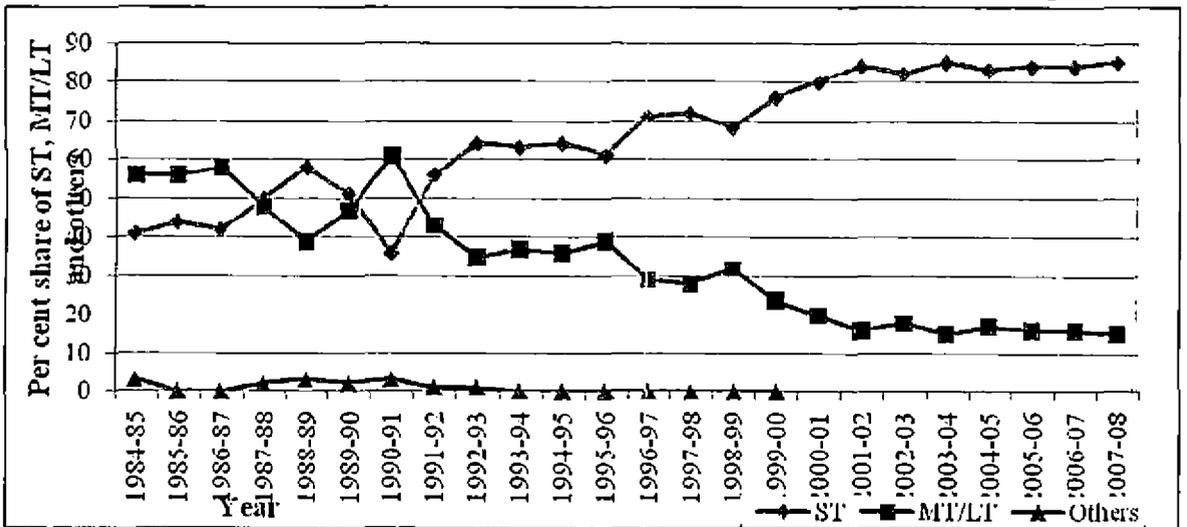
There is a steep fall in the credit flow to agriculture by way of medium term and long term loans by RRBs since 1992-93. The share of indirect credit is insignificant in the case of RRBs. The analysis of the purpose – wise credit flow to agriculture in India reveals that the medium and long term credit requirements of farmers are neglected by all the instituional agencies. They cater mostly to the short term credit requirements of farmers.

For analysing the purpose – wise credit flow to agriculture in Kerala, production credit and investment credit for a period of 12 years from 1999-'00 to 2010-11 are considered. First sub period in the study covers first six years from 1999-'00 to 2004-05 and second sub period covers next six years from 2005-06 to 2010-11. The institutional credit flow to agriculture in Kerala along with CAGR for the two sub periods are depicted in Table 4.5.

Table 4.5 Institutional credit flow to agriculture in Kerala: purpose-wise, 1999-'00 to 2010-11

(in Rs. crore)

Year	Production credit	Investment credit	Total
1999-00	1911 (79)	509(21)	2420 (100)
2000-01	2312(80)	596(20)	2908(100)
2001-02	2311(81)	550(19)	2861(100)
2002-03	2901(83)	613(17)	3514(100)
2003-04	3620(80)	929(20)	4549(100)
2004-05	5672(83)	1182 (17)	6854(100)
2005-06	7493 (82)	1659(18)	9152(100)
2006-07	9667(81)	2262(19)	11929(100)
2007-08	13203(83)	2757(17)	15960(100)
2008-09	14605 (78)	4228(22)	18833(100)
2009-10	18817(78)	5307(22)	24124(100)
2010-11	23512 (82)	5141(18)	28653(100)
CAGR 1st Sub period	0.199	0.151	0.189
CAGR 2nd Sub period	0.210	0.207	0.209

Source: Economic Review, Various issues
Note: Figures in brackets represent percentage share of each to total

Table 4.5 reveals that major portion of the institutional credit to agriculture in Kerala is given as production credit. It has been around 80 per cent during the entire study period. It is already seen from Table 4.4 that co-operatives, SCBs and RRBs are giving major portion of their credit for short term agricultural purposes in India. Since production credit is given for short term agricultural purposes, the purpose – wise distribution of credit at all India level and in Kerala is having the same pattern, implying that institutional credit flow is very less for long term investments in agriculture in Kerala also.

The CAGR reveals higher growth during the second sub period in the case of production credit as well as investment credit in Kerala.

Fig. 4. 9 Percentage share of institutional credit to agriculture in Kerala: purpose - wise
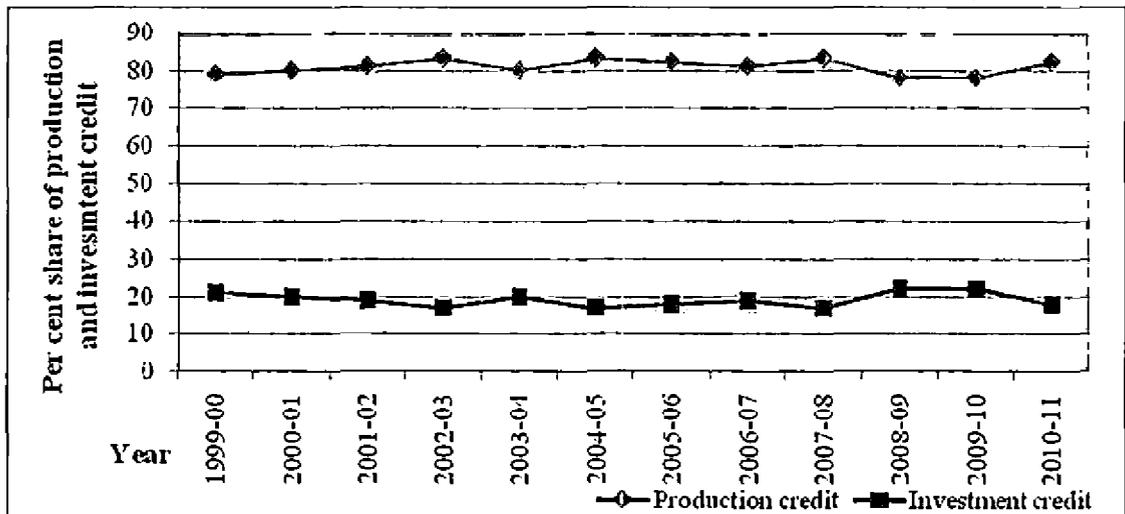
The purpose – wise credit flow to agriculture in Kerala depicts the same pattern as revealed at all India level, even though the classification of credit is slightly different (Fig. 4.6, 4.7 and 4.8). Medium term and long term loans represented by investment credit receives only around 20 per cent of total credit. This implies that institutional credit is available to farmers at all India level and in Kerala mostly for short term purposes by way of production credit. Co-operatives, commercial banks and RRBs are not keen to provide long term loans or investment credit.

Having examined the source – wise and purpose – wise flow of credit to agriculture in India and Kerala, the next section is devoted for the core objective of the study, viz., impact of institutional credit on agricultural production in India and Kerala.

4.3 Impact of institutional credit on agricultural production: India and Kerala

The impact of institutional credit on agricultural production in India and Kerala has been examined separately using Cobb-Douglas production function. First the impact at all India level is done, followed by that in Kerala. A trend analysis of the variables selected for Cobb-Douglas production function will help to have an idea about the general behaviour of these variables considered for the study. Hence the first part of this section is earmarked for the analysis of the trend and pattern of the variables selected for the Cobb-Douglas production function.

4.3.1 Analysis of trend and pattern of variables for Cobb-Douglas production function

In the new millennium, the challenges in Indian agricultural sector are quite different from those met in the previous decades. The enormous pressure to produce more food from less land with shrinking natural resources is a tough task for the farmers. The domestic foodgrain production has been believed to rise by achieving higher productivity through improved farming practices, expansion of irrigation, better seeds and the extensive and balanced use of fertilisers. To keep up the momentum of growth, a careful economic evaluation of inputs like seeds, fertilisers, irrigation sources etc. are of considerable importance, which is done in this section. Hence to start with the analysis of impact of institutional credit on agricultural production, the variables selected for the Cobb-Douglas production function are explained, followed by trend analysis of these variables.

4.3.1.1 Variables for Cobb-Douglas production function

The important variables considered for Cobb-Douglas production function for India are, gross domestic product from agriculture and allied activities (in Rs. crore, AGDP), institutional credit (in Rs. crore, IC), gross cropped area (in million ha, GCA), agricultural labour force (in million persons), fertiliser consumption (in lakh tones), availability of seeds (in lakh quintals), electricity consumption for agricultural purposes (in MKWh) and net irrigated area (in thousand ha). For Kerala, all these variables except availability of seeds are considered, for which uniform data are not available throughout the study period. A brief explanation of these variables is given in this section followed by their trend analysis. Since

institutional credit, the independent variable, has already been discussed at length, the same is not explained here.

(i) Agricultural Gross Domestic Product (AGDP): Agriculture plays an important role in economic development, such as provision of food to the nation, enlarging exports, transfer of manpower to non-agricultural sectors, contribution to capital formation, and securing markets for industrialization. Agricultural development is an integral part of overall economic development. The Indian Economy comprises of several important sectors which contribute to total national product. But by far, agriculture is the main stay of Indian economy and prosperity of agriculture can significantly contribute to the general prosperity of the nation. The progress made by agriculture in the last five decades has been one of the biggest success stories of India. Agriculture and allied activities constitute the single largest contributor to the Gross Domestic Product, almost 33 per cent of it. This increase in agricultural production has been brought about by bringing additional area under cultivation, extension of irrigation facilities, the use of improved high yielding variety of seeds, better techniques evolved through agricultural research, water management, and plant protection through use of fertilisers, pesticides and cropping practices.

(ii) Gross cropped area: This represents the total area sown once and more than once in particular year i.e., the area is counted as many times as there are sowings in a year. This total area is also known as total cropped area or total area sown.

(iii) Agricultural labour force: One of the most distinguishing features of the rural economy in India has been the growth in the number of agricultural workers, cultivators and agricultural labourers engaged in crop production. Agricultural workers constitute the most neglected class in Indian rural structure. Their income is low and employment is irregular. The Prime Minister's speech made in Lok Sabha on August 4, 1966 emphasised that special consideration must be given to the landless agricultural labour. It was pointed out that although there had been tremendous progress in India since independence, this was one section, which had really a very hard time and which deserved very special consideration. The First Agricultural Labour Enquiry Committee, 1950-55 defined agricultural labourer as "those people who are engaged in raising crops on payment of wages". The Second

Agricultural Labour Enquiry Committee, 1956-57 enlarged the definition to include those who are engaged in other agricultural occupations like dairy, farming, horticulture, raising of live-stock, bees, poultry etc. In the context of Indian conditions the definition is not adequate, because it is not possible to completely separate those working on wages throughout the year but only for a part of it. According to the National Commission on Labour "agricultural labourer is one who is basically unskilled and unorganised and has little for its livelihood, other than personal labour." According to Mishra and Puri, "all those persons who derive a major part of their income as payment for work performed on the farms of others can be designated as agricultural workers. For a major part of the year they should work on the land of the others on wages."

At the all India level, approximately 60 per cent of the rural labour force and 45 per cent of the urban labour force is self employed. Rural causal labour constitutes the single largest segment of the total work force in India. Among rural casual labourers, agricultural labourers occupy a predominant position. Most of the workers engaged in agriculture are highly under-employed with very low levels of income. Agriculture is a labour intensive activity. Cost of cultivation data shows that labour accounts for more than 40 per cent of the total variable cost of production in most cases. Therefore, availability of labour to work in agriculture is crucial in sustaining agricultural production.

(iv) Availability of Seeds: Seeds are the basic and critical input for agricultural production. The Indian Seeds Programme recognises three generations of seeds, namely, breeder, foundation, and certified seeds. In Indian agriculture, multiplication, distribution and availability of good quality seeds is crucial to accelerated agricultural production. With entry of Multi National Corporations (MNCs) in seed production and distribution and consequent effects of patenting under the WTO regime, providing quality seeds to farmer at an affordable cost will be a measure challenge in future.

(v) Fertiliser consumption: Fertilisers are a key input in agriculture. Fertiliser use was started in the country with the initiation of the planning process in the early 1950s. It plays an important role in the growth and productivity of agriculture as was recognized way back in the mid sixties. Fertiliser plays a very crucial role to ensure good production. However, only

small quantities were consumed during the initial years. This was changed during the Green Revolution era when the high yielding variety of seeds, irrigation, fertiliser, and credit brought about increased food production. India has emerged as the third largest producer and consumer of fertilisers in the world. But, India, an agriculture centric country, has a lower per hectare fertiliser consumption.

Though a major producer of fertiliser, distribution of fertiliser was very much skewed across in our country. The Indian fertiliser scenario largely discusses the issues of primary nutrients – N, P and K - to be precise. The consumption pattern across India was also as diverse as the geopolitical nature of the nation. North and South India dominates in fertiliser consumption, where it is found to be more than 100 kg/ha. Among the many fertilisers available, urea accounts for most of the consumption of nitrogen and di-ammonium phosphate for most of the phosphate group.

(vi) Electricity consumption for agricultural purposes: There is a growing demand for electrical energy for irrigation requirements in India. Electrical utilities of many states have been facing acute power shortage which has led to unrest in the last few decades; the underground water levels have been falling down drastically and cultivated area has been increasing by cutting down the forests. Hence there is growing demand for electrical energy for irrigation. The generation of electricity is not growing proportionately to the growing demand for it.

(vii) Net irrigated area: Recently water has become a core issue for discussion of any development and resource utilisation talks. This is because the demand for water from various sectors is ever rising but the water availability in the country remains more or less fixed. Among various sectors, agriculture is the largest water consuming sector and its share total water utilisation is around 80 per cent.

India accounts for the largest irrigated area in the world and still over 60 per cent of its cropped area is fed by rain and it contributes substantially to the production of coarse cereals, pulses, and oil seeds. Two-thirds of country's population is dependent on agriculture which faces a bleak future, in the event of deficient rains. Indian agriculture is the biggest

user of water in the world, and about 80 million ha of area is under irrigation. Thirty eight per cent of the total cultivated area is under irrigation.

The details of the above discussed variables for the period 1984-85 to 2007-08 used for the Cobb-Douglas production function in India with CAGR for the two sub periods are depicted in Table 4.6.

Table 4.6 Variables for Cobb-Douglas production function in India, 1984-85 to 2007-08

Year	AGDP (in Rs. core)	IC (in Rs. crore)	GCA (in million ha)	Agricultural labour force (in million persons)	Fertiliser consumption (in lakh tones)	Availability of seeds (in lakh quintals)	Electricity consumption (in MKWh)	Net irrigated area (in thousand ha)
1984-85	73989	9495	176	63.14	82.11	48.50	20960	42145
1985-86	79294	11257	179	65.05	84.74	55.00	23422	41865
1986-87	85108	10024	177	66.95	86.45	55.83	29444	42569
1987-88	94677	12283	177	68.87	87.84	56.30	35267	42892
1988-89	116925	12323	181	70.78	110.40	56.80	38878	46248
1989-90	129222	13246	181	72.69	115.68	57.03	44056	46702
1990-91	150800	12833	186	74.60	125.46	57.10	50321	48023
1991-92	176166	13994	182	77.82	127.28	57.50	58557	49867
1992-93	197569	15239	185	81.04	121.55	60.33	63328	50296
1993-94	229172	26113	186	84.26	123.66	62.20	70699	51452
1994-95	263895	32660	188	87.48	135.63	65.86	79301	53001
1995-96	286946	42929	187	90.70	138.76	69.92	85732	53402
1996-97	345020	46664	190	93.92	143.08	73.27	84019	55112
1997-98	366125	50773	191	97.14	161.88	78.79	91242	55173
1998-99	420486	57303	193	100.36	167.98	84.97	97195	57436
1999-00	446515	133688	190	103.58	180.69	87.98	90934	57143
2000-01	449565	147114	185	106.80	167.02	86.27	84729	55133
2001-02	486617	150557	188	110.02	173.59	91.80	81673	56922
2002-03	472060	170195	176	113.24	160.94	98.03	84486	53871
2003-04	532342	191946	190	116.46	167.99	109.27	87089	56959
2004-05	565426	248603	192	119.68	183.99	120.26	88555	59206
2005-06	637772	311329	193	122.90	203.40	126.75	90292	60411
2006-07	722984	374753	193	126.12	216.51	155.01	99023	61707
2007-08	836518	393962	196	129.34	225.70	179.05	104182	62286
CAGR 1st Sub-period	0.1266	0.1508	0.0025	0.0333	0.0502	0.0310	0.1377	0.0203
CAGR 2nd Sub- period	0.093	0.1946	0.0041	0.0300	0.0414	0.0815	0.0164	0.0129

Source: www.rbi.org.in; Agricultural Statistics at a Glance; www.indiastat.com; CMIE, Various Issues

Table 4.6 shows that AGDP has been consistently increasing in India in all the years except during 2002-03, while institutional credit has decreased in 1986-87 and 1990-91 compared to the previous year. There has been decrease in gross cropped area in many years, which is reflected in the lowest CAGR among all the variables at 0.25 per cent and 0.41 per cent respectively during the first and second sub periods. Agricultural labour force is the only variable which has consistent increase throughout the study period, but at a very low rate, which is also evident from the low CAGR of 3.33 per cent and 3.0 per cent during the two sub periods. Institutional credit is having the highest growth rate during the entire study period among all variables, followed by electricity in the first sub period and AGDP in the first and second sub periods. IC has the highest CAGR of 19.46 per cent in the second sub – period. Electricity consumption for agricultural purposes in India showed a downward move during second sub period. Fertiliser consumption in India turned down in the second sub period as revealed by the low CAGR during the period compared to the first sub period. Availability of seeds in India marked an improvement in second sub period. Net irrigated area also marked decline in the second sub period in India.

The variables for the Cobb-Douglas production function for finding out the impact of institutional credit on agricultural production in Kerala is presented in Table 4.7. As already stated, the variables for Kerala include all those for India excluding seed availability, for which data is not available for the full study period. For Kerala the study period is 1990-91 to 2007-08, divided into two sub periods of nine years each.

Table 4.7   Variables for Cobb-Douglas production function in Kerala, 1990-91 to 2007-08

Year	AGSDP (in Rs. crore)	IC (in Rs. crore)	GCA (in thousand ha)	Agricultural labour force (in thousand persons)	Fertiliser consumption (in lakh tones)	Electricity consumption for agricultural purposes (in MKWh)	Net irrigated area (in thousand ha)
1990-91	3873	806	3020	1999	2.44	207.60	333
1991-92	5761	820	3021	1961	2.24	224.10	333
1992-93	5933	914	3046	1923	2.03	235.20	334
1993-94	7984	954	3043	1885	1.78	261.20	324
1994-95	9723	1198	3048	1847	1.99	271.50	358
1995-96	11791	1333	3067	1810	2.03	321.90	342
1996-97	13210	1597	3021	1772	1.87	329.10	357
1997-98	13263	1534	2969	1734	2.19	340.80	350
1998-99	13931	1927	2917	1696	1.82	354.10	375
1999-00	15179	2432	3002	1658	2.11	375.10	380
2000-01	14219	2907	3022	1621	1.74	350.20	381
2001-02	14944	2861	2992	1583	1.76	187.48	377
2002-03	16001	3514	2970	1545	2.05	184.00	379
2003-04	16986	4549	2954	1508	1.92	188.10	384
2004-05	20844	6854	2996	1470	2.02	200.30	393
2005-06	24019	9152	2986	1432	2.02	190.50	401
2006-07	25758	11906	2918	1394	2.14	221.20	392
2007-08	27459	15960	2761	1356	2.08	240.80	388
CAGR 1st Sub-period	0.153	0.161	-0.0038	-0.018	-0.017	0.058	0.014
CAGR 2nd Sub-period	0.078	0.265	-0.0061	-0.025	0.015	-0.042	0.0038

Source: Statistics for Planning, Economic Review, www.indiastat.com, CMIE.

With respect to the variables selected for the Cobb Douglas production function, a different picture is seen in the case of Kerala, compared to the all India figures. In the case of India, none of the variables showed a negative growth during the study period, although there have been decline in the second sub period in the case of AGSDP, agricultural labour force, fertiliser consumption, electricity consumption, and net irrigated area. But in the case of Kerala, all variables except IC, fertiliser consumption and net irrigated area are showing a

declining CAGR in the second sub period, of which GCA, agricultural labour force and electricity consumption are showing negative growth rate. Negative growth rate in GCA implies that area under cultivation is getting reduced in Kerala. Non – availability of labour force in agriculture, which is a major constraint in Kerala, is revealed by its negative growth rate throughout the study period. As in the case of India, AGSDP has decreased in the second sub period in the case of Kerala also. In brief, the agricultural scenario in Kerala as revealed by the variables selected is in a poor position compared to the all India picture.

4.3.1.2 Institutional credit for agriculture as percentage of AGDP: India and Kerala

One of the indicators for analysing the trend and pattern of agricultural credit is to relate credit to AGDP. In other words, the progress of agricultural credit can be evaluated by using this yardstick. Hence in this section, IC of India and Kerala, one of the independent variables in the Cobb-Douglas production function is related to AGDP of India and Agricultural Gross State Domestic Product (AGSDP) of Kerala respectively. Table 4.8 depicts the behaviour of institutional credit as per cent of AGDP over the period 1984-85 to 2007-08 in India.

Table 4.8 Institutional credit as a per cent of AGDP in India, 1984-85 to 2007-08

(in Rs. crore)

Year	AGDP	Institutional credit			Institutional credit as a per cent of AGDP		
		Direct	Indirect	Total	Direct	Indirect	Total
1984-85	73989	6167	3328	9495	8	4	12
1985-86	79294	7159	4098	11257	9	5	14
1986-87	85108	7720	2304	10024	9	3	12
1987-88	94677	9198	3085	12283	10	3	13
1988-89	116925	9371	2952	12323	8	3	11
1989-90	129222	10628	2618	13246	8	2	10
1990-91	150800	10188	2645	12833	7	2	9
1991-92	176166	11386	2608	13994	6	1	7
1992-93	197569	12529	2710	15239	6	1	7
1993-94	229172	15013	11100	26113	7	5	12
1994-95	263895	18773	13887	32660	7	5	12
1995-96	286946	23692	19237	42929	8	7	15
1996-97	345020	25778	20886	46664	7	6	13
1997-98	366125	27798	22975	50773	8	6	14
1998-99	420486	32477	24826	57303	8	6	14
1999-00	446515	45033	88655	133688	10	20	30
2000-01	449565	47801	99313	147114	11	22	33
2001-02	486617	54216	96341	150557	11	20	31
2002-03	472060	65175	105020	170195	14	22	36
2003-04	532342	83427	108519	191946	16	20	36
2004-05	565426	105302	143301	248603	19	25	44
2005-06	637772	144022	167307	311329	23	26	49
2006-07	722984	189514	185239	374753	26	26	52
2007-08	836518	194953	199009	393962	23	24	47
CAGR 1st Sub period	0.127	0.134	0.177	0.151			
CAGR 2nd Sub period	0.093	0.192	0.215	0.203			

Source: www.rbi.org.in

Institutional credit as percentage of AGDP which was in single digit till 1998-99 is showing a sizeable proportion only from 1999-'00. But it is noteworthy that the share of indirect credit to AGDP which was always less than the share of direct credit to AGDP got almost doubled in 1999-'00 and 2000-01. Thereafter it was more than or equal to the proportion of direct agricultural credit to AGDP. This implies that the increased disbursement of institutional credit for agriculture in mainly contributed by the increase in indirect credit to agriculture. The highest CAGR of 17.70 per cent and 21.50 per cent for indirect credit in the first and second sub periods also reveal the prominence of indirect credit

in the total IC. But when IC as a whole is considered, there is tremendous increase in the share of it to AGDP in India, which is encouraging.

Institutional credit with split up on direct and indirect credit, as a percentage of AGDP of India is graphically presented in Fig 4.10

Fig. 4.10 Institutional credit as a per cent of AGDP in India
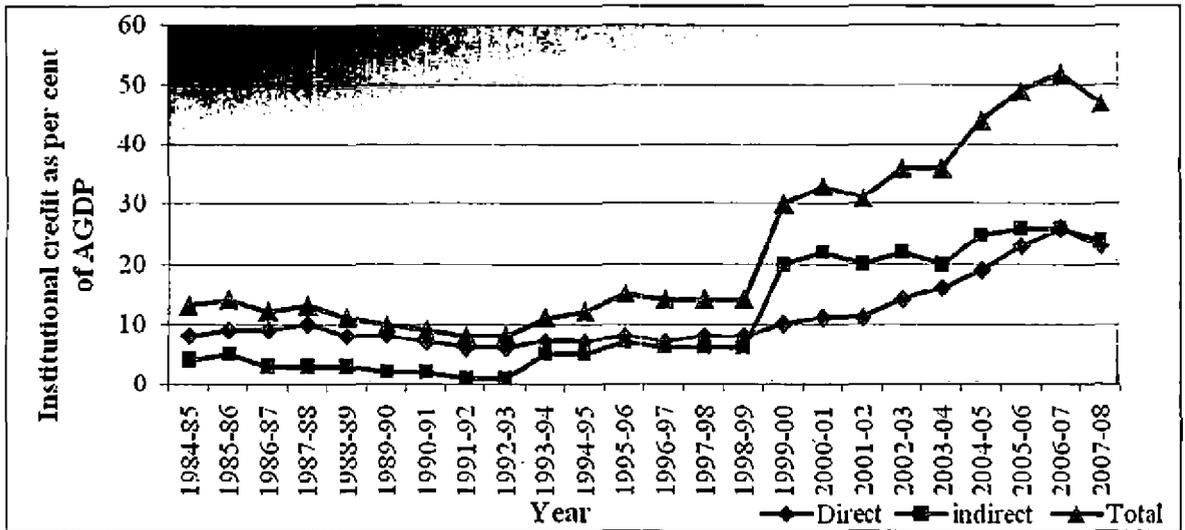
A steep increase in the share of IC to AGDP is evident in the year 1999-00, which, as already stated is due to the increase in indirect credit to agriculture especially though the co-operatives. In the recent years direct credit has almost become equal to indirect credit, thanks to the efforts of SCBs and RRBs.

As far as institutional credit in Kerala is concerned, separate data on direct and indirect credit for the entire study period are not available. Hence the total institutional credit as a percentage of AGSDP of Kerala is considered and presented in Table 4.9.

Table 4.9 Institutional credit as per cent of AGSDP of Kerala, 1990-91 to 2007-08

(in Rs. crore)

Year	AGSDP	Institutional Credit	Institutional credit as a percentage of AGSDP
1990-91	3873	806.00	20.81
1991-92	5761	820.00	14.23
1992-93	5933	914.00	15.41
1993-94	7984	954.00	11.95
1994-95	9723	1198.00	12.32
1995-96	11791	1333.00	11.31
1996-97	13210	1597.00	12.09
1997-98	13263	1534.12	11.57
1998-99	13931	1927.13	13.83
1999-00	15179	2431.72	16.02
2000-01	14219	2906.65	20.44
2001-02	14944	2861.05	19.15
2002-03	16001	3514.00	21.96
2003-04	16986	4549.00	26.78
2004-05	20844	6854.36	32.88
2005-06	24019	9152.13	38.10
2006-07	25758	11906.00	46.22
2007-08	27459	15960.00	58.12
CAGR 1st Sub-period	0.153	0.161	-
CAGR 2nd Sub- period	0.078	0.265	-

Source: Economic Review, Various issues

The percentage share of IC to AGSDP of Kerala is showing a mixed trend from 1990-91 till 2001-02, ranging between 11 per cent and 20 per cent, after which it has been continuously increasing displaying a tremendous rise. But this increase in share of IC to AGSDP of Kerala can be attributed not only to the increase in IC, but also to the lower rate of growth in AGSDP. The CAGR of AGSDP for the first sub period is 15.30 per cent while for the second sub period it is only 7.8 per cent. The same for IC is 16.10 per cent and 26.50 per cent respectively. Since the rate of growth of IC is higher than the rate of AGSDP of Kerala, the share of IC to AGSDP is still higher for Kerala. Institutional credit as percentage of AGSDP of Kerala for the period 1990-91 to 2007-08 is graphically depicted in Fig. 4.11

Fig. 4.11 Institutional credit as a percentage of AGSDP in Kerala
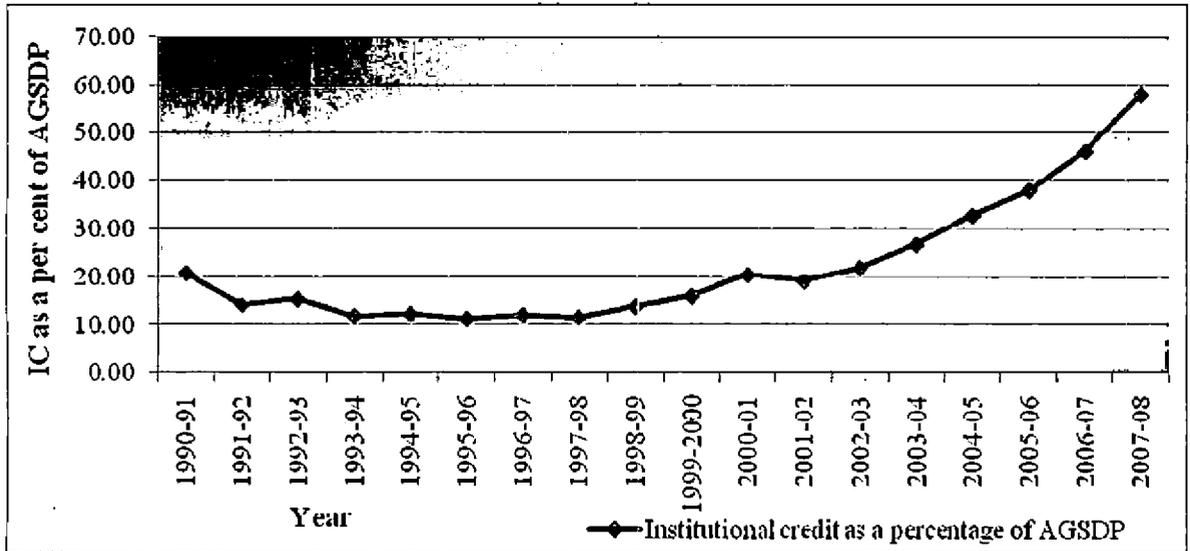
The steep increase in the percentage share of IC to AGSDP of Kerala from the year 2003-04 is quite evident from Fig. 4.11. A better understanding about the reason behind this steep increase can be obtained from the analysis of the growth pattern of variables selected for Cobb-Douglas production function in Kerala which is done in Table 4.11.

4.3.1.3 Growth pattern of variables for Cobb-Douglas production function: India and Kerala

Before fitting the Cobb-Douglas production function, Mann-Whitney U Test was done to find out whether the growth in all other independent variables is in accordance with the growth in IC. For this the annual growth rate over the previous year was calculated for the dependent variable AGDP and all the independent variables including IC for both India and Kerala. The growth rate of all variables for the period 1984-85 to 2007-08 for India is given in Table 4.10.

Table 4.10 Growth rates of variables for Cobb-Douglas production function: India, 1984-85 to 2007-08

Year	AGDP	Institutional credit			GCA	Agricultural labour force	Fertiliser consumption	Seed availability	Electricity consumption	Net irrigated area
		Direct	Indirect	Total						
1984-85	7.84	17.60	22.71	19.34	-2.76	3.12	6.50		14.95	0.47
1985-86	7.17	16.07	23.17	18.56	1.70	3.03	3.20	13.40	11.75	-0.66
1986-87	7.33	7.85	-43.79	-10.95	-1.12	2.94	2.02	1.51	25.71	1.68
1987-88	11.24	19.14	33.90	22.54	0.00	2.85	1.61	0.84	19.78	0.76
1988-89	23.50	1.88	-4.31	0.33	2.26	2.77	25.68	0.89	10.24	7.82
1989-90	10.52	13.41	-11.31	7.49	0.00	2.70	4.78	0.40	13.32	0.98
1990-91	16.70	-4.14	1.031	-3.12	2.62	2.63	8.45	0.12	14.22	2.83
1991-92	16.82	9.92	5.67	9.05	-1.88	4.32	1.45	0.70	16.37	3.84
1992-93	12.15	11.88	-3.04	8.90	1.78	4.14	-4.50	4.92	8.15	0.86
1993-94	16.00	19.83	309.59	71.36	0.50	3.97	1.74	3.10	11.64	2.30
1994-95	15.15	25.04	25.11	25.07	0.88	3.82	9.68	5.88	12.17	3.01
1995-96	8.73	26.20	38.52	31.44	-0.79	3.68	2.31	6.16	8.11	0.76
1996-97	20.24	8.38	9.09	8.70	1.60	3.55	3.11	4.79	-2.00	3.20
1997-98	6.12	8.26	9.48	8.81	0.54	3.43	13.14	7.53	8.60	0.11
1998-99	14.85	16.11	8.93	12.86	1.08	3.31	3.77	7.84	6.52	4.10
1999-00	6.19	39.46	254.33	133.30	-1.50	3.21	7.57	3.54	-6.44	-0.51
2000-01	0.68	5.97	12.11	10.04	-2.32	3.11	-7.57	-1.94	-6.82	-3.52
2001-02	8.24	12.69	-2.62	2.34	1.59	3.01	3.93	6.41	-3.61	3.24
2002-03	-2.99	21.25	8.49	13.04	-6.75	2.93	-7.29	6.79	3.44	-5.36
2003-04	12.77	28.00	3.33	12.78	8.26	2.84	4.38	11.47	3.08	5.73
2004-05	6.21	26.22	32.05	29.52	0.77	2.76	9.52	10.06	1.68	3.94
2005-06	12.79	36.77	16.75	25.23	0.79	2.69	10.55	5.40	1.96	2.04
2006-07	13.36	31.59	10.72	20.37	0.09	2.62	6.45	22.30	9.67	2.15
2007-08	15.70	2.87	7.43	5.13	1.35	2.55	4.24	15.51	5.21	0.94

Agricultural labour force is the only variable which is continuously showing a positive growth without any negative value throughout the study period. The increase in agricultural labour force is also steady at around two to four per cent during the study period. The highest growth rates are reflected in IC, though there are negative growth rates in 1986-87 and 1990-91. Even AGDP, the dependant variable is showing a negative growth rate in 2002-03 compared to the previous year. Gross cropped area is having the highest negative growth rates ranging between -6.75 and 8.26 per cent. The major reason for the decline in gross cropped area was the drought in the year 2002. Rainfall deficiency dropped to 51 per cent surpassing all previous droughts. The 2002 monsoon was one of the shortest in recorded history. The drought had its impact not only on GCA, but also on AGDP, GCA, fertiliser consumption, and net irrigated area during 2002-03.

The pattern of annual growth rates of all variables for Cobb Douglas production function in India are graphically presented in Fig. 4.12 to 4.19

Fig. 4.12 Trend in annual growth rate of AGDP in India, 1984-85 to 2007-08
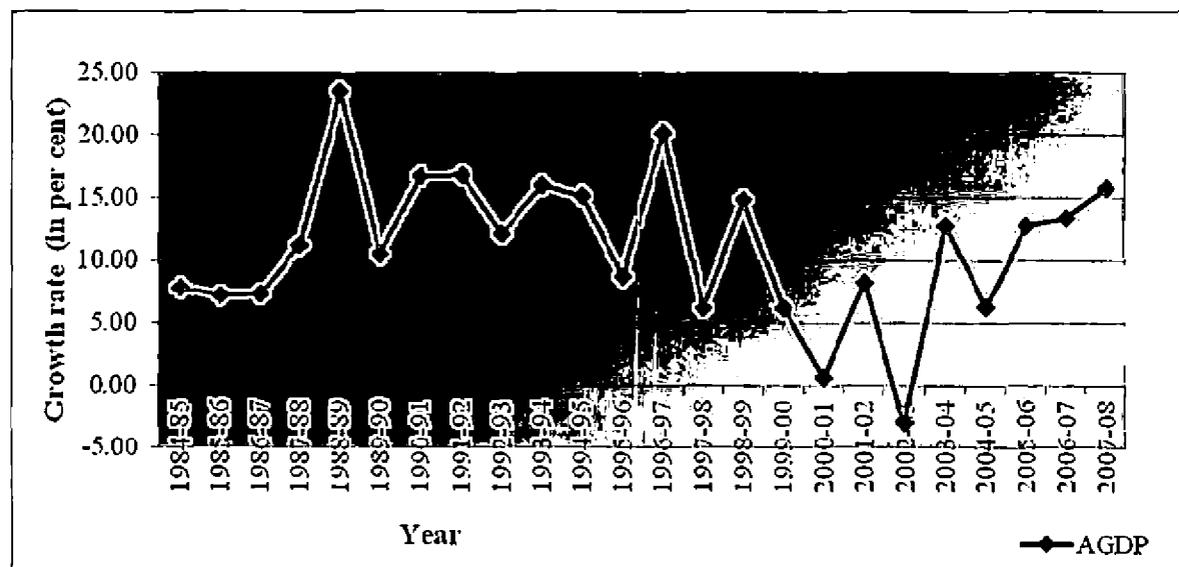
Fig. 4.12 indicates a fluctuating trend in the growth rate of AGDP in India. It has been negative in the year 2002-03. Foodgrain production dropped by 29 million tones to 183 million tones as against 212 million tones in 2001. No other drought in the past led to such a

drop in food production as the 2002 drought. In the last three years a steady increase is seen in the growth rate of AGDP.

Fig. 4.13 Trend in annual growth rate of institutional credit in India, 1984-85 to 2007-08
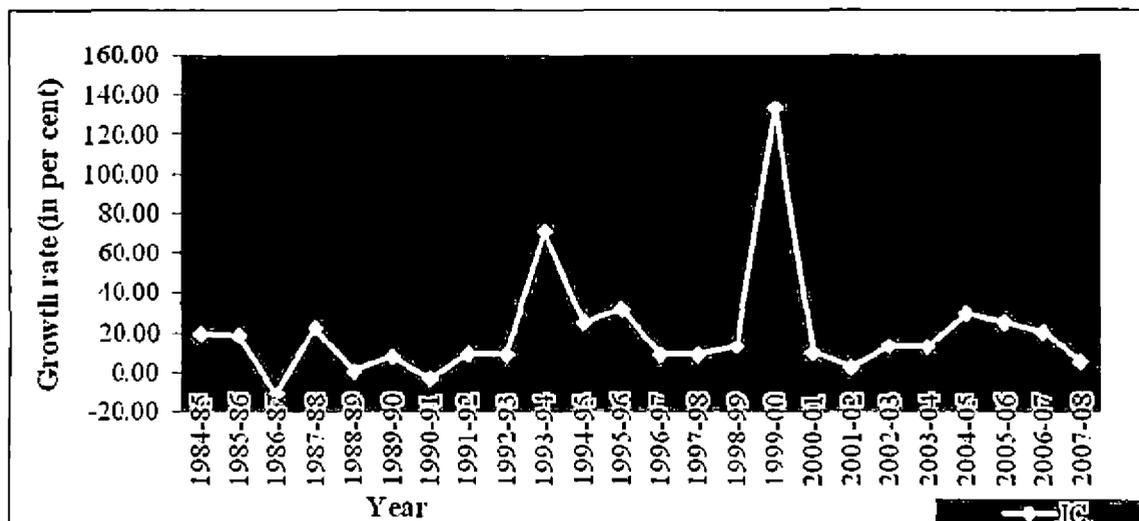
Fig. 4.13 shows that there is steep increase in the growth rate of instituional credit in the years 1993-94 and 1999-00, compared to the other years. Both these can be attributed to the increase in credit flow to agriculture by co-operatives by way of indirect credit. In 1993-94, the share of co-operatives in total credit flow increased to 71 per cent compared to 56 per cent in the previous year. It is to be noted that the share of direct credit decreased from 76 per cent in 1992-93 to 46 per cent in 1993-94, while that of indirect credit increased from 24 per cent to 54 per cent during the same period. In 1999-'00, the share of co-operatives was 81 per cent compared to 63 per cent during the previous year. Direct credit decreased from 42 per cent to 24 per cent, while indirect credit increased from 58 per cent to 76 per cent during the same period. (Table 4.1 and 4.2).

Fig. 4.14 Trend in annual growth rate of GCA in India, 1984-85 to 2007-08
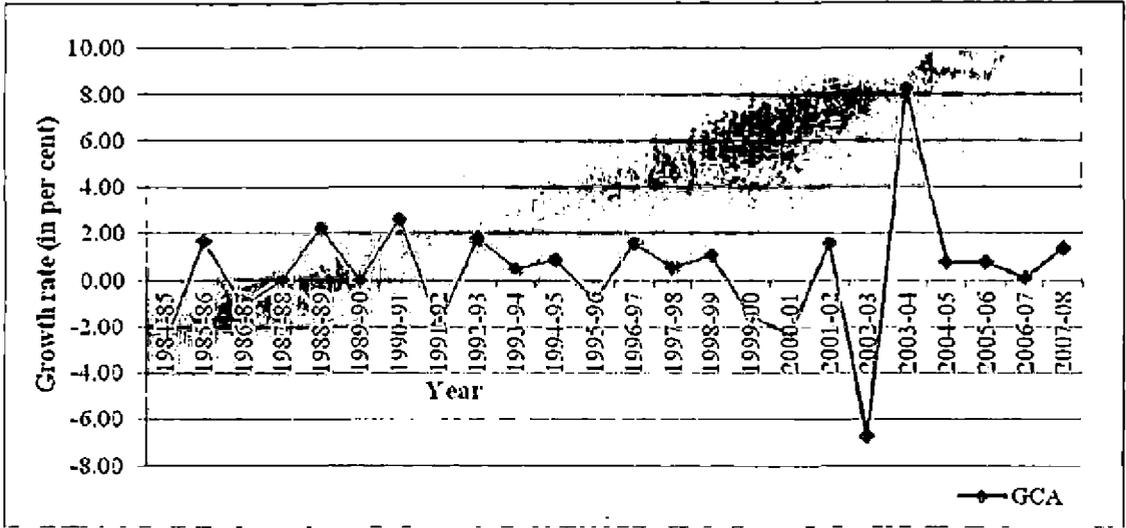
As per Fig. 4.14, GCA in India has not marked any significant growth over the years. It could be seen that in the year 2002-03, GCA marked the lowest growth of -6.75 per cent in which year AGDP in India was also found negative. It was estimated that over 18 million ha of cropped area were left unsown during the Kharif season of the year due to the drought, mentioned earlier. The per cent fall of Kharif crop acreage, as compared to the normal, was the highest in Kerala (-59.3 %), followed by Rajasthan (- 40.9 %), Tamil Nadu (-27.3%), and Uttar Pradesh (-19.4%) (PACS, n.d).

Fig. 4.15 Trend in annual growth rate of agricultural labour force in India, 1984-85 to 2007-08
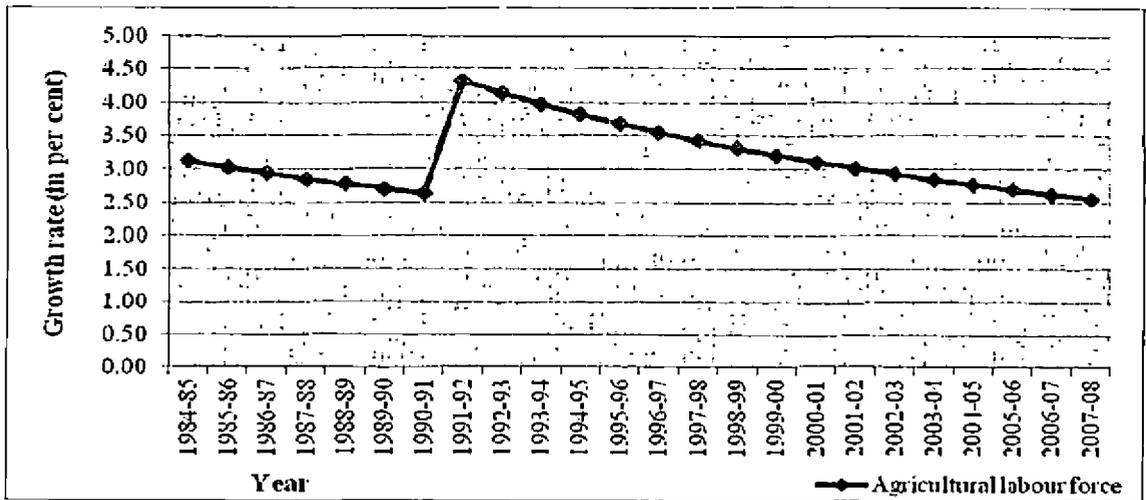
Even though agricultural labour force is showing a positive growth throughout the study period (Table 4.10), it is showing a steady but declining trend since 1991-92.

Fig. 4.16 Trend in annual growth rate of fertiliser consumption in India, 1984-85 to 2007-08
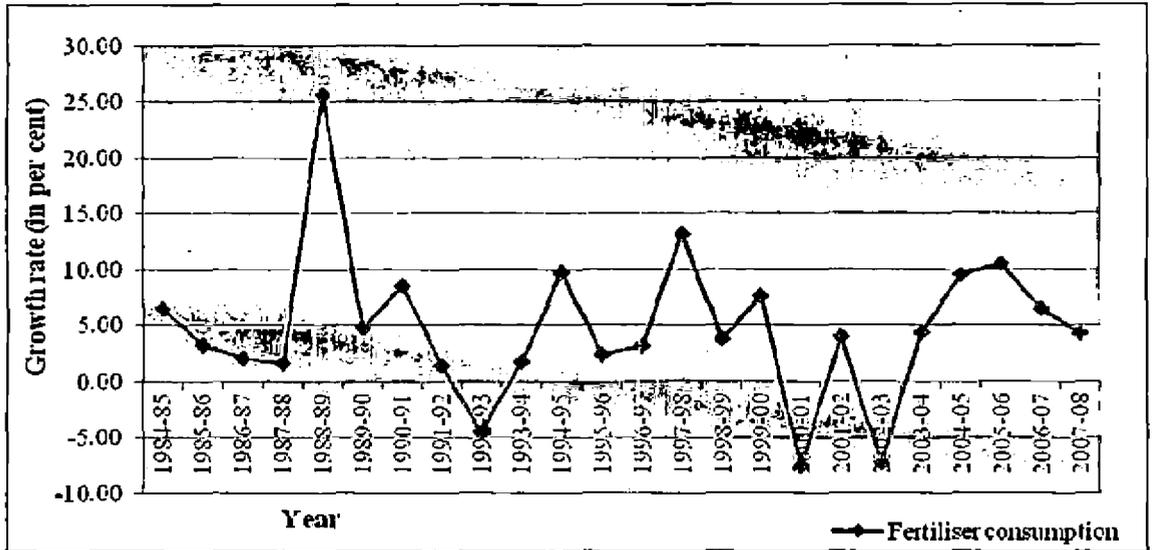
Fertiliser consumption is showing negative growth rates in 1992-93, 2000-01 and 2002-03. Out of these, GCA also is having negative growth in 2000-01 and 2002-03 (Fig. 4.14). Naturally, when the cropped area gets reduced, the fertiliser consumption also gets reduced.

Fig. 4.17 Trend in annual growth rate of seed availability in India, 1984-85 to 2007-08
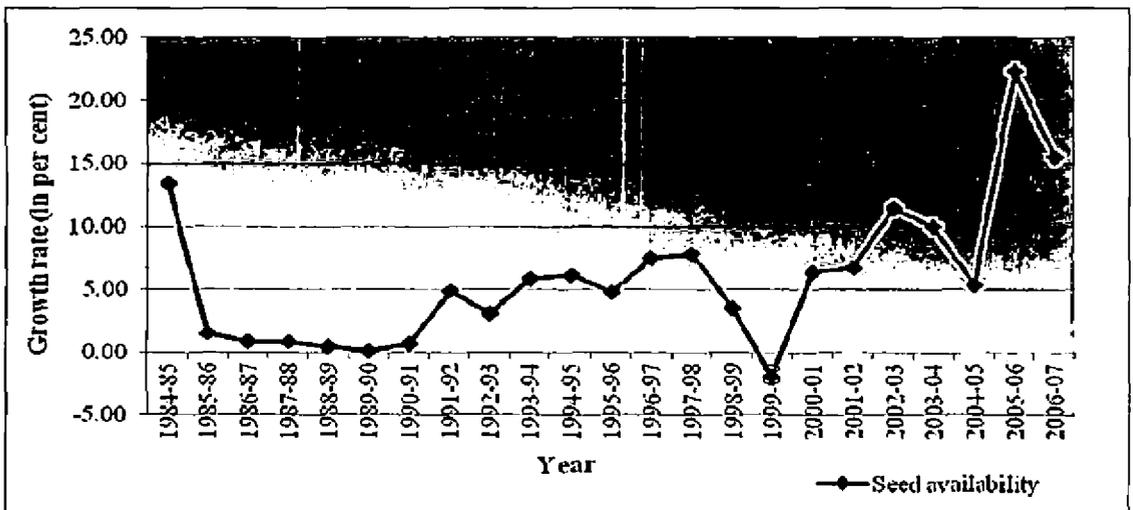
Seed availability is showing negative growth rate in 1999-00. It is to be noted that in the same year, GCA and fertilser comsumption were also negative. (Fig. 4.14 and4.16).

Fig. 4.18 Trend in annual growth rate of electricity consumption in India, 1984-85 to 2007 -08
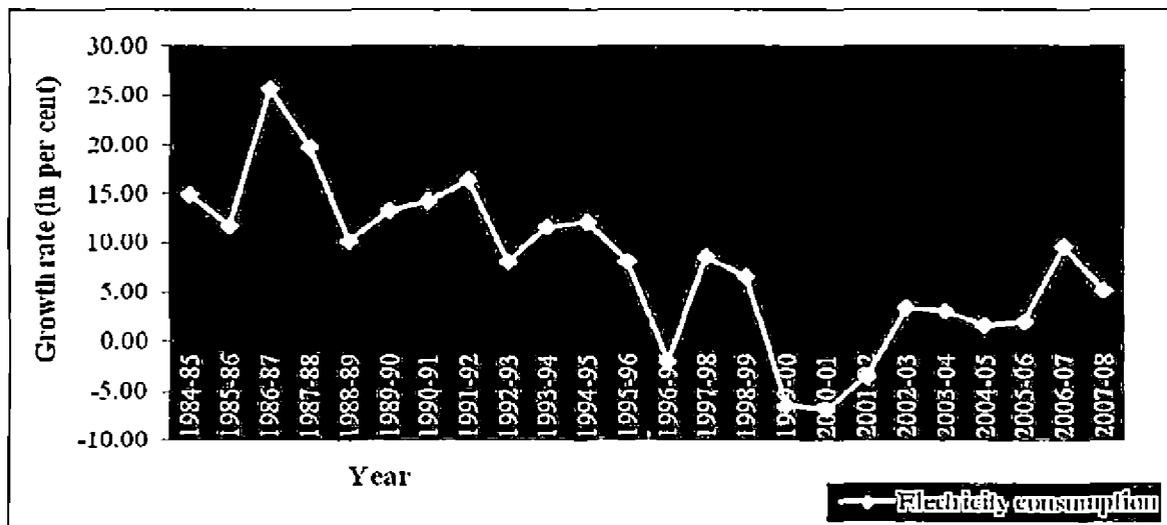
Electricity consumption is having negative growth rates in 1996-97, 1999-'00, 2000-01 and 2001-02 of which during 2000-01, GCA, seed availability and fertiliser consumption also had negative growth rates. Any stress on the water situation as in a drought can have serious consequences in the power availability for consumption purposes. In 1995-96, the increase in energy consumption in the agricultural sector could be explained in terms of changing cropping pattern, in favour of cash crops and the preferences, priorities and concessions extended to agricultural connections. In 1998-99 due to policy measures of the State Governments, subsidised power supplies to agricultural consumers were introduced (Planning Commission, 2001). Electricity consumption in the agriculture sector has been increasing mainly because of greater irrigation demand for new crop varieties and subsidised electricity to this sector. Due importance is not given to proper selection, installation, operation and maintenance of pump-sets as a result of which they do not operate at the desired level of efficiency, leading to huge waste of energy.

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Fig.4.19 Trend in annual growth rate of net irrigated area in India, 1984-85 to 2007-08
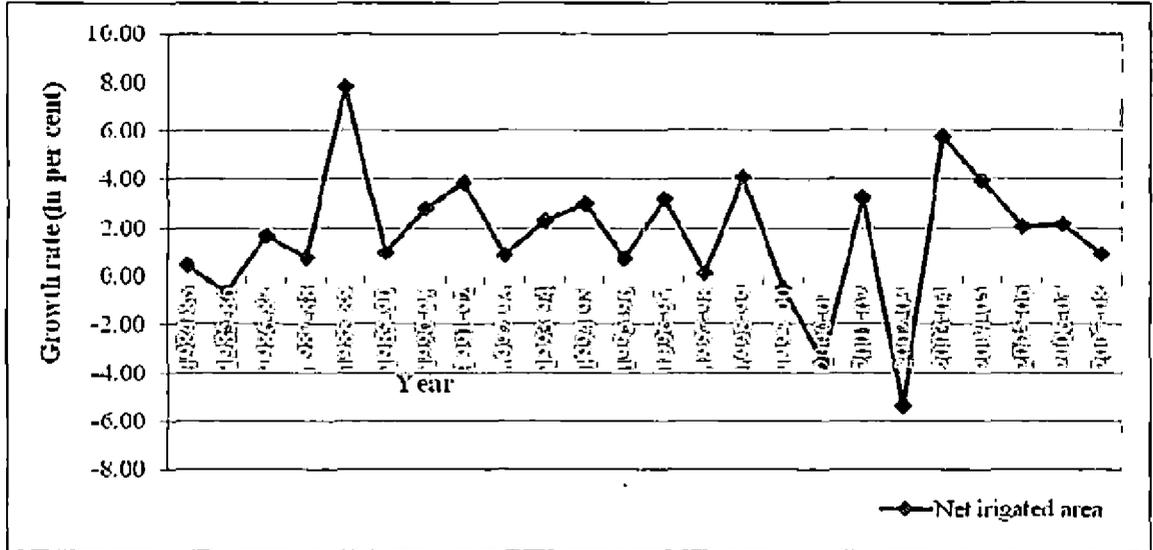
Net irrigated area is having negative growth rate in 1985-86, 1999-00, 2000-01, and 2002-03. The trend of negative growth rate in GCA, seed availability, fertiliser consumption and electricity consumption during 1999-00 is repeated in the case of net irrigated area also.

Having discussed the pattern of growth of all variables selected for Cobb Douglas production function in India, it is attempted to analyse the variables for Kerala, which is presented in Table 4.11. As already stated, all variables for India except seed availability for which uniform data for the entire study period is not available, is selected for Kerala.

Table 4.11 Growth rates of variables selected for Cobb-Douglas production function: Kerala

Year	Growth rates (in per cent)						
	AGSDP	IC	GCA	Agricultural labour force	Fertiliser consumption	Electricity consumption	Net irrigated area
1990-91		60.50	0.03		15.09	-2.40	0.91
1991-92	48.75	1.74	0.03	-1.89	-8.20	7.95	0.00
1992-93	2.99	11.46	0.83	-1.93	-9.38	4.95	0.30
1993-94	34.57	4.38	-0.10	-1.97	-12.32	11.05	-2.99
1994-95	21.78	25.58	0.16	-2.01	11.80	3.94	10.49
1995-96	21.27	11.27	0.62	-2.05	2.01	18.56	-4.47
1996-97	12.03	19.80	-1.50	-2.09	-7.88	2.24	4.39
1997-98	0.40	-3.94	-1.72	-2.13	17.11	3.56	-1.96
1998-99	5.04	25.62	-1.75	-2.18	-16.89	3.90	7.14
1999-00	8.96	26.18	2.91	-2.23	15.93	5.93	1.33
2000-01	-6.32	19.53	0.67	-2.26	-17.54	-6.64	0.26
2001-02	5.10	-1.57	-0.99	-2.33	1.15	-46.46	-1.05
2002-03	7.07	22.82	-0.74	-2.39	16.48	-1.86	0.53
2003-04	6.16	29.45	-0.54	-2.45	-6.34	2.23	1.32
2004-05	22.71	50.68	1.42	-2.51	5.21	6.49	2.34
2005-06	15.23	33.52	-0.33	-2.57	0.00	-4.89	2.04
2006-07	7.24	30.09	-2.28	-2.64	5.94	16.12	-2.24
2007-08	6.60	34.05	-5.38	-2.71	-2.80	8.86	-1.02

Agricultural labour force is the single variable which has a negative growth throughout the study period. In not even a single year, there is positive growth in the case of labour force. This is in sharp contrast to the all India situation where there is no negative growth in labour force in any of the years, even though it is steadily declining since 1991-92. The lack of availability of labourers to do agricultural operations in Kerala is underlined here. In the case of India it is seen that GCA, seed availability, fertiliser consumption, electricity consumption and net irrigated area are having negative growth rate during 1999-00. But in the case of Kerala, all these variables have a positive growth rate. But the trend of negative growth rate in GCA in India during 2002-03 is seen in the case of Kerala also. (Table 4.10). The pattern of annual growth rates of all variables for Cobb-Douglas production function in Kerala are graphically presented in Fig. 4.20 to 4.25

Fig. 4.20 Trend in annual growth rate of AGSDP in Kerala, 1990-91 to 2007-08
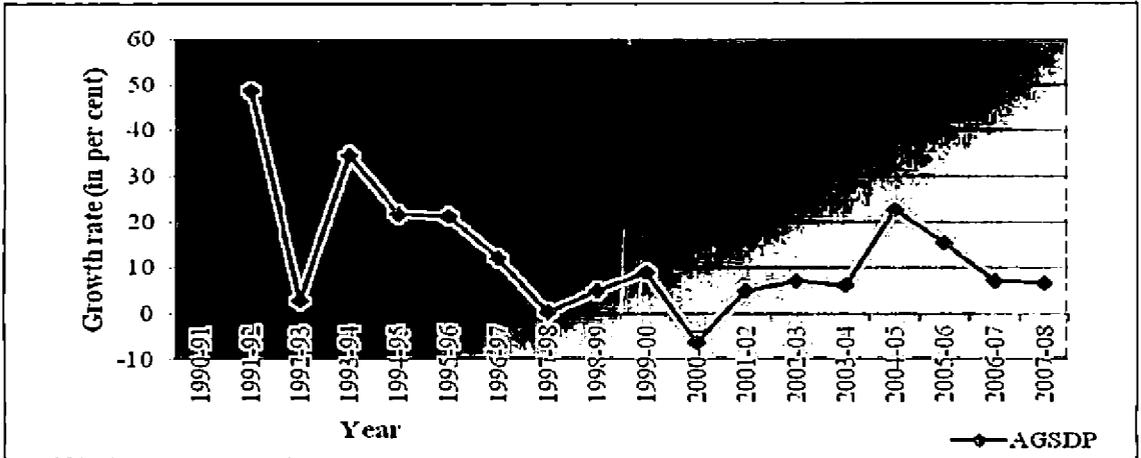
Fig. 4.20 indicates a negative trend in the growth rate of AGDP in Kerala except for certain years. It has been negative in the year 2000-01. As already indicated, foodgrain production in India dropped by 29 million tones to 183 million tones as against 212 million tones in 2001. A reflection of this is seen in Kerala also.

Fig. 4.21 Trend in annual growth rate of institutional credit in Kerala, 1990-91 to 2007-08
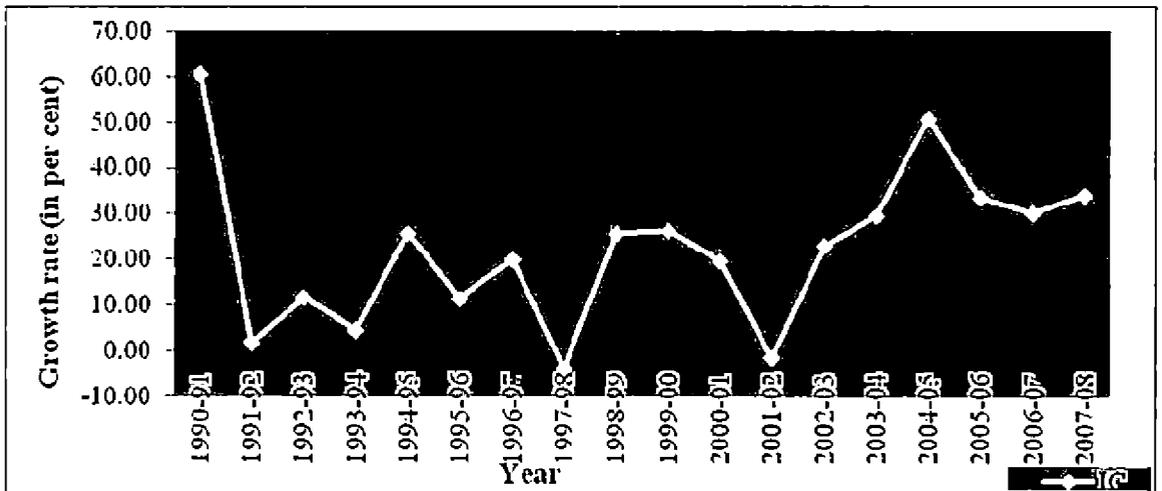
Fig. 4.21 reveals a declining rate of growth in IC in Kerala during 1997-98 and 2001-02. Both these can be attributed to the decline in the credit flow to agriculture by SCBs. In both these years the growth in disbursement of credit by commercial banks has been negative (Table 4.3).

Fig. 4.22 Trend in annual growth rate of GCA in Kerala, 1990-91 to 2007-08
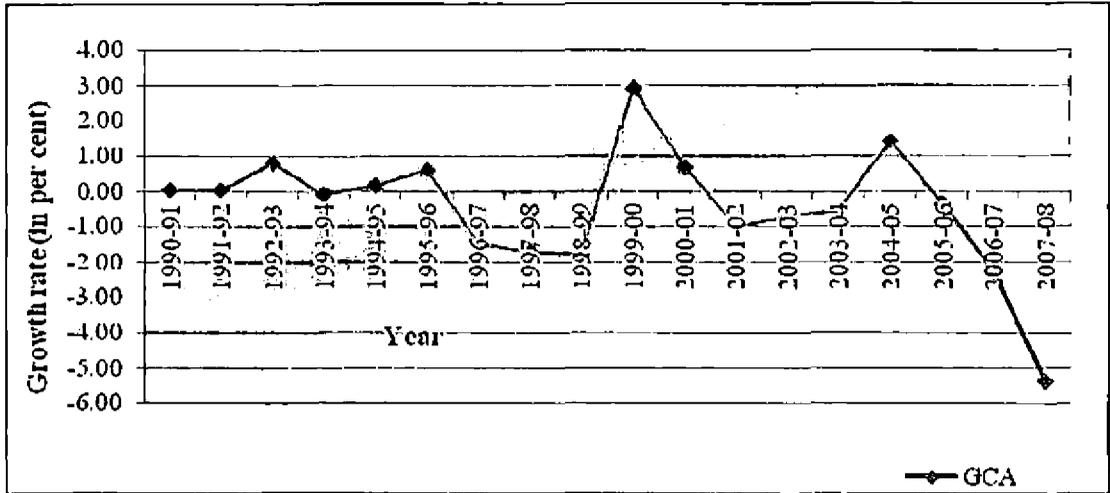
Out of the 18 years under observation, only eight years had positive growth in GCA compared to the previous year. GCA is declining fast in Kerala since 2004-05.

Fig. 4.23 Trend in annual growth rate of agricultural labour force in Kerala, 1990-91 to 2007-08
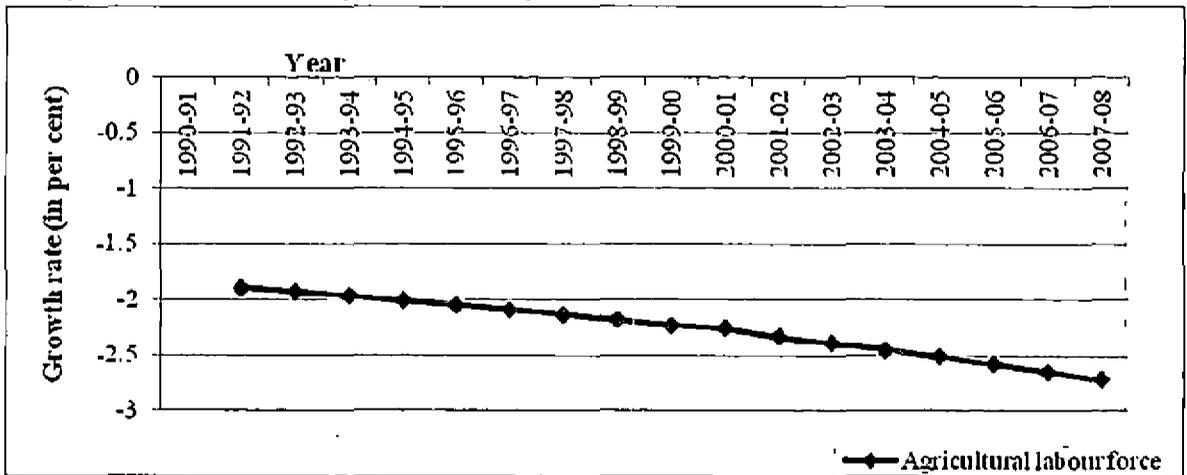
As evident from Fig. 4.23, agricultural labour force has been consistently declining in Kerala with negative growth rate throughout the study period.

Fig. 4.24 Trend in annual growth rate of fertiliser consumption in Kerala, 1990-91 to 2007-08
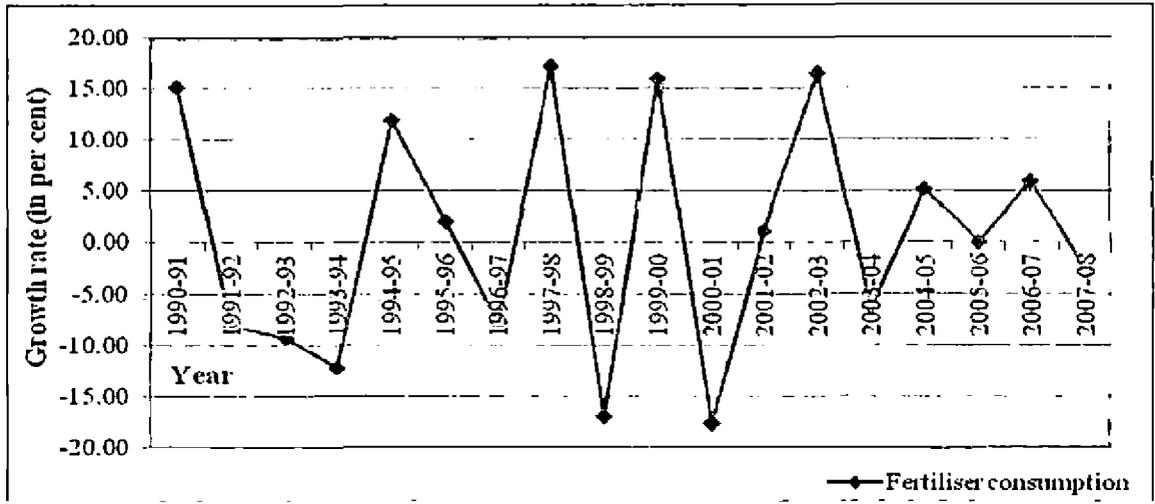
As per Fig. 4.24, fertiliser consumption in Kerala is showing a highly fluctuating trend with both positive and negative growth rates in between. The highest negative growth is in 2000-01, in which year agricultural labour force, electricity consumption and moreover, AGSDP were negative. Even GCA and net irrigated area had only a nominal growth in these years. Since AGSDP is dependent on these inputs, the negative growth in these inputs will be reflected in AGSDP also.

Fig.4.25 Trend in annual growth rate of electricity consumption in Kerala, 1990-91 to 2007-08
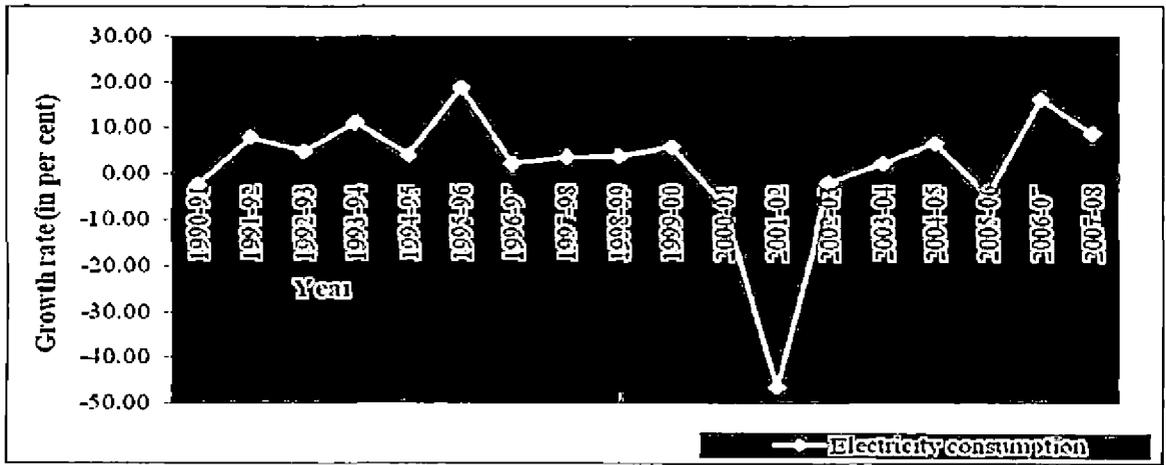
Electricity consumption is having the highest negative growth rate in 2001-02, in which year IC, GCA, agricultural labour force, and net irrigated area are also having negative growth rate.

Fig. 4.26 Trend in annual growth rate of net irrigated area in Kerala, 1990-91 to 2007-08
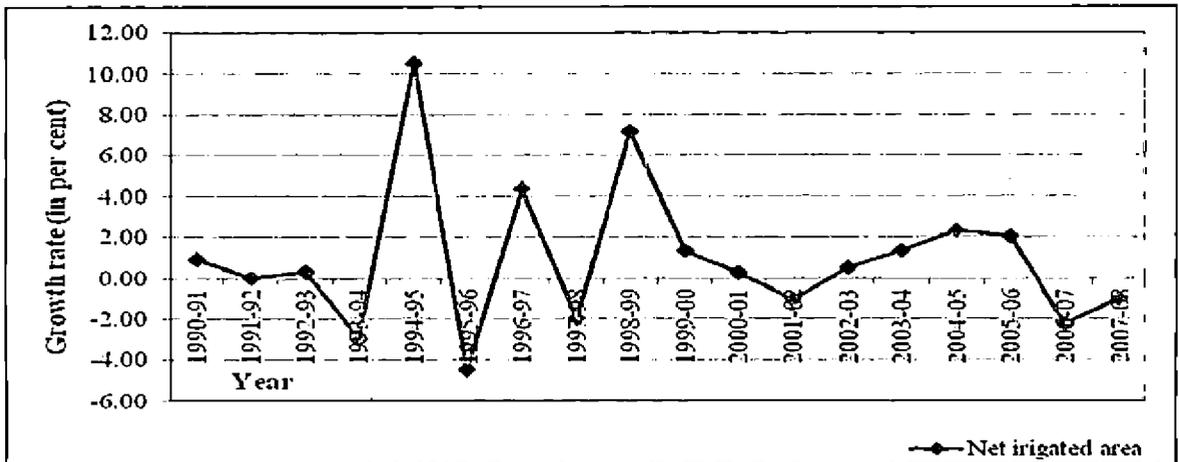
As evident from Fig. 4.26, the growth rate in net irrigated area is not remarkable. The two high growth rates in 1994-95 and 1998-99 are due to negative growth rates in the just preceding years.

To conclude, in Kerala, none of the variables considered for the study has registered significant growth rates over the years. An annual growth rate of AGDP in Kerala was found drastically falling in the year 1992-93 and was even during 1994-95 to 1995-96. The lowest growth was marked in the year 2000-01. It was observed that the highest and lowest growth rate of institutional credit was recorded in the first sub period. With respect to gross cropped area, constant growth was marked during early stages of first sub period and the lowest was found in second sub period. Agricultural labour force was found declining over the entire study period. Consumption of fertilisers in Kerala was also not depicting any significant growth during the study period. And finally, net irrigated area has also not shown any significant growth over the period.

4.3.1.4 Comparison of the growth pattern of variables – Mann-Whitney U Test

After analysing the growth pattern of the dependent variable AGDP and independent variables for India and Kerala, Mann – Whitney U Test has been employed for the pair-wise comparison of the growth pattern of IC and other independent variables to check whether the growth rates in GCA, agricultural labour force, fertiliser consumption, availability of seeds (not taken for Kerala), electricity consumption for agricultural purposes, and net irrigated

area in India and Kerala are moving in par with the growth rate of institutional credit. The results of the Mann-Whitney U Test for India and Kerala are depicted in Table 4.12 and 4.13 respectively.

Table 4.12 Mann-Whitney U Test for India

Variables	Mann Whitney U	Wilcoxon W	Z	Asymp.sig (2 tailed)
CR GCA I	65	365	-4.60	0.000
CR LAB I	96	396	-3.96	0.000
CR FERTI I	133	433	-3.20	0.001
CR SEED I	138	414	-2.78	0.005
CR ELECTRI	193	493	-1.96	0.050
CR IRRIG I	77	377	-4.35	0.000

Table 4.13 Mann-Whitney U Test for Kerala

Variables	Mann Whitney U	Wilcoxon W	Z	Asymp.sig (2 tailed)
CR GCA K	32	203	-4.11	0.000
CR LAB K	17	170	-4.49	0.000
CR FERTI K	46	217	-3.67	0.000
CR ELECTRI K	53	224	-3.45	0.001
CR IRRIG K	39	210	-3.89	0.000

From Table 4.12 and Table 4.13, it could be seen that the growth pattern for IC and other variables was significantly different for both India and Kerala. None of the variables showed that growth rates are moving in par with the growth rates of IC both in India and Kerala. That means, IC disbursed in India and Kerala might not be used for the agricultural purposes alone, for which it was issued. Farmers might have diverted the credit for purposes other than agriculture.

4.3.1.5 Trend and pattern of variables per unit of cropped area: India and Kerala

Examination of flow of institutional credit and other variables per unit of cropped area is an additional tool of analysing trend and pattern and of policy interest to the government. Hence this section is devoted for the analysis of the trend and pattern of the variables selected for Cobb-Douglas production function using the indicators as a proportion of per cropped area in India and Kerala. In India per unit of cultivated/ cropped area is expressed in million hectares (ha) and in Kerala in thousand ha. The variables expressed as a proportion of per unit of cultivated area in India is depicted in Table 4.14.

Table 4.14 Indicators per unit of cropped area in India, 1984-85 to 2007-08

Year	AGDP (in Rs. crore)	IC (in Rs. crore)	Agricultural labour force (in million persons)	Fertiliser consumption (in lakh tones)	Availability of seeds (in lakh quintals)	Electricity consumption (in MKWh)	Net irrigated area (in thousand ha)
1984-85	420.39	53.95	0.3588	0.47	0.28	119.09	239.5
1985-86	442.98	62.89	0.3634	0.47	0.31	130.85	233.9
1986-87	480.84	56.63	0.3783	0.49	0.32	166.35	240.5
1987-88	534.90	69.40	0.3891	0.50	0.32	199.25	242.3
1988-89	645.99	68.08	0.3910	0.61	0.31	214.80	255.5
1989-90	713.93	73.18	0.4016	0.64	0.32	243.40	258.0
1990-91	811.88	69.09	0.4016	0.68	0.31	270.92	258.5
1991-92	966.66	76.79	0.4270	0.70	0.32	321.31	273.6
1992-93	1065.14	82.16	0.4369	0.66	0.33	341.41	271.2
1993-94	1229.33	140.08	0.4520	0.66	0.33	379.25	276.0
1994-95	1403.30	173.67	0.4652	0.72	0.35	421.69	281.8
1995-96	1538.08	230.11	0.4862	0.74	0.37	459.54	286.2
1996-97	1820.27	246.19	0.4955	0.75	0.39	443.27	290.8
1997-98	1921.21	266.43	0.5097	0.85	0.41	478.78	289.5
1998-99	2182.98	297.49	0.5210	0.87	0.44	504.59	298.2
1999-00	2353.30	704.59	0.5459	0.95	0.46	479.26	301.2
2000-01	2425.62	793.75	0.5762	0.90	0.47	457.15	297.5
2001-02	2584.46	799.62	0.5843	0.92	0.49	433.77	302.3
2002-03	2688.58	969.33	0.6449	0.92	0.56	481.18	306.8
2003-04	2800.66	1009.83	0.6127	0.88	0.57	458.18	299.7
2004-05	2951.92	1297.88	0.6248	0.96	0.63	462.32	309.1
2005-06	3303.68	1612.69	0.6366	1.05	0.66	467.72	312.9
2006-07	3741.61	1939.43	0.6527	1.12	0.80	512.47	319.3
2007-08	4271.54	2011.70	0.6605	1.15	0.91	531.99	318.1

AGDP is the only variable per unit of cropped area which has been constantly increasing under both sub periods. All other variables have either a stagnant or decreasing proportion per unit of cropped area in at least one year or more. The trend of the ratio of each of the variables is diagrammatically presented in Fig. 4.27 to 4.33.

Fig. 4.27 Trend of AGDP per million ha of cropped area in India, 1984-85 to 2007-08
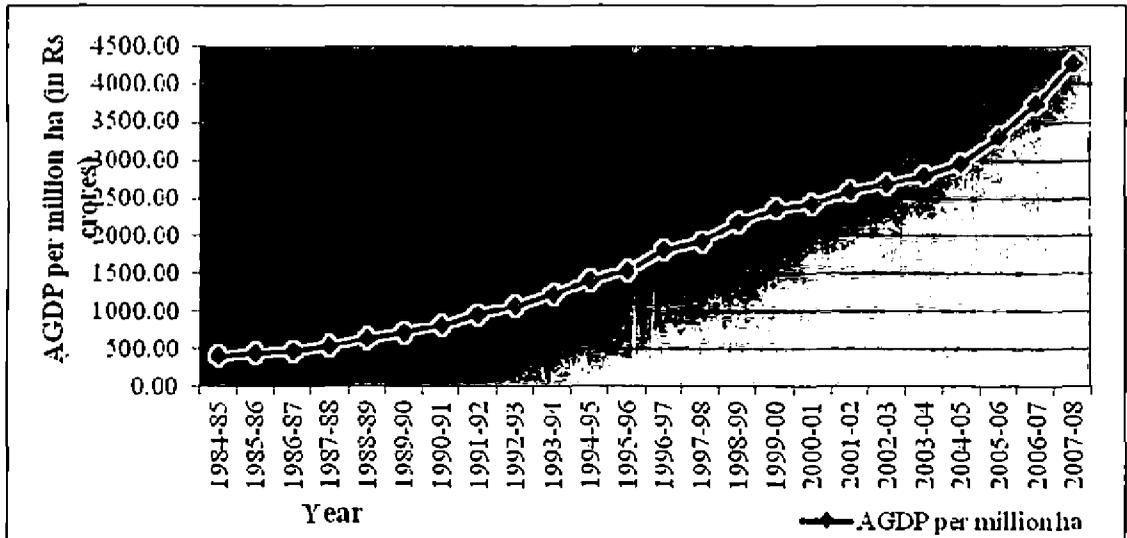
AGDP per million ha is showing a continuous increasing trend in both sub periods in India. It increased from Rs. 420.39 crore per million ha in 1984-85 to Rs. 4271.54 crore per million ha in 2007-08.

Fig. 4.28 Trend of institutional credit per million ha of cropped area in India, 1984-85 to 2007-08
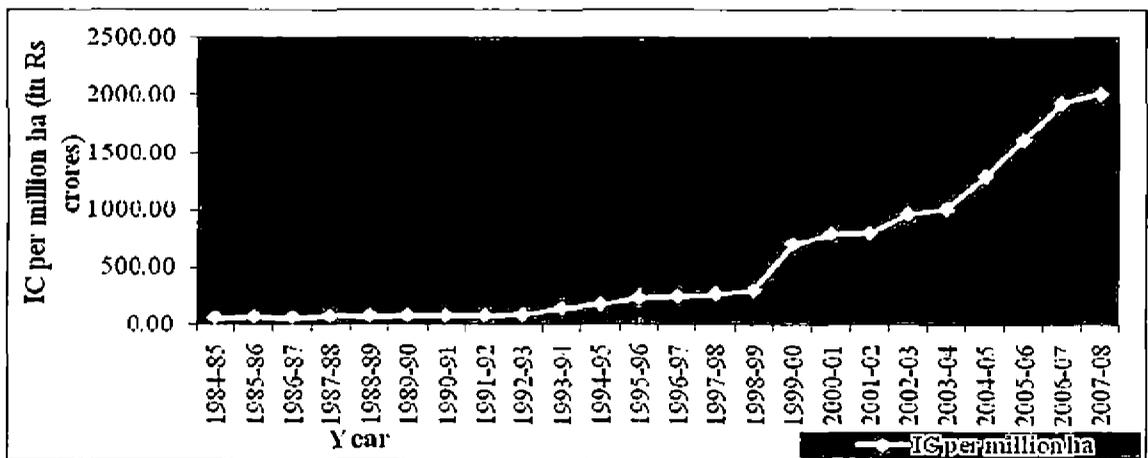
Trend in real agricultural credit in terms of per unit of cropped area is an important scale of measurement to view the progress of agricultural credit. The amount of IC per unit of cropped area was more or less stagnant till 1992-93, after which it started increasing continuously. After 2003-04 onwards, the increase has been tremendous. The increase in total institutional credit per million ha in India can be attributed to the rapid increase in both direct and indirect credit with unchanged level of total cultivated area. Disbursement of institutional credit per cropped hectare has also depicted a similar increasing trend in nominal terms in Pakistan. (Iqbal *et al.*, 2003)

Fig. 4.29 Trend in agricultural labour force per million ha of cropped area in India
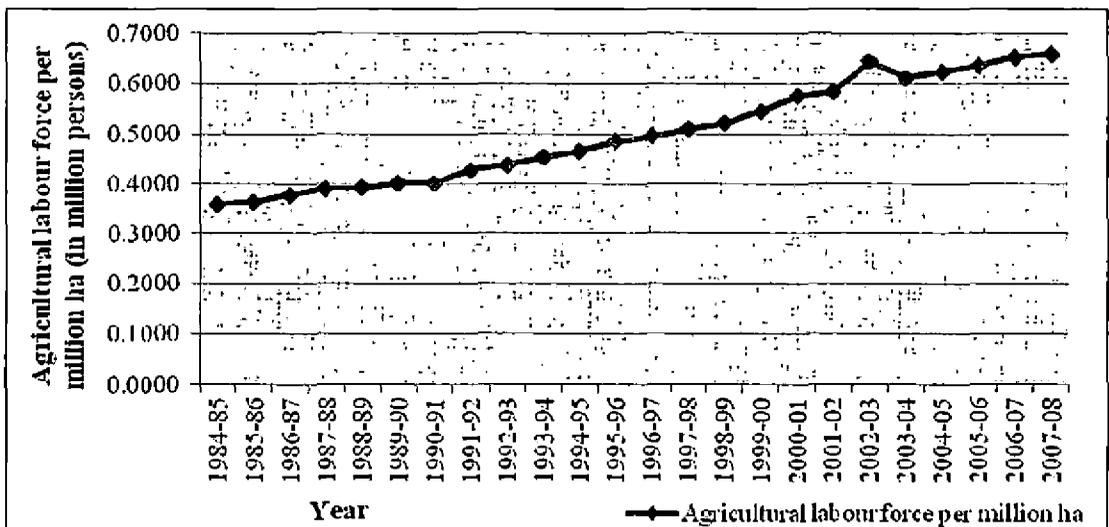
In general, agricultural labour force per million ha in India is showing an increasing trend as revealed by Fig. 4.29. It was stagnant in the year 1990-91 and got reduced in 2003-04 compared to the previous year.

Fig. 4.30 Trend in fertiliser consumption per million ha of cropped area in India, 1984-85 to 2007-08
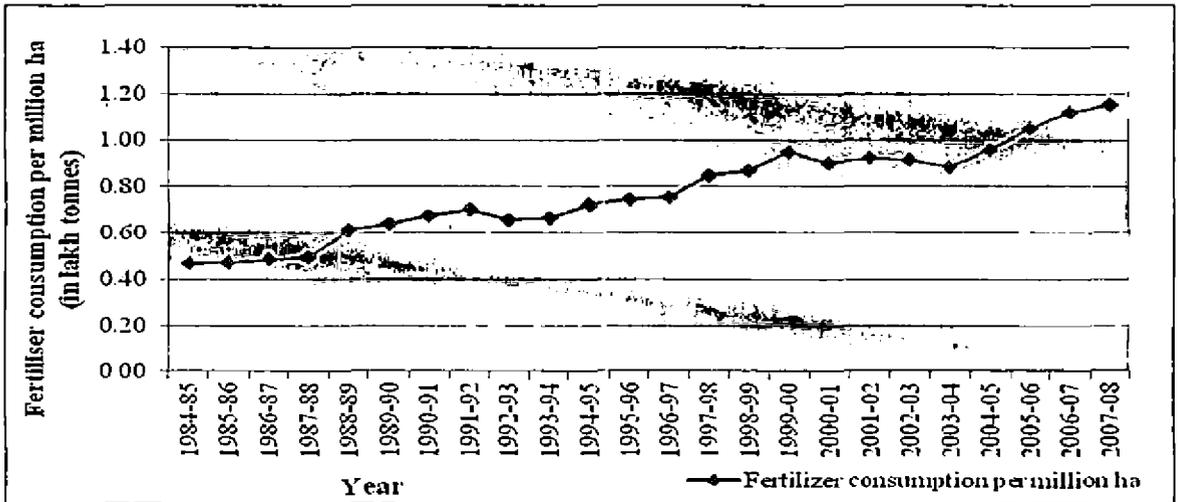
Fertiliser consumption as revealed by Fig. 4.30 is showing a fluctuating, but increasing trend. But the increase has been very limited as compared to instituional credit.

Fig.4.31 Trend in availability of seeds per million ha of cropped area in India, 1984-85 to 2007-08
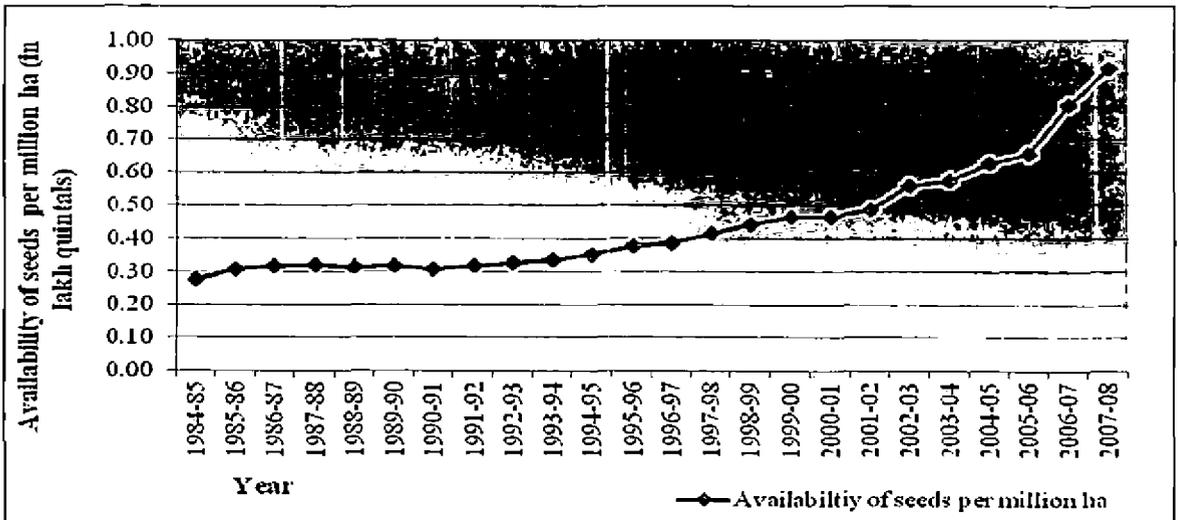
It is clear from Fig. 4.31 that during the first sub period, availability of seeds did not mark any significant increase over the years. By the end of first sub period the situation has changed and availability of seeds available per million ha recorded a sharp increase.

Fig. 4.32 Trend in electricity consumption per million ha of cropped area in India
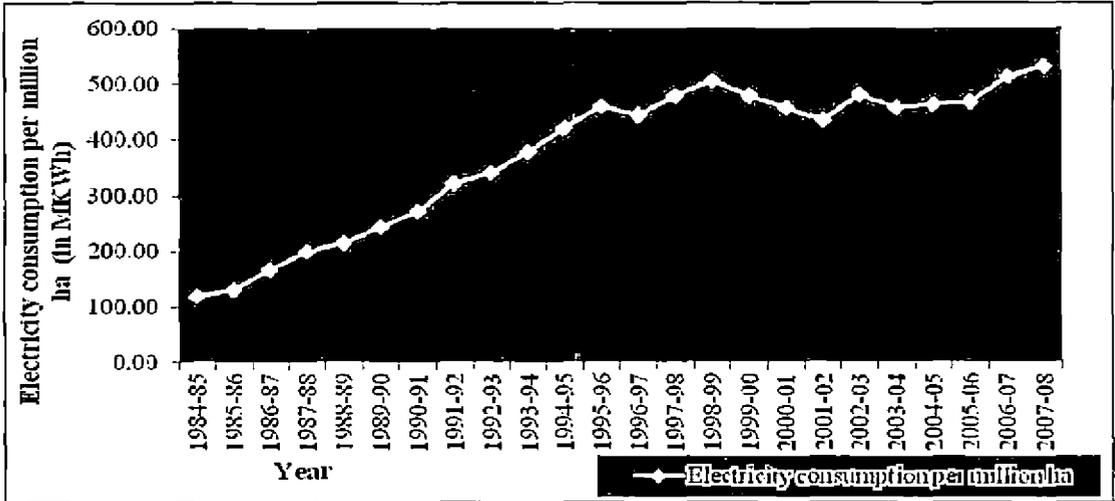
As evident from Fig. 4.32, electricity consumption per million ha of cropped area is showing an increasing trend in the first sub period. The second sub period started with a decline in its consumption followed by a fluctuating trend and got stabilised from 2004-05 onwards.

Fig. 4.33 Trend in net irrigated area per million ha of cropped area in India, 1984-85 to 2007-08
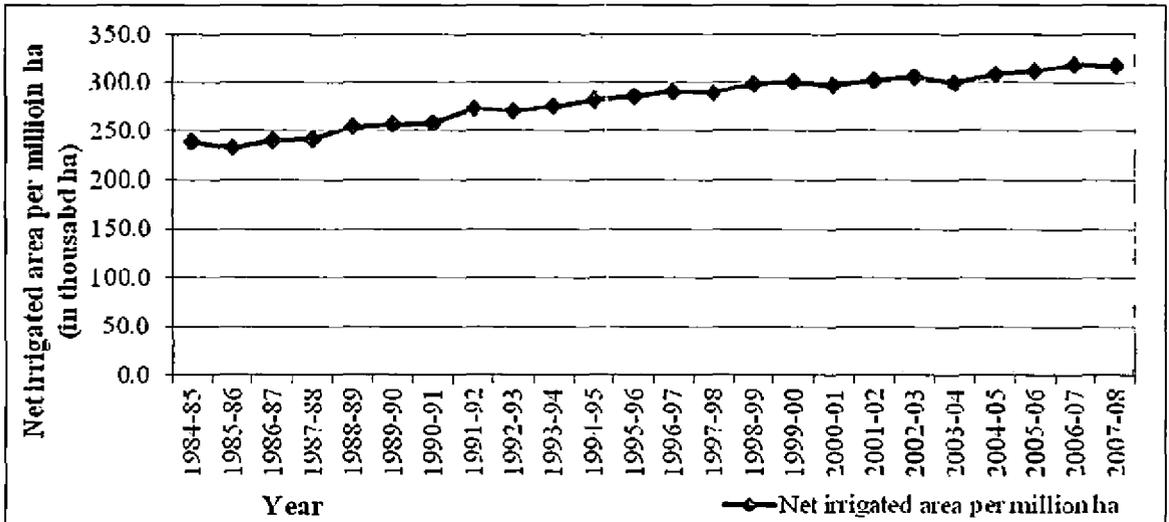
Net irrigated area per unit of cropped area is showing a mixed trend in both the sub periods, though with not a remarkable increase. The second sub period has a lesser rate of growth in the net irrigated area compared to the first sub period.

From the discussion of the trend and pattern of variables per unit of cropped area in India it is concluded that a remarkable increase in per unit of cropped area is seen only in the case of AGDP, IC, agricultural labour force and seed availability. The increase in fertiliser consumption and net irrigated area is not remarkable.

The analysis of the trend and pattern of the variables selected for Cobb-Douglas production function using the indicators as a proportion of per unit of cropped area in Kerala expressed in thousand ha is depicted in Table 4.15.

Table 4.15 Indicators per unit of cropped area in Kerala, 1990-91 to 2007-08

Year	AGSDP (in Rs. crore)	IC (in Rs. crore)	Agricultural labour force (in thousand persons)	Fertiliser consumption (in lakh tones)	Electricity consumption · for agricultural purposes (in MKWh)	Net irrigated area (in thousand ha)
1990-91	1.28	0.27	0.662	0.00081	0.069	0.110
1991-92	1.91	0.27	0.649	0.00074	0.074	0.110
1992-93	1.95	0.30	0.631	0.00067	0.077	0.110
1993-94	2.62	0.31	0.620	0.00058	0.086	0.106
1994-95	3.19	0.39	0.606	0.00065	0.089	0.117
1995-96	3.84	0.43	0.590	0.00066	0.105	0.112
1996-97	4.37	0.53	0.587	0.00062	0.109	0.118
1997-98	4.47	0.52	0.584	0.00074	0.115	0.118
1998-99	4.78	0.66	0.581	0.00062	0.121	0.129
1999-00	5.06	0.81	0.552	0.00070	0.125	0.127
2000-01	4.71	0.96	0.536	0.00058	0.116	0.126
2001-02	4.99	0.96	0.529	0.00059	0.063	0.126
2002-03	5.39	1.18	· 0.520	0.00069	0.062	0.128
2003-04	5.75	1.54	0.510	0.00065	0.064	0.130
2004-05	6.96	2.29	0.491	0.00067	0.067	0.131
2005-06	8.04	3.07	0.480	0.00068	0.064	0.134
2006-07	8.83	4.08	0.478	0.00073	0.076	0.134
2007-08	9.95	5.78	0.491	0.00075	0.087	0.141

The indicators per unit of cropped area in Kerala are showing the same trend of that in absolute amounts as seen already in Table 4.7. There is decline in AGSDP in 2000-01; IC

is constantly increasing throughout the study period; labour force is continuously decreasing except during the last year of study; and fertiliser consumption is having a mixed trend. The trend in the ratio of each of the variables is graphically depicted in Fig. 4.34 to Fig 4.3.39.

Fig.4.34 Trend of AGSDP per thousand ha of cropped area in Kerala, 1990-91 to 2007-08
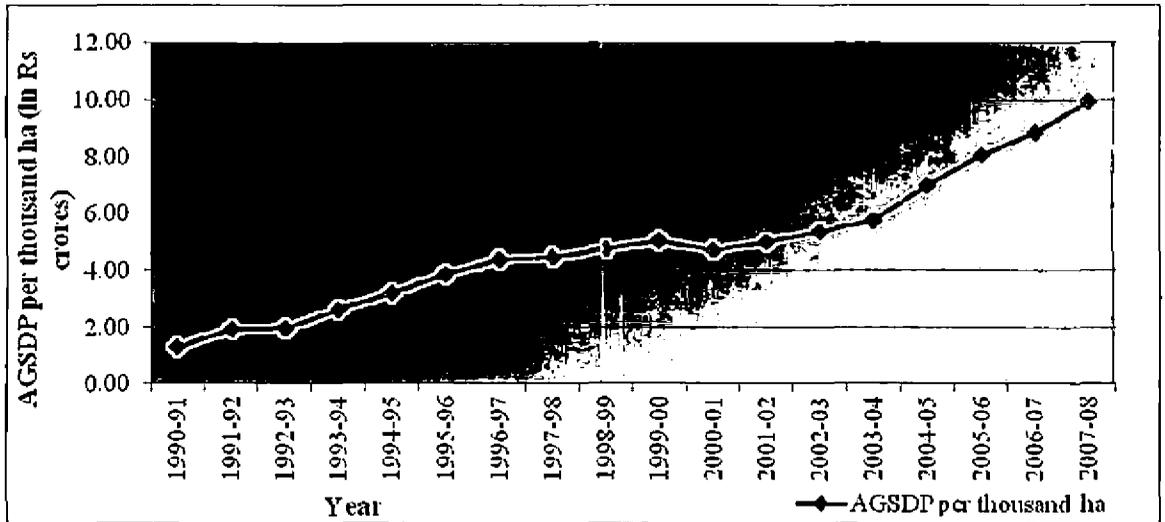
In Kerala, per unit of cultivated/ cropped area is expressed in thousand ha. It is seen from Table 4.15 that AGSDP per unit of cropped area in Kerala has declined in the year 2000-01. Table 4.11 has already revealed that AGSDP for Kerala had a negative growth of 6.32 during 2000-01 compared to the previous year. The GCA for the year shows only a marginal increase over the previous year. Hence it can be implied that the decline in per unit of AGSDP is due to the fall in the absolute amount of it rather than the increase in GCA.

Fig.4.35 Trend of institutional credit per thousand ha of cropped area in Kerala, 1990-91 to 2007-08
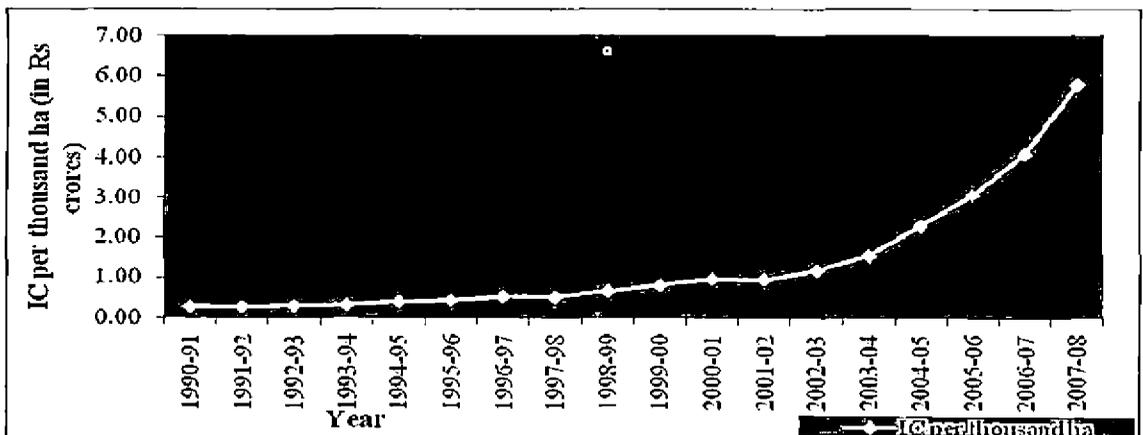
Institutional credit per thousand ha in Kerala also showed an upward trend over the years. Institutional credit per thousand ha marked no increase in 1991-92 from that of previous year. From 1992-93 onwards, it showed an upward trend. The declining trend in IC during 2001-02 (Table 4.7) is nullified in the trend of IC per unit of cropped area due the fall in GCA in the same year.

Fig.4.36 Trend in agricultural labour force per thousand ha of cropped area in Kerala
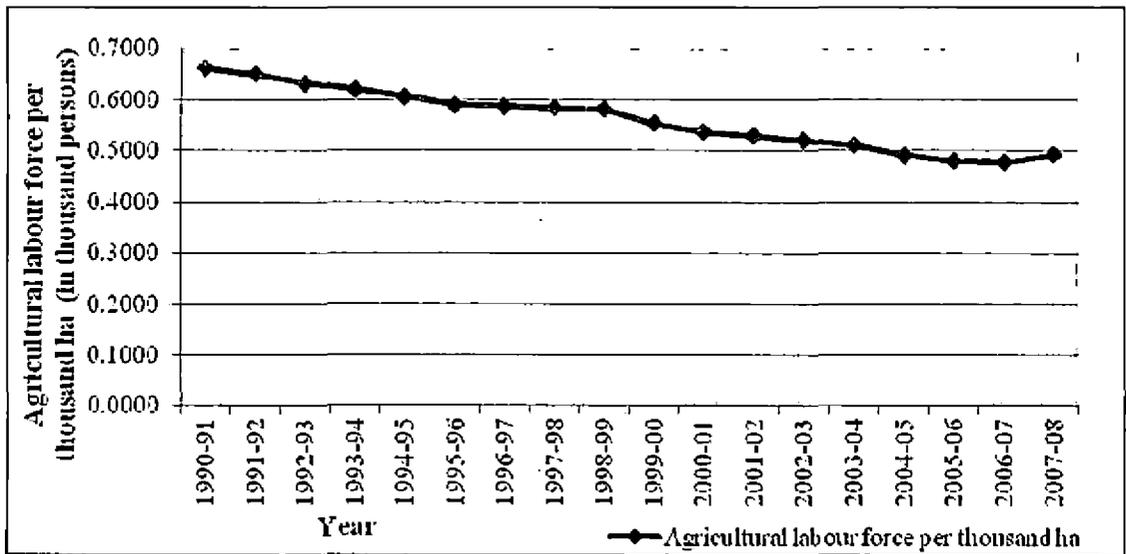
Fig 4.36 clearly shows constantly declining labour force in Kerala except during the last year of observation, i.e, 2007-08. Table 4.7 and 4.11 have shown declining agricultural labour force and negative growth rate over previous year respectively throughout the study period including the last year. The GCA during the year has also declined. Hence agricultural labour force per unit of cropped area depicts an increasing trend in the last year of study over the previous year due to higher negative growth rate in GCA compared to the negative growth in agricultural labour force in the year.

Fig.4.37 Trend in fertiliser consumption per thousand ha of cropped area in Kerala
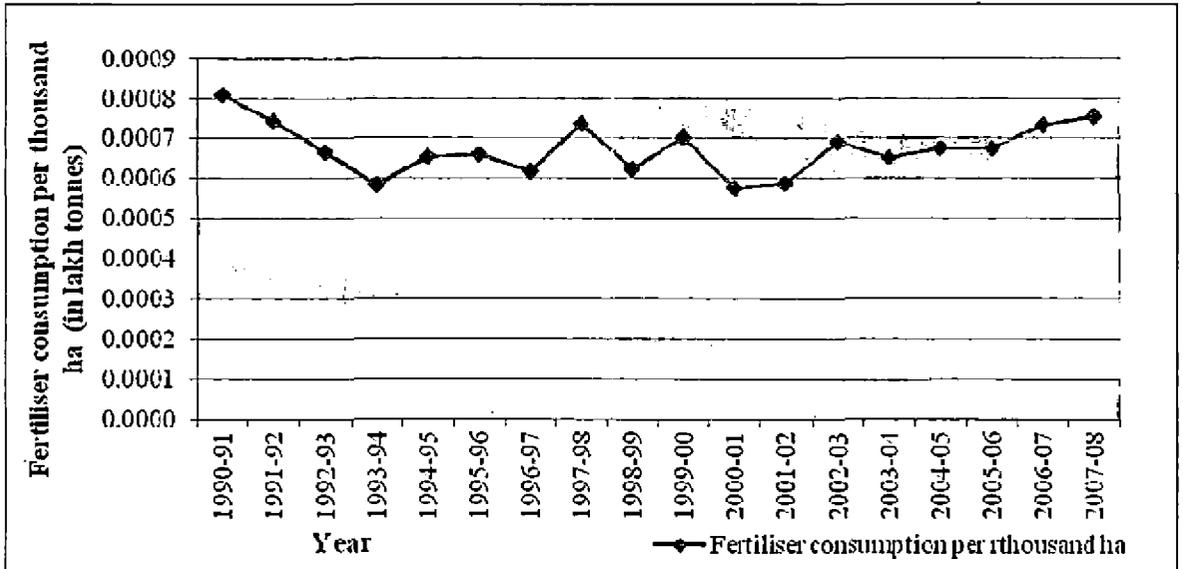
Fertiliser consumption per thousand ha in Kerala is showing the same fluctuating trend as in the case of the trend in annual growth rate of fertiliser consumption in Kerala (Fig 4.24).

Fig 4.38 Trend in electricity consumption per thousand ha of cropped area in Kerala
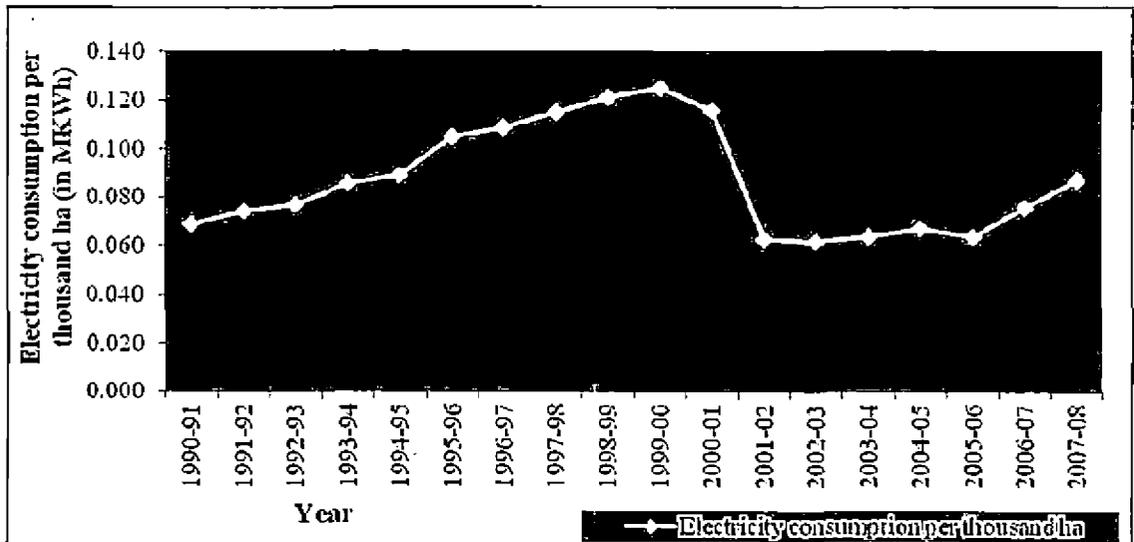
The declining electricity consumption per thousand ha of cropped area in Kerala as seen in Fig.4.38 resembles the declining trend in annual growth rate of electricity consumption in Kerala (Fig. 4.25).

Fig. 4.39 Trend in net irrigated area per thousand ha of cropped area in Kerala, 1990-91 to 2007-08
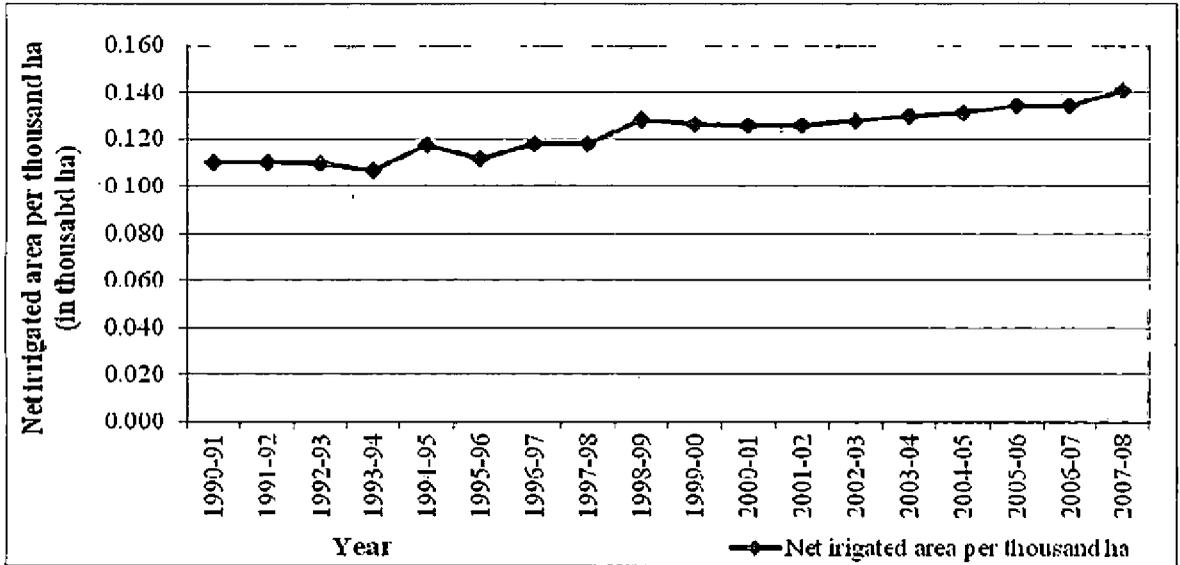
As in the case of agricultural labour force, the negative growth rate in GCA is higher than that in net irrigated area (Table 4.11). Hence even though net irrigated area has declined (Table 4.7) and annual growth rate has been negative (Table 4.11), net irrigated area per thousand ha of gross cropped area is showing an increasing trend in the last year of observation, as seen in Fig 4.39.

While discussing the indicators per thousand ha of cropped area, it is seen that the negative effect of three of the variables have been nullified by the high annual negative growth rate in GCA in the last year of observation. This relates to IC in the year 2001-02, and agricultural labour force and net irrigated area in the last year of study, as already indicated earlier.

4.3.2 Regression analysis

For studying the impact of institutional credit on agricultural production, Cobb-Douglas production function is fitted, for which the association between the dependent variable viz, AGDP and the independent variables is to be checked. Hence correlation between the AGDP and IC, GCA, agricultural labour force, fertiliser consumption, seed

availability (not for Kerala), electricity consumption and net irrigated area for both India and Kerala have been found out and depicted in Table 4.16 and 4.17 respectively.

Table 4.16 Correlation coefficient of the variables, India

Variables	Correlation coefficient
Dependent variable	
AGDP	1
Independent variable	
IC	.942
GCA	.774
Agricultural labour force	.985
Fertiliser consumption	.974
Availability of seeds	.961
Electricity consumption for agricultural purposes	.870
Net irrigated area	.941

Table 4.17 Correlation coefficient of the variables, Kerala

Variables	Correlation coefficient
Dependent variable	
AGSDP	1
Independent variable	
IC	0.903
GCA	-0.715
Agricultural labour force	-0.968
Fertiliser consumption	-0.132
Electricity consumption for agricultural purposes	-0.181
Net irrigated area	0.882

As revealed from Table 4.16 and Table 4.17, there is significant correlation between AGDP and all other independent variables in the case of India and IC and net irrigated area in the case of Kerala. Since the correlation co-efficient is significant between AGDP and IC in the case of both India and Kerala, and the main objective of the study is to examine the impact of IC on agricultural production, simple linear regression was fitted to study the individual contribution of IC to AGDP, using AGDP (Y_I for India and Y_K for Kerala) as the dependent variable and IC ($X_{1\,I}$ for India and $X_{1\,K}$ for Kerala) as the one and only dependent variable. The resultant equation is depicted in Table 4.18

Table 4.18 Simple linear regression model fitted for India and Kerala

	Simple Linear Regression Model	Adjusted R square
India	$Y_I = 163588.002 + 1.70\,X_{1I}$** (0.13)	0.883
Kerala	$Y_K = -9978.54 + 11.13\,X_{1K}$** (0.97)	0.886.

Note: ** significant at one per cent level

As revealed by Table 4.18, linear regression model fitted using the variable IC alone could explain 88.3 per cent variation in AGDP of India. The regression coefficient of IC is positive and significant in the model fitted for India. The regression coefficient of variable was 1.70 which implies that for a unit change in IC (Rs. crore), AGDP increases by Rs 1.70 crore in India. Intercept of the model is 163588.002 which represent the expected AGDP, when no IC is sanctioned.

In the model fitted for Kerala, AGDP was regressed on IC. It was found that regression coefficient of IC was significant and positive. Adjusted R square for the model for Kerala was 0.886, which could explain 88.6 per cent variation of AGDP. The significance of IC indicates that, AGDP in Kerala can be improved by providing more amounts of IC. Intercept of the model for Kerala was -9978.54 which represents the expected average AGDP in Kerala, when no IC would be disbursed, again stressing the importance of IC in Kerala. Thus, simple linear regression model fitted for India and Kerala with IC as the one and only independent variable, could explain large portion of variation in the dependent variable, AGDP. The model illustrates the importance of IC to AGDP in India and Kerala. This

supports the finding of a study in which Ordinary Least Squares (OLS) estimates of the production function revealed that institutional credit affected agricultural production positively. (Iqbal *et al.*, 2003)

In order to examine the contribution of other independent variables on AGDP, Multiple Linear Regression model was fitted for India and Kerala. For Multiple Linear Regression Analysis, the annual data on institutional credit to agriculture (IC, in Rs. crore), gross cropped area (GCA, in million ha), agricultural labour force (in thousand persons), fertiliser consumption (in lakh tones), availability of seeds (in lakh quintals), electricity consumption for agricultural purposes (in MKWh) and net irrigated area (in thousand ha) were considered as independent variables, and gross domestic product from agriculture and allied activities (AGDP, in Rs. crore) as dependent variable during the period 1984-85 to 2007-08 for India. Institutional credit (IC, in Rs. crore), gross cropped area (GCA, in thousand ha), agricultural labour force (in thousand persons), fertiliser consumption (in lakh tones), electricity consumption for agricultural purposes (in MKWh) and net irrigated area (in thousand ha) were considered as independent variables for the period from 1990-91 to 2007-08 for Kerala, and Agricultural Gross State Domestic Product (AGSDP, in Rs. crore) as dependent variable. Independent variables are represented by X_{1I}, X_{2I}, X_{3I}, X_{4I}, X_{5I}, X_{6I}, and X_{7I} and dependent variable is denoted by Y_I for India. Independent variables for Kerala are denoted by X_{1K}, X_{2K}, X_{3K}, X_{4K}, X_{5K}, and X_{6K}, and dependent variable for model fitted for Kerala is represented as Y_K. The equation arrived at is as follows:

Table 4.19 Multiple linear regression model fitted for India and Kerala (using all variables)

	Multiple Linear Regression Model	Adjusted R square
India	$Y_I = -588138.48 - 0.1\,X_{1I} + 539.77X_{2I} + 4995.79\,X_{3I}{}^{**} + 759.59\,X_{4I} + 2658.87\,X_{5I}{}^{**} +$ (0.27) (2039.09) (1275.06) (607.68) (757.80) $0.084\,X_{6I} + 0.653\,X_{7I}$ (1.022) (7.401)	0.994
Kerala	$Y_K = 19865.48 + 0.67X_{1K}{}^{**} + 10.77X_{2K} - 25.46\,X_{3K}{}^{**} + 1058.31\,X_{4K} + 14.47\,X_{5K} -$ (0.16) (6.47) (5.701) (1754.61) (4.40) $9.17\,X_{6K}$ (33.43)	0.975

Note: ** significant at one per cent level

The adjusted R square of the model for India is 0.994 which indicates that 99.4 percent variations in AGDP in India are explained by the seven independent variables used in the model. Agricultural labour force and seed availability are the variables found significant in the model at one per cent level. Regression coefficients for agricultural labour force and seed availability were 4995.79 and 2658.87. It implies that for one unit change in agricultural labour force (in million), AGDP increases by Rs. 4995.79, and one unit change in availability of seeds (in lakh quintals), results in Rs. 2658.87 crore increase in AGDP.

The Multiple Linear Regression equation in Kerala, could explain 97.5 per cent variation in AGSDP by the six independent variables used in the model fitted for Kerala. IC and agricultural labour force are the significant variables at one per cent level. Regression coefficient was positive for IC and negative for agricultural labour force in Kerala. The regression coefficient of IC in the model for Kerala explains that, one unit change in IC (in Rs. crore) increases AGSDP by Rs. 0.67 crore and regression coefficient of agricultural labour force implies that, one unit change in agricultural labour force (in thousand persons) in Kerala decreases AGSDP by Rs. 25.46 crore. Other variables in the model were found insignificant.

4.3.3 Cobb-Douglas Model

To examine the impact of total institutional credit on agricultural production, Cobb-Douglas model was fitted for India and Kerala, taking logarithm value of AGDP as the dependent variable and, logarithm value of IC (X_{1Ic}), fertiliser consumption (X_{2Ic}), availability of seeds (X_{3Ic}), electricity consumption for agricultural purposes (X_{4Ic}), net irrigated area (X_{5Ic}) and agricultural labour force (X_{6Ic}) as independent variables for India. For Kerala, model was fitted taking logarithm value of AGSDP as the dependent variable and logarithm value of IC (X_{1Kc}), GCA (X_{2Kc}), agricultural labour force (X_{3Kc}), fertiliser consumption (X_{4Kc}), electricity consumption for agricultural purposes (X_{5Kc}) and net irrigated area (X_{6Kc}) as independent variables. Dependent variable, AGDP in India and AGSDP in Kerala are represented as Y_{Ica} and Y_{Kca} respectively. Resulted equation is:

Table 4.20 Cobb-Douglas Model for India and Kerala (using all variables)

	Cobb-Douglas Model	Adjusted R square
India	$Y_{Ica} = -13.62 + 0.19\ X_{1Ic}** - 0.014\ X_{2Ic} + 0.11\ X_{3Ic} + 0.38\ X_{4Ic}** + 2.77\ X_{5Ic}* - 6.47\ X_{6Ic}$ (0.041)　　　(0.22)　　(0.12)　　(0.1)　　　(0.89)　　　(4.68)	0.996
Kerala	$Y_{Kca} = -26.71 + 2.05\ X_{1Kc}* + 0.93\ X_{2Kc} + 4.88\ X_{3Kc} - 0.20\ X_{4Kc} + 0.69\ X_{5Kc} - 4.57\ X_{6Kc}$ (0.72)　　　(6.31)　　(6.36)　　(1.34)　　(0.44)　　(4.04)	0.865

Note: (i) * significant at five per cent level; (ii) ** significant at one per cent level

GCA in India was found removed automatically because of Durbin-Watson test in the SPSS software while fitting Cobb-Douglas model for India. Regression coefficients of IC (X_{1Ic}), electricity consumption for agricultural purposes (X_{4Ic}) and net irrigated area (X_{5Ic}) were found significant and positive for the model fitted for India. It implies positive significant contribution of these variables to AGDP in India. The adjusted R square for the model was 0.996, which means logarithm value of the independent variables included in the model were able to explain 99.6 per cent variation of the logarithm value of AGDP. The regression coefficient of IC in India was 0.19 which implies that for a unit change in IC (in Rs. crore), AGDP increases by Rs. 0.19 crore. The regression coefficient of electricity consumption for agricultural purposes was 0.38. This indicates that, AGDP would be increased by Rs. 0.38 crore by increasing the electricity consumption (in MKWh) by one unit in India. Another variable which had positive impact on the AGDP was net irrigated area. The regression coefficient for net irrigated area was 2.77 which implies that for one unit change in net irrigated area (in thousand ha), AGDP increases by Rs. 2.77 crore.

The adjusted R square was 0.865 for the Cobb-Douglas model fitted for Kerala. The model helped to analyse the association between AGSDP and various determinants of AGSDP during the study period. In Kerala, only IC had significant impact on AGSDP. Regression coefficient of IC was 2.05 implying that one unit change in IC (in Rs. crore) results in Rs. 2.05 crore changes in AGSDP of Kerala. From the model, it could be understood that IC was the major independent variable, which shapes AGSDP in Kerala.

Cobb-Douglas model was again fitted using the significant variables for India and Kerala. Significant variables found in India were IC, electricity consumption for agricultural

purposes, and net irrigated area. The single significant variable noticed in the model fitted for Kerala was IC. The resulted equations are:

Table 4.21 Cobb-Douglas model for India and Kerala (using significant variables)

	Cobb--Douglas Model	Adjusted R square
India	$Y_{Ic} = -17.54 + 0.24 \, X_{11c} + 0.42 \, X_{41c} + 2.11 \, X_{51c}$ $\qquad\qquad (0.02) \qquad (0.08) \qquad (0.44)$	0.996
Kerala	$Y_{Kc} = 1.484 + 1.055 \, X_{1Kc}$ $\qquad\qquad (0.11)$	0.855

The adjusted R square, 0.996 was quite high in the model fitted for India, implying that, logarithm value of the independent variable included in the model were able to explain 99.6 per cent variation of the logarithm value of the AGDP during the study period. The regression coefficient of all significant variables in the model fitted for India were found positive, which indicates that these variables were having positive significant contribution towards AGDP in India. The coefficient of IC (X_{11c}) was 0.24, implying that one unit increase in IC (in Rs. crore) would bring Rs. 0.24 crore increase in AGDP in India. The regression coefficient for electricity consumption for agricultural purposes (X_{41c}) was 0.42. It indicates that AGDP would be increased by Rs. 0.42 crore by increasing electricity consumption for agricultural purposes, by one unit in India. The regression coefficient for net irrigated area (X_{51c}) was 2.11, pointing towards the increase of AGDP by Rs. 2.11 crore, if net irrigated area was increased by one unit. Net irrigated area seemed to be the major contributor to the AGDP.

In contrast, IC was the only significant variable in the model fitted for Kerala. The adjusted R square was 0.855. It indicates that about 86 per cent of the total change in AGSDP in Kerala is explained by IC. The intercept of the model was 1.484, which represents the logarithm of the expected AGSDP in Kerala, when there was no IC disbursed.

Cobb-Douglas model was also fitted for variables per cultivated area (in million ha) for India and Kerala. The dependent variable was, logarithm value of AGDP per million ha (Y_{1pc}) for India. Logarithm value of IC per million ha ($X_{1\,1pc}$), agricultural labour force per million ha ($X_{2\,1pc}$), fertiliser consumption per million ha ($X_{3\,1pc}$), seed availability per

million ha ($X_{4\,1\,p\,c}$), electricity consumption per million ha ($X_{5\,1\,p\,c}$) and net irrigated area per million ha ($X_{6\,1\,p\,c}$) are the independent variables for India. Logarithm value of IC per thousand ha ($X_{1K\,p\,c}$), agricultural labour force per thousand ha ($X_{2K\,p\,c}$), fertiliser consumption per thousand ha ($X_{3K\,p\,c}$), electricity consumption per thousand ha ($X_{4K\,p\,c}$), and net irrigated area per thousand ha ($X_{5K\,p\,c}$) are the independent variables and logarithm value of AGDP per thousand ha ($Y_{K\,p\,c}$) is the dependent variable for Kerala. The regression equation evolved is:

Table 4.22 Cobb-Douglas Model per unit of cultivated area for India and Kerala (using all variables)

	Cobb-Douglas Model	Adjusted R square
India	$Y_{1pc} = -9.43 + 0.15\,X_{11pc}* + 0.23X_{21pc} + 0.14X_{31pc} + 0.15X_{41pc} + 0.41\,X_{51pc}** + 2.45X_{61pc}*$ (0.07) (0.53) (0.25) (0.14) (0.12) (1.07)	0.995
Kerala	$Y_{Kpc} = -0.78 + 0.12\,X_{1\,Kpc} - 4.10\,X_{2Kpc}* - 0.21X_{3Kpc} + 0.58\,X_{4Kpc}** + 0.12\,X_{5Kpc}$ (0.17) (1.50) (0.47) (0.15) (1.23)	0.938

Note: (i) * significant at five per cent level
(ii) ** significant at one per cent level

It could be observed from Table 4.22 that, in the model fitted for India, IC per million ha, electricity consumption for agricultural purposes per million ha, and net irrigated area per million ha were contributing to AGDP significantly. The coefficient of IC per million ha was 0.15, coefficient of electricity consumption for agricultural purposes per million ha was 0.41, and coefficient of net irrigated area per million ha was 2.45. The adjusted R square was 0.995, which explains 99.5 per cent variation in logarithm value of AGDP per million ha by the significant variables in India.

The adjusted R square was 0.938 which means that 93.8 per cent of variation in logarithm value of AGDP per thousand hectare can be explained by the two significant variables, viz., agricultural labour force and electricity consumption for agricultural purposes per thousand hectare in the model fitted for Kerala.

4.3.4 Cochrane - Orcutt model

Even though the value of Adjusted R square was very high, there can be a chance of multicollinearity among the regressors. The presence of auto correlation existing in the ordinary least square method also is to be considered. So an alternative method of regression viz; Cochrane - Orcutt iterative method of regression was made use of for predicting AGDP using the above seven variables for India. This method made use of some lag values of the respective variables also as regressors. In case of analysis of data for India, 14 variables were identified as regressors including lag variables by the iterative Cochrane - Orcutt method. But in the case of Kerala, such lag values were not iterated out. The resulted prediction equation for India and Kerala are given in Table 4.23.

Table 4.23 Cochrane - Orcutt Regression Model for India and Kerala (using significant variables)

	Cochrane - Orcutt Regression Model	Adjusted R square	Durbin-Watson
India	$Y = -131871 + 0.72 \, IC_i{}^{**} + 1985.31$ availability of seed ** + 3.62 electricity consumption$_i$ **	0.996	2.046
Kerala	$Y = -10384.5 + 11.12 \, IC **$	0.887	1.91

Note:** significant at one per cent level

The adjusted R square for the model for India is 0.9986 which explains 99.86 per cent of variation in AGDP. The significant contributing variables were IC, with one time lag, gross cropped area with one time lag, availability of seed and electricity consumption for agricultural purposes with one time lag. So it can be concluded that not only the current figures of the variables were contributing to AGDP but their lagged values also have significant role for increasing AGDP of India. A parsimonious prediction model was identified by the method of Cochrane - Orcutt iteration procedure which gave an equation with three independent variables, viz., IC and electricity consumption for agricultural purposes with one time lag and availability of seed and it could explain 99.58 per cent of variation in AGDP with a much reduced value of Durbin-Watson Test (2.046). This explains that current year's availability of seed and lagged values of IC and electricity consumption

also have an impact on AGDP in India. So the Cochrane - Orcutt model can be considered as the best model for predicting AGDP of India.

When the data for Kerala was considered, only one variable viz., IC has been iterated out as the significant contributor to AGDP and corresponding regression of AGDP on IC resulted in a value of Adjusted R square of 88.76 per cent with a much reduced value of Durbin-Watson Test (1.91). This shows the importance and significance of IC in Kerala for making changes in AGDP.

In order to test the accuracy of the models fitted for India and Kerala, agricultural production is predicted, using the model having the highest adjusted R square. One model is identified as the line of best fit for India and Kerala. For India, Cochrane-Orcutt model is considered as the line of best fit as it is a parsimonious equation with relatively high value of adjusted R square and less value of Durbin-Watson Test. As far as Kerala is concerned, Multiple Linear Regression model fitted is the line of best fit, since the model is having highest adjusted R square among the models fitted for Kerala. Table 4.24 presents the best fit models used for predicting agricultural production in India and Kerala.

Table 4.24 Best fit models for predicting agricultural production in India and Kerala

Type of model	Mathematical form of the model	Adjusted R square	Durbin Watson
Cochrane-Orcutt Model	$Y_t = -131871 + 0.72\ IC_{-1}** + 1985.31$ availability of seed $**+ 3.62$electricity consumption$_{-1}**$	0.996	2.046
Multiple Linear Regression Model	$Y_K = 19865.48 + 0.67X_{1K}** + 10.77X_{2K} - 25.46\ X_{3K}** + 1058.31\ X_{4K} + 14.47\ X_{5K} -$ $\quad\quad (0.16)\quad\quad (6.47)\quad\quad (5.701)\quad\quad (1754.61)\quad\quad (4.40)$ $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad 9.17\ X_{6K}$ $\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad (33.43)$	0.975	-

Note: (i) * significant at five per cent level
(ii) **significant at one per cent level

As evident from Table 4.24 the adjusted R square for the Cochrane - Orcutt Model is the highest among the models fitted for India. For Kerala MLR model is having the highest adjusted R square. The predicted models for India and Kerala are depicted graphically in Fig.4.40 and Fig.4.41.

Fig.4.40 Trend in actual and predicted agricultural production in India
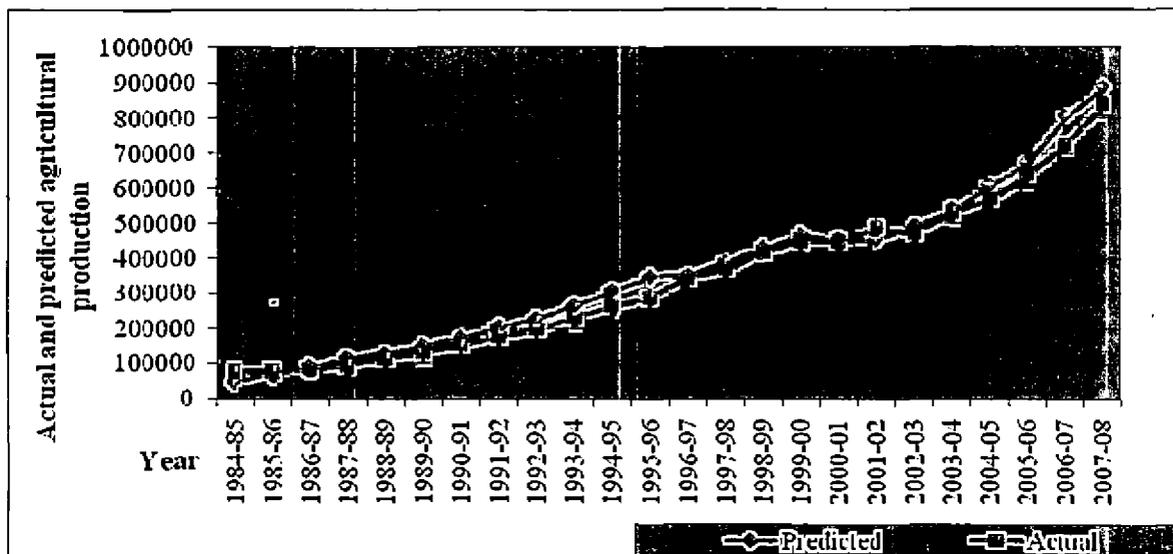
Fig.4.41 Trend in actual and predicted agricultural production in Kerala
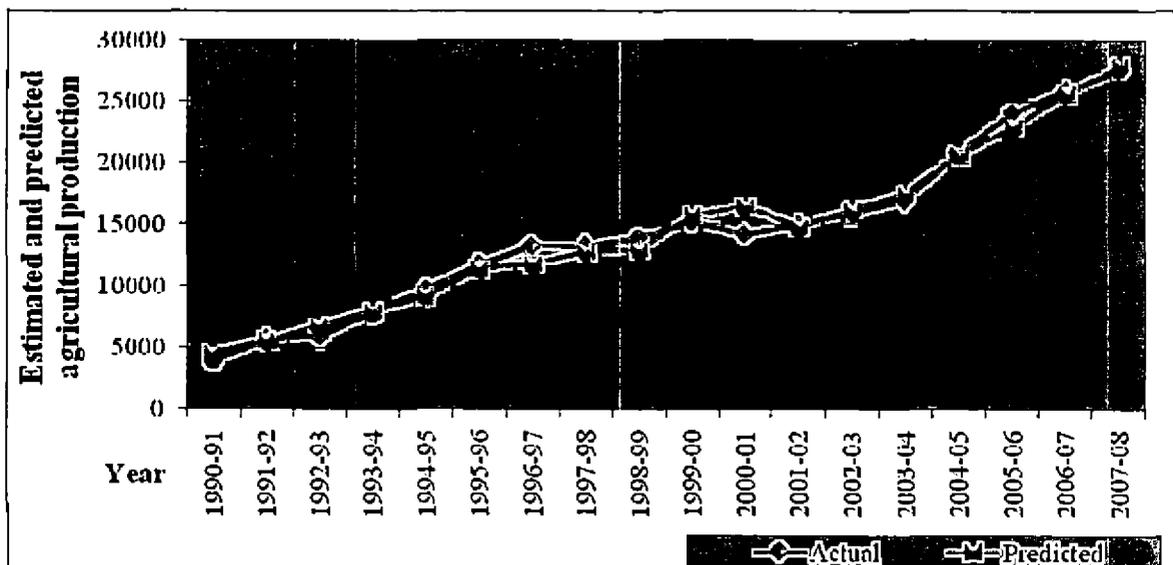
From Fig.4.40 and Fig.4.41 it can be seen that the variation in the series of actual and predicted agricultural production is very low. The actual agricultural production is moving in the same direction as compared with the predicted agricultural production in India and Kerala. This shows the high predictive power of the models fitted. Thus it is established that IC has significant impact on agricultural production both in India and Kerala.

4.4 Pattern of utilisation and impact of credit on farmers of Pananchery Panchayat

The last part of the report deals with the final objective of analysing the pattern of utilisation and impact of credit on farmers of Pananchery Panchayat of Thrissur district based on a primary survey conducted among 60 farmers of the Panchayat. From the analysis of the impact of IC on agricultural production using secondary data, it is already revealed that IC has a significant impact on agricultural production in India and Kerala. Hence an effort is also made in this section to verify the prominence of IC in agricultural production using primary data collected from farmers of Pananchery Panchayat. Since the study is conducted in Pananchery Panchayat of Thrissur district, this section starts with a profile of Thrissur district followed by that of Pananchery Panchayat .The discussion of the institutional credit flow to agriculture – source – wise and purpose – wise is also presented after the profile of Thrissur district. Lastly the pattern of utilisation and impact of credit on farmers in Pananchery Panchayat is discussed. Lastly the problems faced by the respondent farmers with respect to agricultural production are also discussed.

4.4.1 Thrissur district – a profile

Thrissur is the cultural capital of "God's own country", Kerala. The name Thrissur is derived from the name "Thrissivaperur" which means the seat of Lord Shiva. This is also known as "Vadakkunnathan" and is situated in the heart of the town. Several cultural institutions are situated in this district, among which "Kerala Kalamandalam" adorns the first position. Blessed with many artists and writers, Thrissur has a very rich cultural heritage.

Besides its cultural background, Thrissur is mainly an agricultural district where the main crops grown are paddy, coconut, arecanut, pepper, banana and vegetables. The Kole lands of Thrissur contribute a major share in the rice production of Kerala. The Kerala Agricultural University which helps a lot to develop and change the agricultural scenario not only in Thrissur, but of whole Kerala, has its headquarters at Vellanikkara, 12 km east of Thrissur town.

However, the consistent pick up in economic activity for the last two decades stands in vivid contrast to the possibilities thrown open merely by an agricultural district. There has

been large migration of employed youth to Gulf countries from the district for employment in the course of last two decades.

According to the 2001 census, Thrissur district is having a population of 29.75 lakhs. Out of this 21.36 lakhs belong to rural area. The rest are in urban area.

4.4.1.1 Land holding pattern of Thrissur district: There is predominance of marginal holdings in the District necessitating the adoption of joint practices in cultivation and marketing areas among the marginal and small farmers. The District already has group farming communities and adopted group management for crops like coconut. The pattern of landholding in Thrissur district with total area and average size of landholding is given in Table 4.25. The farmers are divided into marginal, small and large farmers based on their landholding pattern. Farmers whose landholdings are less than one ha are considered as marginal farmers. A small farmer is one who possesses a landholding in between one to two ha. Large farmers are those whose landholding exceeds two ha.

Table 4.25 Pattern of land holding in Thrissur district

Type of farmers	Number of operational holding (000's)	Area (Ha)	Average size (Ha)	Per cent to total
Marginal	700.0	86212	0.12	56
Small	24.0	27711	1.20	18
Large	8.3	40027	4.82	26
Total	732.3	153950	0.21	100

Source: District Credit Plan for Thrissur District, 2011-12

More than half of the farmers in the District are marginal farmers with an average landholding of 0.12 ha. More than one-fourth of the farmers are large farmers with an average holding of 4.82 ha.

4.4.1.2 Agricultural profile of Thrissur district: Agriculture continues to be the main economic activity of the people in the District. More than half of the income is generated from agriculture and allied activities. Around 55 per cent of the total workers are having full

time employment in this sector. The main agricultural products are rice, coconut, arecanut, tapioca, rubber, banana, and cashew. The most important crop is paddy. Three crops are raised in certain areas of the District - virippu,. mundakan, and punja - in a year. One of the striking features of the agricultural operations in the District is the kole cultivation. During almost seven months in a year about 11000 ha of highly fertile land in the district gets submerged under water. Tapioca and coconut are also very important crops of the District. Under allied activities, dairy occupies the main place. Poultry, goat rearing, fisheries and piggery are the other important activities. The District has a long tradition in the fishing industry. The pattern of land use in Thrissur district is shown in Table 4.26.

Table 4.26 Land use pattern in Thrissur district

Indicators	(in ha)	As a per cent of geographical area
Total geographical area	299390	100.00
Forest	103619	34.61
Land put to non-agricultural use	27485	9.18
Barren and uncultivable land	1781	0.59
Permanent pastures and grazing land	76	0.02
Land under miscellaneous tree crops	971	0.32
Cultivable waste	3175	1.06
Fallow other than current fallow	3352	1.11
Current fallow	5314	1.77
Net area sown	153950	51.34

Source: District Credit Plan for Thrissur District, 2011-12

As per Table 4.26 more than half of the geographical area of the district comes under the sown area. This includes area sown once and more than once in a year. This is followed by forests area. Land put to non – agricultural use contributes less than ten per cent.

4.4.2 Institutional credit flow to agriculture: Thrissur district

As done in the case of India and Kerala, (Section 4.2), analysis of institutional credit flow to agriculture is done source – wise and purpose – wise in Thrissur district in this section.

4.4.2.1 Credit flow to agriculture in Thrissur district: source – wise

Major institutional sources for finance of the District include SCBs, RRBs, and co-operatives. Three of the old generation private sector banks of the country have their headquarters in Thrissur - Catholic Syrian Bank (1920), Dhanalaxmi Bank (1927) and South Indian Bank (1929). The source- wise institutional credit flow to agriculture in Thrissur district for the period 2000-01 to 2010-11 is depicted in Table 4.27. Though KFC has also been financing agriculture in certain years, it is not included in the Table since the amount is negligible. Since uniform data are available only for 11 years for Thrissur district, the years under study have not been classified into two sub periods as done in the case of discussion of credit flow to agriculture in India and Kerala.

Table 4.27 Credit flow to agriculture in Thrissur district: source – wise, 2000-01 to 2010-11

(in Rs. crore)

Year	Co-operatives	SCBs	RRBs	Total
2000-01	59 (31)	129 (67)	3 (2)	192 (100)
2001-02	53 (28)	125 (67)	9 (5)	187 (100)
2002-03	68 (25)	186 (69)	15 (6)	268 (100)
2003-04	110 (25)	311 (69)	27 (6)	448 (100)
2004-05	174 (28)	416 (66)	40 (6)	630 (100)
2005-06	205 (26)	490 (64)	81 (10)	776 (100)
2006-07	301 (28)	692 (63)	102 (9)	1095 (100)
2007-08	367 (27)	847 (63)	125 (10)	1339 (100)
2008-09	570 (34)	933 (57)	155 (9)	1658 (100)
2009-10	645 (22)	2005 (69)	256 (9)	2906 (100)
2010-11	836 (22)	2751 (73)	201 (5)	3788 (100)
CAGR	0.27	0.32	0.47	0.31

Source: District Credit Plan for Thrissur District, 2011-12

SCBs are the major source of credit to agriculture and allied activities followed by co-operatives and RRBs in Thrissur district as seen in the case of Kerala (Table 4.3). The share of SCBs is found highest in the year 2010-11 and lowest in the year 2008-09. There is a steep increase in the provision of credit by SCBs in the year 2009-10. As seen in the case of India and Kerala, RRBs are having least share in total credit to agriculture in Thrissur district also. RRBs have the highest growth rate with a CAGR of 47 per cent. The source – wise institutional credit to agriculture is graphically presented in Fig. 4.42.

Fig.4.42 Trend in institutional credit to agriculture in Thrissur district, 2000-01 to 2010-11
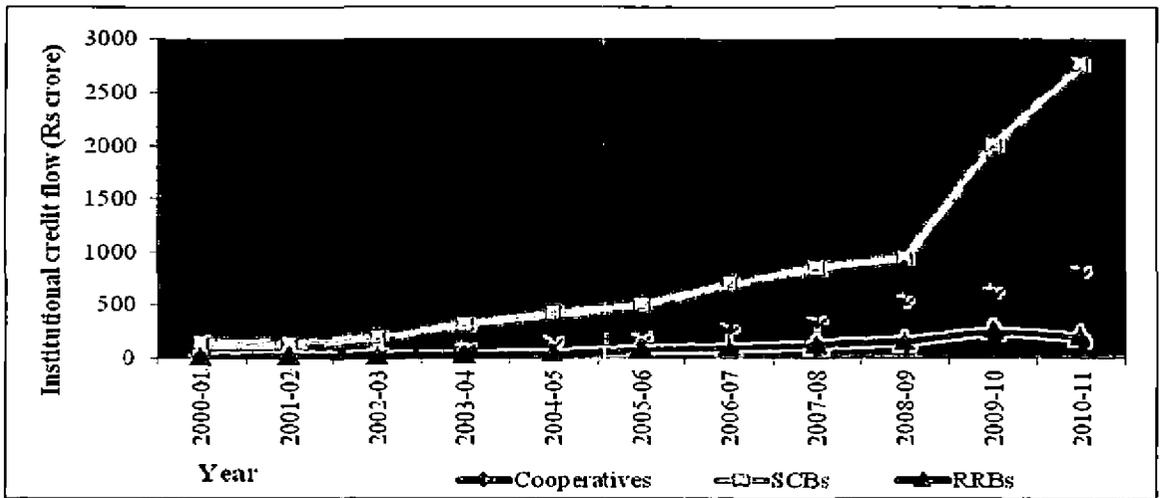
The steep increase in the amount of agricultural credit by SCBS in 2009-10 and 2010-11 is quite evident from Fig. 4.42. RRBs which were having a very small amount of agricultural credit have increased their presence since 2005-06.

The percentage share of the three institutions in the provision of agricultural credit in Thrissur district is graphically depicted by line graphs in Fig. 4.43.

Fig.4.43 Trend of percentage share in institutional credit in Thrissur district
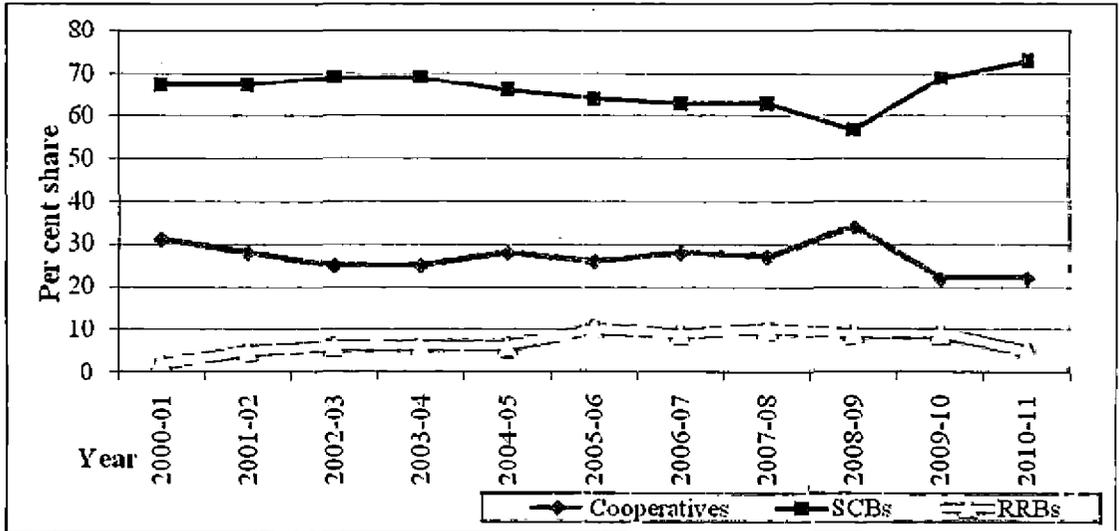
The percentage share of the three institutions in agricultural credit is showing an even trend without much fluctuation except in the case of SCBs and co-operatives in the year 2008-09. In 2008-09, there was a steep increase in the credit flow through co-operatives, whereas the increase in the credit flow of SCBs was comparatively lower, leading to a declining share for SCBs and higher share for co-operatives.

4.4.2.2 Credit flow to agriculture in Thrissur district: purpose – wise

In the case of Thrissur district the purpose – wise classification of agricultural credit is into short term and medium term/long term. The details of institutional credit to agriculture by co-operatives, SCBs and RRBs based on the above classification for the period 2000-01 to 2011-12 along with CAGR for the period is presented in Table 4.28.

Table 4.28 Credit flow to agriculture in Thrissur district: purpose-wise, 2000-01 to 2010-11

(in Rs. crore)

Year	ST	MT/LT	Total
2000-01	165 (86)	27 (14)	192 (100)
2001-02	156 (83)	31 (17)	187 (100)
2002-03	225 (84)	44 (16)	269 (100)
2003-04	358 (80)	90 (20)	448 (100)
2004-05	483 (77)	147 (23)	630 (100)
2005-06	591 (76)	185 (24)	776 (100)
2006-07	882 (81)	213 (19)	1095 (100)
2007-08	1090 (81)	249 (19)	1339 (100)
2008-09	1335 (81)	323 (19)	1658 (100)
2009-10	2385 (82)	521 (18)	2906 (100)
2010-11	3156 (83)	632 (17)	3788 (100)
2011-12	2495 (89)	312 (11)	2807 (100)
CAGR	0.25	0.23	0.25

Source: (i) Background notes for District Consultative Committee for Banking Development, various issues
(ii) District Credit Plan for Thrissur District, various issues

Table 4.28 reveals that major portion of the agricultural credit in Thrissur district is given for short term purposes. About 80 per cent of the total credit to agriculture has gone as short term loans during the entire study period. The share of MT/LT credit ranges from 11 per cent to 20 per cent. It is already revealed from Table 4.4 and Table 4.5, that co-operative, SCBs and RRBs are giving major portion of their agricultural credit for short term purposes. From this it could be understood that the purpose-wise credit flow to agriculture in Thrissur district follows the same pattern that is followed in India and Kerala. In Thrissur also institutional credit flow for long term purposes is very low. The purpose – wise distribution of agricultural credit in Thrissur district is graphically presented in Fig 4.44.

Fig. 4.44 Trend in institutional credit for agriculture in Thrissur district: purpose-wise
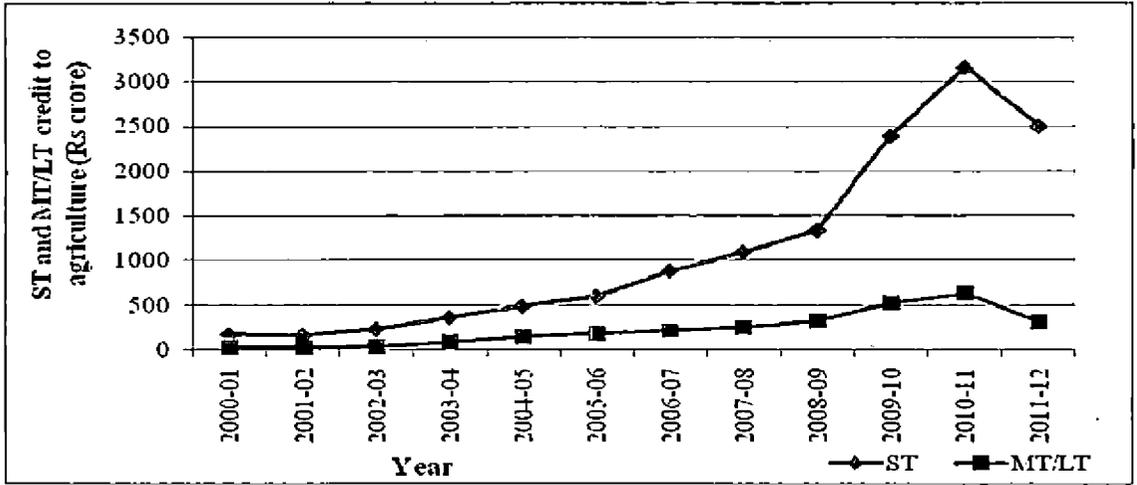
As evident form Fig. 4.44,short term credit has a major share in the agricultural credit of the District compared to MT/LT credit. The steep fall in both short term and MT/LT credit in 2011-12 is quite evident from the figure. Till 2011-12 there has been a continuous increase in both the types of agricultural credit except in the case of ST credit in 2001-02.

The percentage share of ST and MT/LT credit to agriculture in Thrissur district is graphically presented in Fig. 4.45.

Fig. 4.45 Trend in percentage share of ST and MT/LT credit to agriculture in Thrissur district
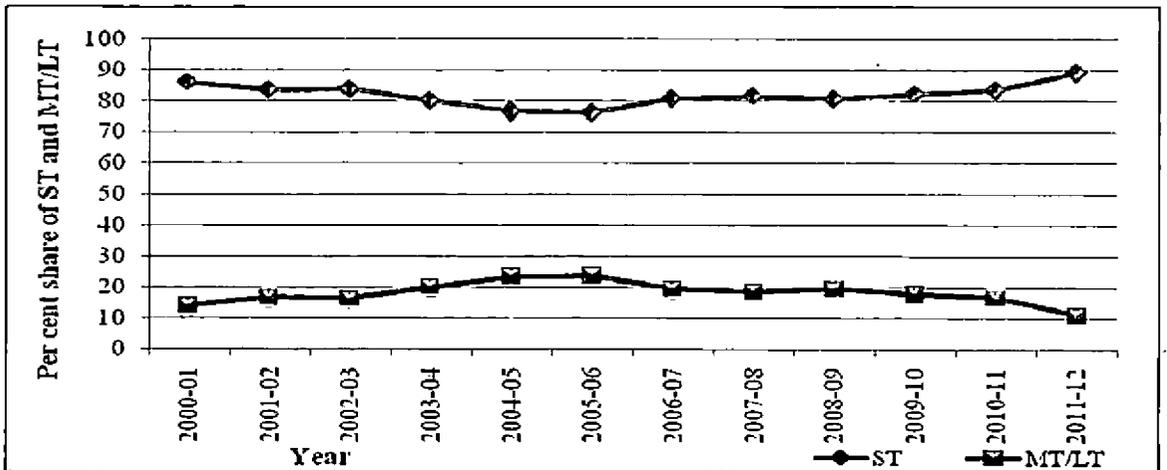
Fig. 4.45 reveals the prominence of short term credit in the agricultural credit disbursement of the District. The share of both remained more or less the same, except for a marginal increase in MT/LT credit during 2003-04 and 2005-06 and a decline in 2011-12.

4.4.3 Pananchery Panchayat – a profile

Pananchery Panchayat which is coming under the Ollukkara Block is selected for examining the last objective of the study, viz., the pattern of utilisation of credit and impact of credit on farmers. Ollukkara block is having wide banking branch network with 52 Public sector banks, 44 private sector banks, five RRBs, seven Thrissur District Co-operative Banks (TDCB), one Co-operative Agricultural and Rural Development Bank (CARDB), one Urban Co-operative Bank and 11 Service Co-operative Banks. Ollukkara Block stood first with an achievement of 218 per cent of the target for priority sector lending during 2010-11 among the blocks in Thrissur district (Canara Bank, 2012). In addition to Pananchery Panchayat, Ollukkara block covers three other Panchayats, viz., Madakkathara Grama Panchayat, Puthur Grama Panchayat, and Nadathara Grama Panchayat. In these Panchayats, Pananchery and Puthur Panchayats are having the highest number of wards. Since the main profession of the people in Pananchery Panchayat is agriculture and the Panchayat is adopted by Kerala Agricultural University (KAU) it is selected for the study.

The Pananchery Panchayat, is located at the eastern part of Thrissur district. The name 'Pananchery' originated from the Tamil words 'cherry' which means 'region' and 'paner' the name of a socially backward community. The Panchayat was formed as per the Cochin Village Panchayat Act, 1914 with Notath Sankara Menon as the first president. The King had directed the Panchayat authorities to develop agriculture in the area and the farmers were imparted information regarding planting and crop protection activities by the Panchayat.

The Panchayat shares borders with Kannambra and Kizhakumchery Panchayats on the East, Madakkathara and Nadathara Panchayats on the West, Puthur Panchayat on the South and Thekkumkara Panchayat on the North. The Panchayat covers a total area of 141.71 sq.km. The two villages namely, Peechi and Pananchery come under this Panchayat. The Block Panchayat divisions forming part of the Panchayat are Madakkathara, Thanippadam, and Peechi. Majority of the population depend on agriculture and allied activities for their livelihood. It is a special grade Panchayat with 22 wards. The demographic details of the Panchayat are depicted in Table 4.29

Table 4.29 Demographic details of Pananchery Panchayat

Category	Population	Percentage share
Male	20912	49
Female	21506	51
Total	42418	100
SC	3647	8.60
ST	991	2.34

Source: Planning Report, Pananchery Panchayat, 2011-12 (2001 Census)

As revealed from Table 4.29, females are more than the male population of the Panchayat reflecting the same trend of Kerala.

4.4.3.1 Agricultural profile of Pananchery Panchayat: The major perennial crops cultivated by the farmers in the Panchayat are coconut, rubber and arecanut. The other crops include tapioca, banana, pepper, and vegetables like cowpea, bitter gourd, amaranthus, little gourd etc. Paddy is another crop cultivated by the farmers in three seasons, viz, mundakan, puncha, and virippu. The area and productivity of the major crops in the Panchayat are presented in Table 4.30. The productivity in Kerala also is given to have a better picture about the performance of the farmers in the Panchayat.

Table 4.30 Area and productivity of the crops cultivated in Pananchery Panchayat

Sl No.	Crops	Area (in ha)	Percentage share	Productivity (Kg. per ha) in Pananchery Panchayat	Productivity (Kg. per ha) in Kerala
1	Rubber	2250	34.10	2500	1442
2	Coconut	2050	31.07	8750 nut	6862
3	Banana	800	12.13	25000	8244
4	Pepper	400	6.06	2200	263
5	Vegetables	350	5.31	13608	14192
6	Arecanut	250	3.79	9000	1001
7	Nutmeg	150	2.27	6000	NA
8	Cashew	150	2.27	750	NA
9	Fruits	100	1.52	21875	NA
10	Paddy/rice	42	0.64	5425	2452
11	Tapioca	40	0.61	18144	32650
12	Pulses	10	0.15	22680	760
13	Fodder	5	0.08	9072	NA
	Total		100.00		

Source: (i) Basic Data, 2009-10, Krishibhavan, Pananchery
(ii) Economic Review , 2011

Table 4.30 reveals that considering the area under cultivation, rubber is the major crop, followed by coconut and banana. Rubber and coconut are cultivated in almost of equal area with a difference of 200 ha. The least cultivated crops are paddy, tapioca, pulses and fodder. The productivity in Pananchery Panchayat is much better in majority of the crops listed compared to the all Kerala average. In case of nutmeg, cashew, fruits and fodder all Kerala productivity is not available. The productivity of Pananchery panchayat is higher than the average productivity of Kerala in the case of rubber, banana, pepper, areacanut, paddy/rice and pulses. Wide differences are seen in the case of banana, pepper, arecanut and pulses. As far as banana is concerned most of the farmers in the Panchayat are cultivating the variety, *Chengazhikkodan* which has more number of bunches compared to *Nedunendran* and hence more weight. *Panniyoor* and *Karimunda* are the common varieties of pepper cultivated by the farmers of the Panchayat of which *Panniyoor* developed by Kerala Agricultural University (KAU), has very high productivity. With respect to arecanut, *Mangala* developed by KAU, with high productivity and local varieties are cultivated. Under pulses, only cowpea is included in the data of the Panchayat. The productivity in Kerala is higher than that of the Pananchery Panchayat in the case of coconut, vegetables excluding

cowpea and tapioca. Bittergourd, snakeguard and cucumber are the most common vegetables cultivated in the Panchayat. Fruits include only mango and jack fruit.

4.4.3.2 Categories of farmers of Pananchery Panchayat: Farmers in Pananchery Panchayat are broadly classified as marginal, small, and large farmers. Farmers whose landholdings are less than one ha are considered as marginal farmers. A small farmer is one who possesses a landholding in between one to two ha. Large farmers are those whose landholding exceeds two ha. Different categories of farmers in Pananchery Panchayat are presented in Table 4.31.

Table 4.31 Category of farmers in Pananchery Panchayat

SI No.	Category	Number of farmers	Percentage share
1	Marginal	9527	88.87
2	Small	1162	10.84
3	Large	31	0.29
4	Total	10720	100.00

Source: Basic Data, 2007-08, Krishibhavan, Pananchery

Table 4.31 reveals that majority of the farmers in Pananchery Panchayat are marginal farmers, followed by small farmers. Large farmers constitute only less than one per cent share to total.

Having discussed the profile of Thrissur district and the Pananchery Panchayat from where the respondents for the primary survey have been selected, the ensuing sections are devoted for the analysis of the primary data collected from the sample respondents.

4.4.4 Characteristics of the sample respondents

Once the locale of the study is discussed, the next step is to examine the characteristics of the sample respondents which would give a better insight into the analysis of the pattern of utilisation and impact of credit on farmers. Hence in this section, the classification of the sample farmers selected from the Pananchery Panchayat, their cropping system and socio – economic characteristics are discussed.

4.4.4.1 Classification of sample respondents

In order to analyse the pattern of utilisation and impact of credit on farmers, primary data were collected from 60 farmers of Pananchery Panchayat. The respondents were selected on the basis of stratified random sampling. Although the category of farmers as per the basic data of the Pananchery Krishibhavan have only marginal, small and large farmers, tenant farmers, who have no land of their own, but do cultivation on leased land were also found in the Panchayat. Hence the sample respondents consist of tenant farmers, marginal farmers, small farmers and large farmers, classified on the basis of their land holdings. Only those farmers who have availed institutional credit and are involved in intensive farming operations for the last three years were selected for the study. From each group, farmers were randomly selected to form the sample size of 60. The classification of the sample respondents is depicted in Table 4.32.

Table 4.32 Classification of sample respondents

Sl. No.	Classification	Number of respondents	Percentage share
1	Tenant farmers (landless)	3	5
2	Marginal farmers (up to one ha)	34	56
3	Small farmers (1 - 2 ha)	19	32
4	Large farmers (more than 2 ha)	4	7
	Total	60	100

Source: Compiled from primary survey

Since majority of the farmers in Pananchery Panchayat are marginal farmers, they form the majority in the sample also as revealed from Table 4.32. The farmers are selected in the sample based on their prominence in the Panchayat. Tenant farmers constitute least share to total. The composition of total sample is diagramatically presented in Fig. 4.46.

Fig. 4.46 Classification of sample respondents
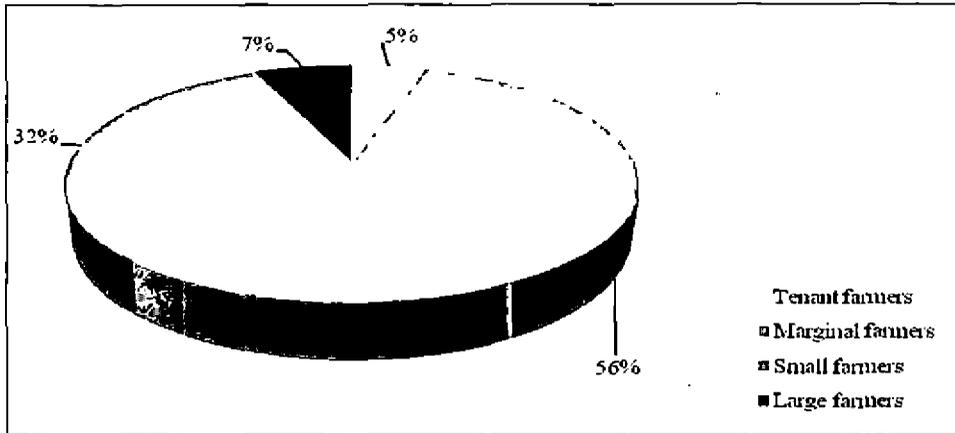
The prominence of each category of farmers in the total sample selected for the study is quite evident from Fig.4.46.

4.4.4.2 Cropping system of respondents

Cropping system is an important component of any farming system. It is the proportion of area under various crops at a point of time. Cropping systems of a region are decided by and large by the types of soil and climate parameters which determine average overall agro-ecological setting for nourishment and appropriateness of a crop or set of crops for cultivation. Nevertheless, at farmers' level, potential productivity and monetary benefits act as guiding principles while opting for a particular crop/cropping system. These decisions with respect to choice of crops and cropping systems are further narrowed down under influence of several other forces related to infrastructure facilities, socio-economic factors, and technological developments, all operating interactively at micro-level. During the survey it was observed that farmers are forced to select only limited crops for cultivation, since wild animal attack is very severe in some parts of Pananchery Panchayat and due to unavailability of labour and increasing labour charges. The cropping system adopted by different categories of farmer respondents is presented in Table 4.33.

Table 4.33 Cropping system of farmer respondents

Category of farmers	Average number of crops cultivated	Crops/ no. of farmers						
		Coconut	Arecanut	Rubber	Banana	Spices	Vegetables	Others
Tenant	2	-	-	-	3 (5)	1 (4)	3 (15)	-
Marginal	4	25 (59)	15 (58)	14 (44)	30 (55)	12 (52)	11 (55)	16 (76)
Small	4	14 (34)	10 (38)	14 (44)	18 (33)	9 (40)	6 (30)	4 (19)
Large	4	3 (7)	1 (4)	4 (12)	4 (7)	1 (4)	0 (0)	1 (5)
Total		42 {70} (100)	26 {43} (100)	32 {53} (100)	55 {92} (100)	23 {38} (100)	20 {33} (100)	21 {35} (100)

Source: (i) Compiled from primary survey
Note: (ii) Figures in single brackets represent percentage share of each to total
        (iii) Figures in double brackets represent percentage share of each to category total

Major perennial crops cultivated by the respondents are coconut, arecanut, and rubber; spices include nutmeg, turmeric, ginger, and pepper; vegetables consist of amaranthus, cowpea, bitter gourd, little gourd and snake gourd and 'others' comprise of dairying, and goat rearing. Since cashew, rice and mango cultivating farmers are negligible in number, they are also included in 'others' category.

Since tenant farmers do not have land of their own, they have concentrated only on short duration crops as seen in Table 4.33. Large farmers mostly prefer perennial crops because of unavailability of labour, as per their opinion. All large farmers are cultivating rubber and banana. Thus from Table 4.33, it is clear that marginal and small farmers are adopting mixed cropping or inter cropping. Majority of the farmers cultivate banana as an intercrop in coconut and arecanut.

Banana is the most commonly cultivated crop, with 92 per cent respondent farmers cultivating banana, followed by coconut (70%) and rubber (53%). The least cultivated category is vegetables (33%).

4.4.4.3 Socio-economic profile of the respondents

Socio economic status is a combined total measure of the economic and sociological factors in relation to a person's work experience. It is an individual's or family's economic and social position in relation to others based on income, education and occupation. For analysing the socio – economic characteristics of the respondents, eight indicators, viz., age, education, facilities at house, type of family, membership in farmer's associations, income from agriculture, family income and total agricultural production are considered, which are depicted in Table 4.34. Facilities at house are given out of ten and expressed in numbers.

Table 4.34 Socio-economic profile of the respondents

Sl. No.	Characteristics	Tenant farmers	Marginal farmers	Small farmers	Large farmers	Total
1	**Age level (years)**					
	25-35	0	1	2		3 (5)
	35-45	1	1	3	2	7 (12)
	45-55	1	15	5	1	22 (36)
	55-65	1	12	7	1	21 (35)
	More than 65	-	5	2	-	7 (12)
	Total	3	34	19	4	60 (100)
2	**Educational level**					
	Illiterate	-	2	-		2(3)
	Up to 10th	3	28	12	3	46(77)
	Higher secondary	-	2	4	-	6 (10)
	Degree	-	2	3	1	6(10)
	Total	3	34	19	4	60 (100)
3	**Type of family**					
	Joint	1	26	10	4	41 (68)
	Nuclear	2	8	9	0	19 (32)
	Total	3	34	19	4	60 (100)
4	**Average facilities at home**	4	4	6	9	-
5	**Membership in farmers' associations**					
	No membership	2	15	9	1	27 (45)
	VFPCK	1	11	7	1	20 (33)
	Farmers' Club	-	3	-	1	4(7)
	Societies		5	1	-	6 (10)

	Others	-	-	2	1	3(5)
	Total	3	34	19	4	60 (100)
6	**Income from agriculture**					
	Up to Rs. 50000	3	27	6	0	36 (60)
	Rs. 50001- Rs. 100000	0	6	7	0	13 (22)
	Rs. 100001- Rs. 150000	0	0	2	1	3 (5)
	More than Rs. 150000	0	1	4	3	8 (13)
	Total	3	34	19	4	60 (100)
7	**Total family income**					
	Up to Rs. 50000	2	12	3	0	17 (28)
	Rs. 50001- Rs.100000	1	10	3	0	14 (23)
	Rs. 100001- Rs. 150000	0	3	1	0	4 (7)
	More than Rs. 150000	0	9	12	4	25 (42)
	Total	3	34	19	4	60 (100)
8	**Total agricultural production**					
	Up to Rs. 100000	1	8	0	0	9 (16)
	Rs. 100001 – Rs. 150000	0	10	1	0	11 (18)
	Rs. 150001 – Rs. 200000	0	6	2	0	8 (13)
	Rs. 200001 – Rs. 250000	0	6	5	0	11 (18)
	Rs. 250001 – Rs. 300000	2	1	1	0	4 (7)
	More than Rs. 300000	0	3	10	4	17 (28)
	Total	3	34	19	4	60 (100)

Source: Compiled from primary survey

Note: Figures in parenthesis represents percentage share to total

Table 4.34 reveals that majority of the farmers (83%) have an age exceeding 45. Only five per cent of the respondent farmers are in the age bracket of 25 to 35. It gives an indication that the present generation is not interested in taking agriculture as a profession.

Education is an important instrument of social input. The educational status of the farmer will have profound influence in the financial management of farm and home and in turn, on the need for credit. Table 4.34 shows that 77 per cent of the respondent farmers have studied only up to the tenth standard. Only ten per cent are degree holders. Already it is seen that the youngsters are not interested in taking agriculture as a profession. Hence it can be inferred that educated youth are hesitant to make agriculture a livelihood.

As regards type of family, 68 per cent of the respondents are having joint family. This is in deviation of the recent trend seen in the urban areas of the State of Kerala.

Facilities at house include fridge, washing machine, microwave oven, two wheelers, car, mobile phone, water connection, bore well, motor pump, computer and internet facility. It is given out of ten point scale. The maximum facilities are for the large farmers. Higher the landholdings, higher are the facilities at home also.

Only 55 per cent of the respondent farmers have membership in the associations of the farmers like, Vegetable and Fruits Promotion Council, Keralam (VFPCK), Farmers' Club, societies, and others, viz., Padasekara Samities, Krishivikasana Samities, Maithri Cluster and various farm groups. VFPCK is the single organisation with the highest number of membership.

Annual income from agriculture is naturally the highest in the case of large farmers, as seen in Table 4.34.Tenant farmers have the least income. Majority (60%) of the farmers come under the income of up to Rs. 50,000 per annum.

While analysing the family income of the respondents, it is understood that the respondents have other sources of income than from agriculture. Majority of the farmers (42%) have an annual income of more than Rs. 1,50,000, while it was only 13% in the case agricultural income.

Total agricultural production of the respondents is quantity produced multiplied by its price and is expressed in rupees. All the large farmers are having agricultural production of more than Rs. 3,00,000. Majority (28%) of the respondents' agricultural production is more than Rs. 3,00,000.

After discussion of the socio economic characteristics individually, the relation between certain characteristics are discussed in the ensuing part of this section.

(a) Agricultural income as a percent of total family income: In order to examine the share of agricultural income of the respondents towards total family income, agricultural income is expressed as a per cent of total family income and is presented in Table 4.35.

Table 4.35 Agricultural income as a per cent of total family income

Per cent	Tenant Farmers	Marginal farmers	Small farmers	Large farmers	Total
Up to 25	0	9	6	1	16 (27)
25 – 50	1	10	3	0	14 (23)
50-75	0	1	1	2	4 (7)
75-100	2	14	9	1	26 (43)
Total	3 (5)	34 (57)	19 (31)	4 (7)	60 (100)

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage share of each to total

Table 4.35 reveals that major share of the income of the respondent farmers come from agriculture. For 43 per cent of the farmers more than 75 per cent of their income is contributed by agriculture.

(b) Relation between average annual agricultural income and average number of facilities: In order to have a better understanding about the agricultural income of each category of farmers, average agricultural income is compared with the average number of facilities at house, of all four category of farmers in Table 4.36

Table 4.36 Average annual agricultural income and average number of facilities

Categories of farmers	Average agricultural income (Rs.)	Average facilities (No.)
Tenant Farmers	25000	4
Marginal farmers	53882	4
Small farmers	121158	6
Large farmers	275000	9

Source: Compiled from primary survey

Table 4.36 shows that average facilities at house increases with the increase in the average income of the farmers from agriculture. Hence large farmers have the highest facilities at home compared to the other groups of farmers.

(c) Relation between membership in farmers' associations and selected characteristics: It is already seen that 55 per cent of the respondent farmers are members of farmers' organisations (Table 4.34). Hence an attempt is made to find out whether there is any significant difference between farmers with membership and without membership in associations, with respect to the facilities at house, agricultural income, agricultural production and cost of cultivation of farmers, using Mann Whitney U Test. The graphical presentation of the composition of the membership of the farmers in various associations as presented in Table 4.34 is depicted in Fig. 4.47 followed by Mann Whitney U test.

Fig. 4.47 Membership in farmers' associations or clubs of respondent farmers
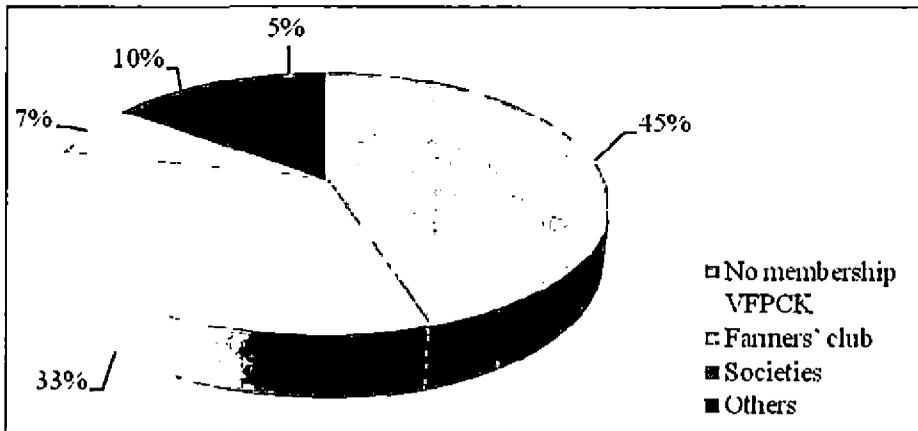
From Fig.4.47, it is clear that 45 per cent of the sample farmers are not having membership in associations or clubs of farmers. The highest membership is in VFPCK and the lowest in Padasekara Samities, Krishivikasana Samities, and Maithri Cluster which are included in 'others' category.

In order to examine whether there is any difference in; agricultural income, facilities at house, agricultural production and cost of cultivation of the respondents who have membership and not taken membership in any farmers' club or association, Mann-Whitney U Test is employed and the results are given in Table 4.37.

Table 4.37 Mann-Whitney U Test for membership in farmers' associations

Test Statistics	Agricultural income	Facilities at house	Agricultural production	Cost of cultivation
Mann-Whitney U	382	285.5	411.5	404
Wilcoxon W	733	636.5	762.5	755
Z	-0.899	-2.364	-0.455	-0.567
Asymp. Sig. (2-tailed)	0.368	0.018	0.649	0.571

From the results of the Mann-Whitney U Test given in Table 4.37, it is seen that, there is no significant difference in the agricultural income, agricultural production and cost of cultivation between farmers with and without membership in the associations or clubs of farmers. But with respect to facilities at house, significant difference is noticed between respondents having membership and those who have no membership in farmers' associations.

(d) Relation between assistance from agencies other than banks and selected characteristics: Farmers sometimes receive assistance from institutions/agencies other than credit institutions, which includes, Krishibhavan, Panchayat, VFPCK, Kerala Horticulture Development Programme (KHDP), Rubber Board, Spices Board, State Horticulture Mission (SHM), and Kerala Forest Department. They provide assistance either in cash, kind or in both. For purchase of seeds, fertilisers, implements, irrigation equipments, and machineries subsidies are given. Assistance in kind is given as seeds, fertilisers, irrigation equipments, and sprayers. Table 4.38 depicts the level of assistance provided by these agencies to the respondents.

Table 4.38 Level of assistance to the respondents from agencies other than credit institutions

Category of farmers	Not assisted	Assistance from		Total number of respondents assisted
		Krishibhavan	Others	
Tenant	1 (33)	1	1	2 (67)
Marginal	9 (27)	21	4	25 (73)
Small	6 (32)	12	1	13 (68)
Large	3 (75)	1	0	1 (25)

Source: Compiled from primary survey
Note: Figures in parenthesis represent percentage share of each to total

As seen in Table 4.38, Krishibhavan is the major agency providing assistance to the respondents in Pananchery Panchayat. Farmers who have obtained assistance from other than Krishibhavan and respondents who are getting assistance from more than one source, are included in 'others' category which includes VFPCK, KHDP, Rubber Board, SHM, Kerala Forest Department, and Spices Board. Majority of the tenant, marginal and small farmers have received assistance from other sources.

Mann-Whitney U Test was employed in order to examine whether there is any difference in: agricultural income, facilities at house, agricultural production, and cost of cultivation of the respondents who were assisted and those not assisted, by these agencies.

Table 4.39 Mann-Whitney U Test for assistance from agencies other than credit institutions

Test Statistics	Agricultural income	Facilities at house	Agricultural production	Cost of cultivation
Mann-Whitney U	382	404	285.5	411.5
Wilcoxon W	733	755	636.5	762.5
Z	-0.899	-0.567	-2.364	-0.455
Asymp. Sig. (2-tailed)	0.368	0.571	0.018	0.649

By applying Mann-Whitney U Test, as given in Table 4.39, it was found that there was no significant difference in facilities at home, agricultural income, agricultural production and cost of cultivation between those who are assisted and not assisted. It can be concluded that institutional credit availed by the respondents eliminates the difference between those who were assisted and not assisted.

4.4.5 Credit to farmers in Pananchery Panchayat: source - wise

Major institutional sources of agricultural credit in Pananchery are SCBs, co-operatives, and RRBs. SCBs in Pananchery Panchayat include State Bank of India (SBI), Punjab National Bank (PNB), and Corporation Bank. Co-operative societies are Peechi and Pananchery Service Co-operative Banks. The one and only RRB working in the Panchayat is South Malabar Gramin Bank (SMGB). Non institutional sources of credit to agriculture include money lenders, and neighbours. Table 4.40 presents the various institutional and non-institutional sources of credit to the respondent farmers of the Panchayat.

Table 4.40 Institutional agricultural credit to respondents: source - wise

Sources of agricultural credit	Number of farmers	Percentage share
Peechi Service Co-operative Bank	8	13
Pananchery Service Co-operative Bank	7	12
SMGB	8	13
SBI	23	38
Others	14	24
Total	60	100

Source: Compiled from primary survey

It is observed from Table 4.40 that SBI is the major source of institutional credit to the farmers as far as the number of farmers financed is concerned. Peechi Service Co-operative Bank and Pananchery Service Co-operative Bank have more or less equal share with that of SMGB in Pananchery Panchayat. 'Others' include PNB, Union Bank of India and Corporation Bank whose contribution to agricultural credit is negligible separately and hence put together. A better picture about the role of these institutions in the provision of agricultural credit can be obtained only if the amount disbursed is examined, which is done in the next section.

4.4.5.1 Institutional sources of credit to agriculture: As already seen institutional sources of credit to agriculture in Pananchery mainly include, PACS, SCBs and RRBs. The amount disbursed by each of the institutional sources of credit in Pananchery Panchayat to the respondents is discussed in this section. The quantum and share of various agencies based on the category of farmers are depicted in Table 4.41. The average amount of credit given per farmer in each category is also given in the Table.

Table 4.41 Institutional credit to agriculture: farmer category-wise

Categories of farmers	Institutional sources of credit to the respondents							
	PACS		SCBs		RRBs		Total	
	Amount (in Rs.)	Number of farmers	Amount (in Rs.)	Number of farmers	Amount (in Rs.)	Number of farmers	Amount (in Rs.)	Number of farmers
Tenant	10000 (12) [10000]	1	75000 (88) [37500]	2	-	-	85000 (100) [28333]	3
Marginal	435000 (15) [48333]	9	2210000 (76) [116316]	19	267000 (9) [44500]	6	2912000 (100) [85647]	34
Small	325000 (16) [81250]	4	1215000 (60) [101250]	12	500000 (24) [166667]	3	2040000 (100) [107368]	19
Large	75000 (23) [37500]	2	250000 (77) [125000]	2	-	-	325000 (100) [81250]	4
Total	845000 [52813] (16)	16 (27)	3750000 [107143] (70)	35 (58)	767000 [85222] (14)	9 (15)	5362000 [89367] (100)	60 (100)

Source: Compiled from primary survey
Note: (i) Figures in simple brackets represent percentage share of each to total
(ii) Figures in square brackets represent average credit per farmer given to each category of farmers.

As far as quantum of credit is concerned, SCBs are giving the largest credit followed by PACS. Tenant farmers are being financed by PACS and SCBs only. In the case of small farmers, highest average amount is provided by RRBs. Except in the case of small farmers, highest amount is provided by SCBs. Among the three agencies, SCBs have the highest average amount per farmer and largest share of total credit. This is in tune with the finding that in Kerala, SCBs are the major sources of financing agriculture (Table 4.3). It is mainly because of interest subvention, and simple loaning procedures that the farmers of Pananchery Panchayat are approaching SCBs. Small farmers have the highest average amount of credit compared to all other types of farmers. RRBs are not financing tenant farmers and large farmers.

4.4.5.2 Non-institutional sources of credit to agriculture: The major sources of non-institutional credit to farmers are moneylenders and neighbours. The farmers depend on non – institutional sources when they find it difficult to get loans from institutional sources at the time of need due to lack of proper security. The money lenders grant credit on simple procedures at exhorbitant interest rates. Table 4.42 depicts the farmer category – wise non-institutional sources of credit.

Table 4.42 Non - institutional credit to agriculture: farmer category-wise

Categories of farmers	Non-institutional sources of credit to the respondents					
	Moneylenders		Neighbours		Total	
	Amount (in Rs.)	Number of farmers	Amount (in Rs.)	Number of farmers	Amount (in Rs.)	Number of farmers
Tenant	50000	2	-	-	50000	2
Marginal	30000	2	71000	3	101000	5
Small	25000	1	..		25000	1
Large	-	-	-	-	-	-
Total	105000	5	71000	3	176000	8

Source: Compiled from primary survey

Table 4.42 reveals that only eight out of the 60 respondent farmers have availed non-institutional credit. None of the large farmers have taken credit from non-institutional sources. All other categories of farmers have taken credit from moneylenders, even though the number is less. The highest amount per head is not exceeding Rs. 25,000. Only marginal farmers depends neighbours for credit, which are usually interest free and for small periods.

Thus it is found that very small per cent of farmers have availed both institutional and non- institutional sources of credit to agriculture. In order to examine whether any difference is seen in; agricultural income, facilities at house, agricultural production, and cost of cultivation of respondents who have availed single source and both sources of credit to agriculture, Mann-Whitney U Test is applied.

Table 4.43 Mann-Whitney U Test for institutional and non- institutional sources of credit to agriculture

Test Statistics	Agricultural income	Facilities at house	Agricultural production	Cost of cultivation
Mann-Whitney U	166.000	159.000	142.000	129.500
Wilcoxon W	202.000	195.000	178.000	165.500
Z	-.914	-1.071	-1.435	-1.729
Asymp. Sig. (2-tailed)	.361	.284	.151	.084

From Table 4.41 and Table 4.42, it was clear that the number of farmers availing non-institutional sources of credit was negligibly small when compared to farmers availing institutional credit. The amount of loan availed from non-institutional sources was also very small. By applying Mann-Whitney U Test it is observed that (Table 4.43) there is no significant contribution from the non-institutional credit as no significant change could be observed with respect to number of facilities at home, income, production and cost of cultivation of the farmers who were using both institutional and non-institutional sources of credit and those farmers who were using only institutional sources of credit to agriculture.

4.4.6 Credit to farmers in Pananchery Panchayat: purpose - wise

It is already seen from the analysis of purpose-wise credit flow to agriculture in India and Kerala that short term and production credit respectively are the most common methods of lending by SCBs. (Table 4.4 and 4.5). Here the purpose-wise credit flow to the respondent farmers are analysed to see the trend in Pananchery Panchayat. The purpose-wise credit flow is presented in Table 4.44.

Table 4.44 Institutional credit to agriculture in Pananchery Panchayat: purpose - wise

Categories of Farmers	ST/Crop loan		KCC		Total	
	Amount (in Rs.)	No. of farmers	Amount (in Rs.)	No. of farmers	Amount (in Rs.)	No. of farmers
Tenant	85000 (100)	3	-	-	85000 (100)	3
Marginal	2237000 (77)	30	675000 (23)	4	2912000 (100)	34
Small	1670000 (82)	16	370000 (18)	3	2040000 (100)	19
Large	325000 (100)	4	-	-	325000 (100)	4
Total	4317000 (81)	53 (88)	1045000 (19)	7 (12)	5362000 (100)	60 (100)

Source: Compiled from primary survey
Note: Figures in parenthesis represent per cent share to total

Table 4.44 reveals that institutional credit is provided to farmers in Pananchery Panchayat by way of short term loans, crop loans and KCC. None of the farmers have availed long term loans. On enquiry it was found that it is not because the banks are not ready to provide long term loans, but farmers demand only short term loans. Even KCC, which has been introduced to provide hassle free and timely credit to farmers is not much popular among the farmers of Pananchery Panchayat. None of the tenant farmers and large farmers have resorted to KCC loans. Out of the 60 farmers, only seven farmers have availed KCC facility. Most of the farmers are ignorant about it and hence the number of farmers availing KCC is negligibly small. It is already seen that the most common crop in

Pananchery Panchayat is banana which is cultivated by 92 per cent of the respondents, and which requires only short term/crop loans (Table 4.27). The farmers are hesitant to take long term loans due to lack of security and the risk involved in the repayment of loan which is spread over a long period of time. Loans up to Rs 50,000 are available on the security of latest land tax receipt without any collateral security. Subsidy in interest rate is not available on amounts exceeding Rs. 3,00,000 and for long term loans. Only loans which are repayable within a period of one year are eligible for subsidy. Moreover, KCC loans are charged at a higher interest rate compared to ordinary short term and crop loans. Hence farmers are interested to take only short term loans by means of crop loans rather than KCC loans and long term loans. This has been reflected in the earlier finding that at all India level and in Kerala, long term credit and investment credit respectively have been getting reduced over the years. (Table 4.4 and 4.5).

4.4.7 Pattern of utilisation of institutional credit by farmers

Productive utilisation of institutional credit has a favourable influence on the ability of the borrower to generate additional income from the investment. It increases the farmers' ability to apply proper crop management techniques and helps to improve the yield and income. This helps to repay the loan amount in time. The usefulness of institutional credit is to be judged not merely on the quantum of credit pumped into the sector, but on how far it is utilised properly by the farmers. Hence it is attempted in this section to examine the pattern of utilisation of credit by the farmers of Pananchery Panchayat, which is the first part of the last objective of the study.

The pattern of utilisation of institutional credit availed by different categories of farmers of Pananchery Panchayat are presented in Table 4.45. The amount spent by the farmers for various inputs are classified into four slabs, viz., those who spent upto 30 per cent, of loan amount disbursed, 31-60 per cent, 61-100 per cent and more than 100 per cent. Farmers who spent less than 100 per cent diverted the credit for other unproductive purposes and those who spent more than 100 per cent contributed from their own funds and are in need of more credit for meeting their cost of cultivation, which is increasing day by day. This can be called as credit gap i.e., difference between credit actually required by the farmers and

credit sanctioned by the institutional agencies. The pattern of utilisation of institutional credit and overdue position of each category of farmers is presented in Table 4.45. The amount spent by each farmer for each item of expenditure is considered for the individual item columns, and the total of these items is considered for the total column.

Table 4.45 Pattern of utilisation of institutional credit by the respondents

Category of farmers	Per cent of utilisation of credit	Per cent amount spent for					Overdue (in per cent to total)
		Labour	Seed	Fertiliser	Others	Total	
Tenant	Up to 30	3	3	2	3	0	-
	31-60	-	-	1	-	0	
	61-100	-	-	-	-	3 (100)	
	More than 100	-	-	-	-	-	
Marginal	Up to 30	26	32	27	26	8 (24)	21
	31-60	5	2	4	-	7 (21)	
	61-100	2	0	2	7	10 (29)	
	More than 100	1	0	1	1	9 (26)	
Small	Up to 30	8	17	10	12	3 (16)	37
	31-60	5	2	0	2	4 (21)	
	61-100	4	0	7	4	1 (5)	
	More than 100	2	0	2	1	11 (58)	
Large	Up to 30	0	3	1	3	0	25
	31-60	1	1	1	0	0	
	61-100	1	0	0	0	0	
	More than 100	2	0	2	1	4 (100)	

Source: Compiled from primary survey
Note: Figures in parenthesis represents percentage share of each to total

From Table 4.45, it is seen that four major inputs for which respondents spent major portion of their institutional credit are, labour, seeds, fertilisers and for other purposes which include, purchase of poles, and other materials. Tenant farmers spent 61-100 per cent of total institutional credit for acquiring inputs. In the case of marginal farmers, 29 per cent spent 61-100 per cent of their total loan amount for acquiring inputs; 58 per cent of the small farmers and cent per cent of the large farmers spent more than the total institutional credit availed by them for purchase of inputs. From the Table it is observed that major portion of the respondent's institutional credit was used for labour, fertiliser and seeds. This reinstates the earlier finding that the farmers of Pananchery Panchayat are taking only short term/crop

loans from the institutional sources (Table 4.44). Naturally short term loans are for meeting the cost of inputs on the farm. Singh (1996) has also identified that, major productive purposes for which farmers spent credit was for purchase of agricultural inputs and implements and purchase and development of land. It is noteworthy that farmers are not taking loans for subsidiary farming activities like dairying, poultry farming etc. for which medium term loans are usually disbursed. The element of subsidy in interest rate and concession of security norms will not be available to these loans and this might be one of the reasons for not taking loans for such purposes by the farmers. Institutional credit has lesser prominence in the pattern of utilisation of credit of large farmers, since all of them are spending more than the loan amount for meeting the input costs of their farming activites. It is seen that 37 per cent of the farmers have utilised only less than 60 per cent of the loan amount for agricultural purposes. This implies that atleast 40 per cent of their loan amount was utilised for purposes other than agriculture. This reinstates the finding from the secondary data that IC disbursed in India and Kerala might not be used for the agricultural purposes alone, for which it was issued. Farmers might have diverted the credit for purposes other than agriculture (Table 4.12 and Table 4.13). Major purpose for which they diverted credit was on social and religious ceremonies and purchase of essential commodities (Singh, 1996)

With respect to overdue position of the respondents, tenant farmers are not having any loan overdue. Thirty seven per cent of the small farmers and 21 per cent of the marginal farmers are facing overdues. It is to be noted here that even with higher income from agriculture (Table 4.35), the large farmers have overdues to the extent of 25 per cent.

4.4.8 Impact of institutional credit on farmers in Pananchery Panchayat

After having a clear understanding about the impact of institutional credit to agriculture and allied activities in India and Kerala, an attempt is made here to examine the impact of IC on agricultural production in the sample area selected, i.e., Pananchery Panchayat. As in the case of India and Kerala, Cobb Douglas production model is fitted to find the impact of institutional credit on farmers of Pananchery Panchayat. In addition it is

also attempted to assess the impact of institutional credit on the standard of living of the respondent farmers using selected variables, employing Mann-Whitney U Test.

For fitting the Cobb Douglas model, total agricultural production of a farmer is taken as dependent variable and sanctioned IC (in Rs), cost of cultivation (in Rs), and cropped area (in are) of each farmer are taken as independent variables. Agricultural production, the dependent variable is expressed as 'Yp'. Independent variables, viz, IC, cost of cultivation, and cropped area are expressed as X_{P1}, X_{P2}, X_{P3} respectively. Resulted equation is as follows:

Table 4.46 Cobb-Douglas Model for sample respondents in Pananchery Panchayat

Cobb Douglas Model	Adjusted R Square
$Y_P = 5.514 + 0.075\ X_{P1} + 0.75\ X_{P2} + 0.284\ X_{P3}$ (0.038) (0.062) (0.061)	0.858

From the Cobb - Douglas production model fitted for the primary data in Table 4.46, it can be seen that 85.88 per cent of the agricultural production can be explained through the three variables viz, institutional credit (in Rs.), cost of cultivation (in Rs.) and total land used for cultivation (in are). All the regression coefficients of the model are found to be positive, implying positive impact of the independent variables on the dependent variable, agricultural production (in Rs.). The regression coefficient of IC was 0.075 which implies that for a unit change in IC (in Rs.) agricultural production in Pananchery panchayat increases by Rs.0.075.

In order to test the accuracy of the model fitted for the sample, agricultural production is predicted, using the model given in Table 4.46, with the calculated adjusted R square. Fig.4. 48 shows the predictability of the production function fitted.

Fig. 4.48 Actual and predicted agricultural production of the respondents in Pananchery Panchayat
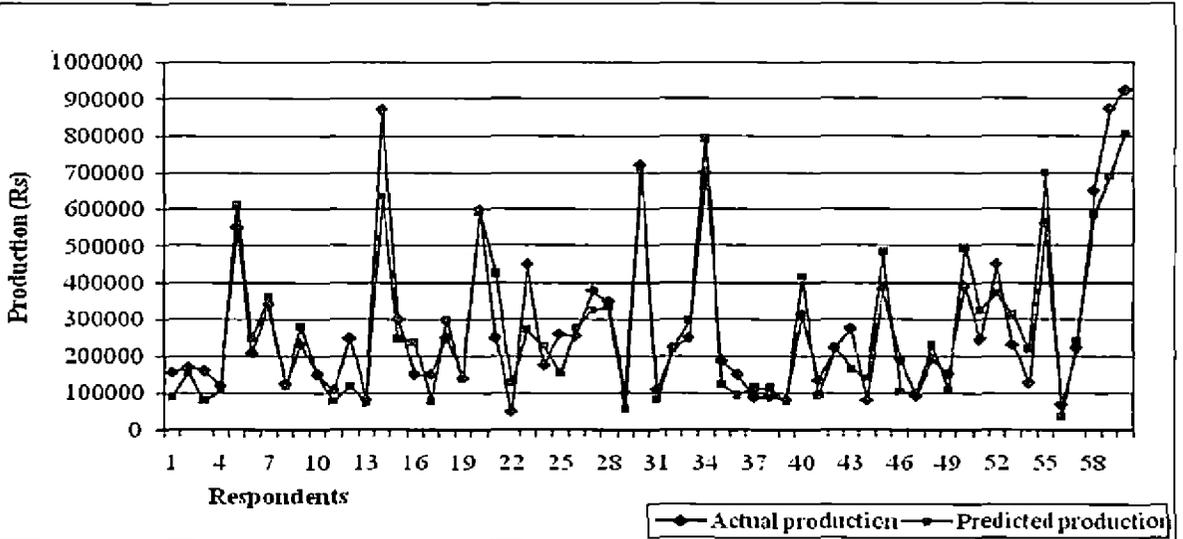
Fig. 4.48 shows that the variation in the series of actual and predicted agricultural production is very low. The actual agricultural production is moving in the same direction as compared with the predicted agricultural production of the respondents in Pananchery Panchayat as seen in case of the results using secondary data for India and Kerala (Fig. 4.40 and 4.41). Thus it is established that IC has significant impact on agricultural production of the farmers in Pananchery Panchayat, as revealed in the case of India and Kerala.

4.4.8.1 Impact of institutional credit on infrastructure facilities of the farmers: Once it is established that IC has significant impact on agricultural production, it is examined whether institutional credit has any impact on improving the infrastructural facilities of the farmers of the Panchayat. Three variables have been identified for the same, viz; water availability for irrigation, electricity connection for agricultural purposes and light goods vehicles and jeeps for transportation of inputs and agricultural commodities. Education provided to children, though not an infrastructure facility, but an indicator of standard of living, is also considered. Mann-Whitney U Test is employed in order to assess the impact of IC on water availability, electricity and education provided to children. One respondent who is not having accessibility to any of these variables was excluded. With respect to vehicles owned, simple percentage is employed since positive changes were quite evident from the tabulated data.

Table 4.47 presents the results of Mann-Whitney Test for the variables – water availability, electricity for irrigation and education provided to children.

Table 4.47 Mann-Whitney U Test for water availability, electricity and education

Test Statistics	Water availability	Electricity	Education provided
Mann-Whitney U	0	0	0
Wilcoxon W	780	903	91
Z	-7.616	-7.55	-7.55
Asymp. Sig. (2-tailed)	0.00	0.00	0.00

While analysing the impact of institutional credit on farmers, it was found that there was significant impact of institutional credit on water availability for irrigation, electricity for agricultural purposes and provision of better education to children.

Table 4.48 depicts the impact of IC on vehicles for transportation of goods owned by the farmers. The details of vehicles owned before and after taking loans are given in the Table.

Table 4.48 Impact of institutional credit on vehicles owned by farmers

Indicators	Number of farmers	Per cent share
Before taking the loan	7	12
After taking the loan	30	50
No impact	23	38
Total	60	100

Source: Compiled from primary survey

Table 4.48 makes it clear that the farmers have purchased vehicles after taking credit from institutional sources. Since the farmers have taken only short term / crop loans, there cannot be a diversion of credit for purchase of vehicles (Table 4.44). If non – institutional sources are considered it is already seen that the number of farmers who have availed it are very few in number (Table 4.42). Also it is found that 43 per cent of the respondents are having more than 75 per cent of their total family income form agriculture.

Hence it can be inferred that most of the farmers have purchased the vehicles from the income generated from agriculture after taking institutional credit. Hence the impact of IC on infrastructural facilities and educational facilities to the children of the farmers is also significant.

4.4.9 Problems faced by the respondents in Pananchery Panchayat

While conducting primary survey among the farmers, some of the problems faced by the farmers of Pananchery Panchayat with respect to agricultural production were brought to the notice of the researcher. Hence as a last part of the report, these problems are discussed which would also be of help to the policy makers while formulating policies and schemes for enhancing agricultural production in the State and the country. The major problems identified for each category of farmers ranked based on the frequency for each problem are presented in Table 4.49.

Table 4.49 Problems faced by farmers in Pananchery Panchayat

Sl No	Problems	Tenant farmers	Marginal farmers	Small farmers	Large farmers	Total	Rank
1	Supply of adulterated fertilisers	3	15	10	4	32	1
2	Non - availability of inputs	2	15	11	4	32	1
3	Untimely distribution of fertilisers	3	12	8	-	23	3
4	Increasing cost of inputs	3	6	8	2	19	4
5	Natural disasters	3	6	7	1	17	5
6	Pest attacks	3	8	6	-	17	5
7	Wild animal attack	1	5	9	-	15	7
8	Lack of proper assistance from Krishibhavan, panchayat etc.	3	7	5	-	15	7
9	Negligence by bankers	3	6	6	-	15	7
10	Price fluctuation of output	3	7	5	-	15	7
11	Non- availability of credit	1	6	3	-	10	11

Source: Compiled from primary survey

From among the eleven major problems identified and presented in Table 4.49, the problems related to inputs for agricultural production are of foremost significance. Non availability of inputs, supply of adulterated fertilisers, untimely distribution of fertilisers, and increasing cost of inputs are being ranked as the most significant problems faced by the farmers. Major inputs for agricultural production include labour, seed, fertilisers, manures, pesticides and other inputs such as poles, and other consumable materials. The major challenge for the respondents is to find labourers for farm activities. Since mechanised farming using tractors/ machines is not possible due to the geographical nature of the land, they are forced to depend on labourers to get things done, or not to do the agricultural operations. Some of the farmers, especially tenant farmers do the farming activities by themselves to the extent possible.

The respondents pointed out that some of the fertilisers available are adulterated containing deleterious or harmful ingredients injurious to plant life when applied in accordance with the directions for use on the label. Factamfos is one of important fertilisers that find acute shortage in supply in Pananchery Panchayat. Cost of inputs is another major problem faced by the respondents. The prices of fertilisers are becoming unaffordable to all categories including large farmers. The major challenge for banana cultivators in Pananchery Panchayat is the non - availability and prices of poles. These poles are either not available or they have to bring it from other places, by paying huge transportation charges which increases the price per pole exhorbitantly. The situation with respect to prices of cattle feed and hay are not much different. Thus, increasing prices of various inputs make it difficult for farmers to earn income from their agriculture and allied activities.

Crop failure/loss due to natural disasters, pest attacks and wild animal attack are also important problems faced by the respondents. Since some parts of the Pananchery Panchayat are very near to forest area, crops are destroyed by wild animals and makes unfit for human consumption. Peacock, pigs, and monkeys are threat to banana growers; rats for tapioca; and deer for rubber growers. As a result they are forced to avoid these crops at least in some part of their cultivable area.

Lack of proper technical guidance and assistance, inadequate supply of subsidised inputs, untimely distribution of fertilisers, political discrimination in the supply of inputs, absence of initiatives and technically qualified staff for providing consultancy and bank and marketing related services to farmers from Krishibhavan, Panchayat and commodity boards are also issues to be sorted out for the benefit of the farmers. The farmers, especially illiterate are in dire need of qualified staff at Panchayat level for filling up of various forms and preparation of documents and proposals to be submitted to banks for financing, providing market intelligence services for enabling them to fetch reasonable prices for their products, making them aware of the implications of non repayment of loans in time etc.

It is noteworthy that the last ranked among the problems is the non -availability of credit by the farmers of Pananchery. This was pointed out especially in the case of co-operatives, due to the procedural delays involved in getting the loans sanctioned. Timely availability of credit is also a factor which has been stressed by the farmers for implementation.

The study has revealed that institutional credit is significant in determining agricultural production. This has been proved using secondary data in the case of India and Kerala. The analysis of the primary data collected from the farmers of Pananchery Panchayat has also revealed that IC has a significant impact on agricultural production in Kerala.

Summary and Conclusion

CHAPTER 5

SUMMARY OF FINDINGS AND CONCLUSION

Agriculture forms an integral part of our economy for various reasons, for one, nearly 70 per cent of the rural population directly or indirectly depends on agriculture for livelihood support. Second, despite the share of agriculture in India's gross domestic product being around 15 per cent, the performance of the economy continues to be affected by the growth of agriculture. Despite a steady decline of its share in the GDP, there has been no corresponding reduction in people employed in this segment and agriculture continues to play a significant role in the overall socio-economic development of the country. Therefore, fostering rapid, sustained and broad-based growth in agriculture remains a key priority. Keeping in view the increasing population dependent on agriculture, the allied activities are also gaining more prominence. The interdependence of the agriculture sector and its linkages with the rest of the economy is much stronger making it more significant in the broader frame of growth architecture.

The study on 'impact of institutional credit on agricultural production in Kerala' has been undertaken with the objectives of assessing the source-wise and purpose-wise credit flow to agriculture; comparing the performance of various institutions in the provision of agricultural credit; examining the impact of institutional credit on agricultural production, and analysing the pattern of utilisation and impact of credit on farmers with respect to Pananchery Panchayat of Thrissur district.

The study was based on both primary and secondary data. The first three objectives were studied by making use of secondary data, both at national level and for Kerala; for analysing the pattern of utilisation and impact of credit on farmers of Pananchery, primary data were used. A survey was conducted using pre-tested structured interview schedule among 60 farmers, comprising of tenant, maiginal, small and large farmers.

Major sources of data were, www.rbi.org.in, Agricultural Statistics at a Glance, Economic Review, and www.indiastat.com for the period 1984-85 to 2010-11 for India, and 1990-91 to 2010-11 for Kerala. Percentages, annual growth rates, compound annual growth

rates (CAGR), ordinary line graphs, pie diagrams, Mann-Whitney U Test, correlation, simple and multiple linear regression, Cobb-Douglas model, Cochrane-Orcutt Regression model and Durbin-Watson d- Test were employed to analyse the data.

5.1 Major findings

The major findings of the study are summarised and presented in the sequence given below:

5.1.1 Institutional credit to agriculture: a prelude

5.1.2 Credit flow to agriculture: India and Kerala

5.1.3 Impact of institutional credit on agricultural production: India and Kerala

5.1.4 Pattern of utilisation and impact of credit on farmers of Pananchery Panchayat of Thrissur district.

5.1.1 Institutional credit to agriculture: a prelude

The sources of agricultural credit are of mainly two categories: institutional and non – institutional credit agencies. The institutional credit agencies consist of mainly Co-operative credit societies, Commercial banks / Scheduled Commercial Banks (SCBs) and Regional Rural Banks (RRBs). The non- institutional sources are traders and commission agents, landlords, moneylenders and friends and relatives.

5.1.2 Credit flow to agriculture: India and Kerala

The analysis of the source-wise disbursement of credit and its comparison makes it clear that at all India level, co-operatives are the major source of agricultural credit, while in Kerala, it is the commercial banks. The negligence of the co-operatives to address the credit needs of the farmers of Kerala is quite evident. Although RRBs have only a meagre share in the credit disbursement to farmers at all India level, in Kerala they have a prominent role, though not equal to co-operatives. This achievement can be attributed to the tremendous performance of the two RRBs in the State, which are among the best performing RRBs in the country. The introduction of financial /banking sector reforms in India has adversely affected the disbursement of agricultural credit by commercial banks in India and Kerala as evident

from the credit flow during these years. This situation was reversed only after the Government of India and RBI took specific measures to improve the credit flow to the agricultural sector.

Co-operatives, SCBs and RRBs which were giving prominence for direct credit to farmers, has gradually started disbursing indirect credit. The tendency of shift in the disbursement of credit from farm to non farm sector has also increased leading to declining flow of credit to agriculture.

The major credit disbursement of SCBs and RRBs are by way of short term credit. Credit disbursement by state governments and REC forms only a meagre portion of the total credit flow to agriculture.

Major portion of the institutional credit to agriculture in Kerala is given as production credit. Purpose-wise distribution of credit at all India level and in Kerala is having the same pattern, implying that institutional credit flow is declining for long term investments in agriculture.

5.1.3 Impact of institutional credit on agricuitural production: India and Kerala

The important variables considered for Cobb-Douglas production function for India were, gross domestic product from agriculture and allied activities (AGDP, in Rs. crore), institutional credit (IC, in Rs. crore), gross cropped area (GCA, in million ha), agricultural labour force (in million persons), fertiliser consumption (in lakh tones), availability of seeds (in lakh quintals), electricity consumption for agricultural purposes (in MKWh) and net irrigated area (in thousand ha). For Kerala, all these variables except availability of seeds are considered.

Trend analysis of the variables for India showed that AGDP has been consistently increasing in all the years except during 2002-03. Institutional credit has decreased in 1986-87 and 1990-91 compared to the previous year. There has been decrease in GCA in many years, which is reflected in the lowest CAGR among all the variables. Agricultural labour force is the only variable which has consistent increase throughout the study period, but at a very low rate. Institutional credit is having the highest growth rate

during the entire study period among all variables, followed by electricity in the first sub period and AGDP in the first and second sub periods. Electricity consumption for agricultural purposes in India showed a downward move during second sub period. Fertiliser consumption in India turned down in the second sub period as revealed by the low CAGR during the period compared to the first sub period. Availability of seeds in India marked an improvement in second sub period. Net irrigated area also marked decline in the second sub period in India.

With respect to the variables selected for the Cobb-Douglas production function, a different picture is seen in the case of Kerala. All variables except IC, fertiliser consumption and net irrigated area are showing a declining CAGR in the second sub period, of which GCA, agricultural labour force and electricity consumption are showing negative growth rate. Negative growth rate in GCA implies that area under cultivation is getting reduced in Kerala. Non-availability of labour force in agriculture, which is a major constraint in Kerala, is revealed by its negative growth rate throughout the study period.

The share of indirect credit to AGDP which was always less than the share of direct credit to AGDP got almost doubled in 1999-'00 and 2000-01 in India. When IC as a whole is considered, there is tremendous increase in the share of it to AGDP.

The percentage share of IC to AGSDP of Kerala is showing a mixed trend from 1990-91 till 2001-02. The increase in share of IC to AGSDP of Kerala can be attributed not only to the increase in IC, but also to the lower rate of growth in AGSDP. Since the rate of growth of IC is higher than the rate of AGSDP of Kerala, the share of IC to AGSDP is still higher for Kerala.

While analysing the growth pattern of variables for Cobb-Douglas model, in India, agricultural labour force has shown positive growth throughout the study period. The highest growth rates are reflected in IC. Gross cropped area is having the highest negative growth rates. A fluctuating trend was observed in the growth rate of AGDP in India.

In Kerala, agricultural labour force is the single variable which has a negative growth throughout the study period. A negative trend in the growth rate of AGDP is seen

except for certain years. A declining rate of growth in IC during 1997-98 and 2001-02 in which the growth in disbursement of credit by commercial banks has been negative. This can be attributed to the decline in the credit flow to agriculture by SCBs in these years. It is observed that GCA is declining fast in Kerala since 2004-05. Agricultural labour force has been consistently declining. Fertiliser consumption is showing a highly fluctuating trend. Electricity consumption is having the highest negative growth rate in 2001-02. The growth rate in net irrigated area is not remarkable in Kerala.

While comparing the growth pattern of variables using Mann-Whitney U Test it was found that the growth pattern for IC and other variables was significantly different for both India and Kerala. None of the variables showed that growth rates are moving in par with the growth rates of IC both in India and Kerala. That means, IC disbursed in India and Kerala might not be used for the agricultural purposes alone, for which it was issued. Farmers might have diverted the credit for purposes other than agriculture.

From the discussion of the trend and pattern of variables per unit of cropped area in India it is concluded that a remarkable increase in per unit of cropped area is seen only in the case of AGDP, IC, agricultural labour force and seed availability. The increase in fertiliser consumption and net irrigated area is not remarkable. While discussing the indicators per thousand ha of cropped area, it is seen that the negative effect of three of the variables have been nullified by the high annual negative growth rate in GCA in the last year of observation. This relates to IC in the year 2001-02, and agricultural labour force and net irrigated area in the last year of study.

The correlation coefficient between AGDP and IC was found highly significant both in India and Kerala. A simple linear regression model fitted using the variable IC alone could explain 88.3 per cent variation in AGDP of India. It was found that IC could explain 88.6 per cent variation in AGSDP in Kerala.

In the Multiple Linear Regression (MLR) equation fitted for India, the adjusted R square of the model for India could explain 99.4 per cent variation in AGDP by the seven

independent variables used. Agricultural labour force and seed availability were the variables found significant in the model.

The Multiple Linear Regression equation in Kerala, could explain 97.5 per cent variation in AGSDP by the six independent variables used in the model. IC and agricultural labour force are the significant variables.

Cobb-Douglas production function fitted in India could explain 99.6 per cent variation in AGDP. The significant contributing variables found were institutional credit, electricity consumption for agricultural purposes and net irrigated area. The Cobb-Douglas production function fitted again using significant variables alone gave an Adjusted R square, explaining, 99.6 per cent variation of the logarithm value of the AGDP.

The adjusted R square was 0.865 for the Cobb-Douglas model fitted for Kerala. The single significant variable noticed in the model fitted for Kerala was IC. In the model fitted again using the significant variable alone, the Adjusted R square was almost equivalent to the previous model.

Cochrane-Orcutt iterative method of regression for predicting AGDP using the seven variables, explained 99.86 per cent of variation in AGDP. The significant contributing variables were IC, gross cropped area, availability of seed and electricity consumption for agricultural purposes, with one time lag for each. This implies that not only the current figures of the variables were contributing to AGDP but also their lagged values, which have significant role in increasing AGDP of India. A parsimonious prediction model identified with three independent variables viz, IC and electricity with one time lag and availability of seed could explain 99.58 per cent of variation in AGDP with a much reduced value of Durbin-Watson Test (2.046). This regression model is recommended as the best model for predicting AGDP of India.

When the data for Kerala was considered only one variable, viz., IC has been iterated out as the significant contributor to AGDP and the corresponding equation resulted in an Adjusted R square of 88.76 per cent with a much reduced value of Durbin-Watson test

(1.91). This shows the importance and significance of IC in Kerala for making changes in AGDP.

Agricultural production in India and Kerala were predicted using the models which have the highest adjusted R square. The Cochrane-Orcutt Model is having the highest adjusted R square among the models fitted for India. For Kerala MLR model is having the highest adjusted R square. The actual agricultural production is moving in the same direction as compared with the predicted agricultural production in India and Kerala. Hence it is concluded that the prediction of agricultural production using the models fitted is accurate and that IC has significant impact on agricultural production both in India and Kerala.

5.1.4 Pattern of utilisation and impact of credit on farmers of Pananchery Panchayat

Thrissur is mainly an agricultural district where the main crops grown are paddy, coconut, arecanut, pepper, banana and vegetables. More than half of the farmers in the District are marginal farmers with an average landholding of 0.12 ha. Agriculture continues to be the main economic activity of the people in the District. More than half of the geographical area of the District comes under the sown area. Land put to non – agricultural use contributes less than ten per cent.

Major institutional sources of finance of the District include SCBs, RRBs, and co-operatives. SCBs are the major source of credit to agriculture and allied activities followed by co-operatives and RRBs in Thrissur district as seen in the case of Kerala. RRBs are having least share in total credit to agriculture. The percentage share of the three institutions in agricultural credit is showing an even trend without much fluctuation except in the case of SCBs and co-operatives in the year 2008-09. Major portion of the agricultural credit in the District is given for short term purposes.

In Pananchery Panchayat considering the area under cultivation, rubber is the major crop, followed by coconut and banana. The productivity of the Panchayat is higher than the average productivity of Kerala in the case of rubber, banana, pepper, areacanut, paddy/rice and pulses.

Majority of the farmers in Pananchery Panchayat are marginal farmers, followed by small farmers. Large farmers constitute only less than one per cent share to total. Tenant farmers were also found in the Panchayat during the survey.

Major perennial crops cultivated by the respondents are coconut, arecanut, and rubber; spices include nutmeg, turmeric, ginger, and pepper; vegetables consist of amaranthus, cowpea, bitter gourd, little gourd and snake gourd and 'others' comprise of dairying, and goat rearing. Banana is the most commonly cultivated crop, followed by coconut, and rubber. The least cultivated category is vegetables.

Majority of the farmers have an age exceeding 45. Only five per cent of the respondent farmers are in the age bracket of 25 to 35. It gives an indication that the present generation is not interested in taking agriculture as a profession. While analysing education level of the respondents, it is revealed that only ten per cent are degree holders. As regards type of family, 68 per cent of the respondents are having joint family. The highest facilities at home are for the large farmers. Fifty five per cent of the respondent farmers have membership in farmers' associations. The highest membership is in VFPCK and the lowest in Padasekara Samities, Krishivikasana Samities, and Maithri Cluster which are included in 'others' category. Annual income from agriculture is naturally the highest in the case of large farmers. Majority of the farmers come under the income of upto Rs. 50,000 per annum. While analysing the family income of the respondents, it is found that the respondents have other sources of income than from agriculture. All the large farmers are having annual agricultural production of more than Rs. 3,00,000. Major share of the income of the respondent farmers come from agriculture. Average facilities at house increase with the increase in the average income of the farmers from agriculture. .

While comparing the performance of the respondents, with respect to agricultural income, facilities at house, agricultural production and cost of cultivation, it was found that there is no significant difference in the agricultural income, agricultural production and cost of cultivation between farmers with and without membership in associations or clubs of farmers. But with respect to facilities at house, significant difference

is noticed between respondents having membership and those who have no membership in farmers' associations.

Krishibhavan is the major agency providing assistance to the respondents in Pananchery Panchayat. Majority of the tenant, marginal and small farmers have received assistance from other sources, including VFPCK, KHDP, Rubber Board, SHM, Kerala Forest Department, and Spices Board. By applying Mann-Whitney U Test, it was found that there was no significant difference in facilities at home, agricultural income, agricultural production and cost of cultivation between those who were assisted and not assisted. It can be concluded that institutional credit availed by the respondents eliminates the difference between those who were assisted and not assisted.

Major institutional sources of agricultural credit in Pananchery are SCBs, co-operatives, and RRBs. SCBs in Pananchery Panchayat include State Bank of India (SBI), Punjab National Bank (PNB), and Corporation Bank. Co-operative societies are Peechi and Pananchery Service Co-operative Banks. The one and only RRB working in the Panchayat is South Malabar Gramin Bank (SMGB). Non institutional sources of credit to agriculture include money lenders, and neighbours.

SBI is the major source of institutional credit to the farmers. Peechi Service Co-operative Bank and Pananchery Service Co-operative Bank have more or less equal share with that of SMGB in Pananchery Panchayat. Among the three agencies, SCBs have the highest average amount per farmer and largest share of total credit. This is in tune with the finding that in Kerala SCBs are the major sources of financing agriculture. It is mainly because of interest subvention, and simple loaning procedures that the farmers of Pananchery Panchayat are approaching SCBs. The major sources of non-institutional credit to farmers are moneylenders and neighbours. It is found that very small per cent of farmers have availed institutional and non- institutional sources of credit to agriculture.

Mann-Whitney U Test showed no significant difference in number of facilities at home, income, production and cost of cultivation between farmers who were availing both institutional and non-institutional sources of credit and those who were having only

institutional sources of credit to agriculture. Hence it is inferred that there is no significant contribution from the non-institutional credit to farmers in Pananchery.

Institutional credit is provided to farmers in Pananchery Panchayat by way of short term loans, crop loans and KCC. None of the farmers have availed long term loans. On enquiry it was found that it is not because the banks are not ready to provide long term loans, but farmers demand only short term loans. Even KCC, which has been introduced to provide hassle free and timely credit to farmers is not much popular among the farmers of Pananchery Panchayat. The farmers are hesitant to take long term loans due to lack of security and the risk involved in the repayment of loan which is spread over a long period of time. Farmers are interested to take only short term loans by means of crop loans rather than KCC loans and long term loans.

Four major inputs for which respondents spent major portion of their institutional credit are, labour, seeds, fertilisers and for other purposes which include, purchase of poles, and other materials. Major portion of the respondent's institutional credit was used for labour, fertiliser and seeds. This reinstates the earlier finding that the farmers of Pananchery Panchayat are taking only short term / crop loans from the institutional sources. Farmers are not taking loans for subsidiary farming activities like dairying, poultry farming etc. for which medium term loans are usually disbursed. Institutional credit has lesser prominence in the pattern of utilisation of credit of large farmers, since all of them are spending more than the loan amount for meeting the input costs of their farming activites. Farmers of Pananchery also have diverted the credit for purposes other than agriculture as seen in the case of Kerala and India. With respect to overdue position of the respondents, tenant farmers are not having any loan overdue. Even with higher income from agriculture the large farmers have overdues to the extent of 25 per cent.

From the Cobb-Douglas production model fitted for the primary data it can be seen that 85.88 per cent of the agricultural production can be explained through the three variables viz, institutional credit (in Rs.), cost of cultivation (in Rs.) and total land used for cultivation (in are). In an attempt to check the accuracy of the model fitted for primary data, it is observed that, the variation in the series of actual and predicted agricultural production is

very low. The actual agricultural production is moving in the same direction as compared with the predicted agricultural production of the respondents in Pananchery Panchayat as seen in the case of the results using secondary data for India and Kerala. Thus it is concluded that IC has significant impact on agricultural production of the farmers in Pananchery Panchayat, as in the case of India and Kerala.

While analysing the impact of institutional credit on farmers, it was found that there was significant impact of institutional credit on water availability for irrigation, electricity for agricultural purposes and provision of better education to children. Farmers have purchased vehicles after taking credit from institutional sources. Since the farmers have taken only short term / crop loans, there is no diversion of credit for purchase of vehicles. Most of the farmers have purchased the vehicles from the income generated from agriculture after taking institutional credit. Therefore the impact of IC on infrastructural facilities and education to the children of the farmers is also significant.

From among the eleven major problems identified, non availability of inputs, supply of adulterated fertilisers, untimely distribution of fertilisers, and increasing cost of inputs are the most significant problems faced by the farmers. Major inputs for agricultural production include labour, seed, fertilisers, manures, pesticides and other inputs such as poles, and other consumable materials. The major challenge for the respondents is to find labourers for farm activities.

Since mechanised farming using tractors/ machines is not possible due to the geographical nature of the land, they are forced to depend on labourers, or not to cultivate. Some of the farmers, especially tenant farmers do the farming activities by themselves to the extent possible. Some of the fertilisers available are adulterated containing deleterious or harmful ingredients injurious to plant life when applied in accordance with the directions for use on the label. Factamfos is one of important fertilisers that find acute shortage in supply in Pananchery Panchayat. Cost of inputs is another major problem faced by the respondents. The prices of fertilisers are becoming unaffordable to all categories including large farmers. Increasing prices of various inputs make it difficult for farmers to earn income from their agriculture and allied activities. Crop failure/loss due to natural disasters, pest attacks and

wild animal attack are also important problems faced by the respondents. Since some parts of the Pananchery Panchayat are very near to forest area, crops are destroyed by wild animals and makes unfit for human consumption. As a result they are forced to avoid these crops at least in some part of their cultivable area.

Lack of proper technical guidance and assistance, inadequate supply of subsidised inputs, untimely distribution of fertilisers, political discrimination in the supply of inputs, absence of initiatives and technically qualified staff for providing consultancy and bank related services to farmers from Krishibhavan, Panchayat and commodity boards are also issues to be sorted out for the benefit of the farmers. The farmers, especially illiterate are in dire need of qualified staff at Panchayat level for filling up of various forms and preparation of documents and proposals to be submitted to banks for financing, providing market intelligence services for enabling them to fetch reasonable prices for their products, making them aware of the implications of non repayment of loans in time etc. The last ranked among the problems is the non -availability of credit by the farmers of Pananchery. Timely availability of credit is also a factor which has been stressed by the farmers for implementation.

5.2 Conclusion

The study on impact of institutional credit on agricultural production in Kerala has revealed that co-operatives are the major source of IC in India, and SCBs in Kerala, Thrissur and Pananchery Panchayat. Co-operatives are more interested to provide indirect loans in recent years. IC is mainly disbursed by way of short-term and production credit in India, Kerala and Pananchery. Simple and Multiple Linear Regression, Cobb-Douglas and Cochrane-Orcutt Regression models revealed that IC has significant and positive impact on agricultural production in India and Kerala. Cobb-Douglas model for the Pananchery Panchayat also pointed out the significant contribution of IC in agricultural production.

As far as the problems of farmers of Pananchery Panchayat are concerned, availability of credit is not an important one. This might be one of the reasons for the high productivity compared to State average, in many of the crops cultivated in Pananchery, given

the significance of institutional credit in agricultural production. The major problem related to IC as pointed out by them is the absence of initiatives and technically qualified staff for providing consultancy, bank related and marketing services to farmers from Krishibhavan, Panchayat and commodity boards. The farmers, especially illiterate are in dire need of qualified staff at Panchayat level for filling up of various forms and preparation of documents and proposals to be submitted to banks for financing, providing market intelligence services and making them competent to trade in futures markets in agricultural commodities so as to fetch reasonable prices for their products. The agricultural officers, according to the farmers are preoccupied with their routine functions. Hence it is suggested that the services of additional personnel competent to provide technical consultancy and guidance with respect to the financing and commodity market intelligence services may be provided to the farmers at the Panchayat level.

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Abstract

IMPACT OF INSTITUTIONAL CREDIT ON AGRICULTURAL PRODUCTION IN KERALA

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ABSTRACT OF THE THESIS

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ABSTRACT

The study on 'Impact of institutional credit on agricultural production in Kerala' has been undertaken with the objectives of assessing the source-wise and purpose-wise credit flow to agriculture; comparing the performance of various institutions in the provision of agricultural credit; examining the impact of institutional credit on agricultural production, and analysing the pattern of utilisation and impact of credit on farmers with respect to Pananchery Panchayat of Thrissur district.

The study was based on both primary and secondary data. Major sources of data were, www.rbi.org.in, Agricultural Statistics at a Glance, Economic Review, and www.indiastat.com for the period 1984-85 to 2010-11 for India, and 1990-91 to 2010-11 for Kerala. Percentages, annual growth rates, compound annual growth rates (CAGR), ordinary line graphs, pie diagrams, Mann-Whitney U Test, correlation, simple and multiple linear regression, Cobb-Douglas model, Cochrane-Orcutt Regression model and Durbin-Watson d-Test were employed to analyse the data. Primary data have been collected from 60 farmers selected through stratified random sampling from Pananchery Panchayat of Thrissur district.

The study has revealed that co-operatives are the major source of IC in India, and SCBs in Kerala, Thrissur and Pananchery Panchayat. Co-operatives are more interested to provide indirect loans in recent years. IC is mainly disbursed by way of short-term and production credit in India, Kerala and Pananchery. Simple and Multiple Linear Regression, Cobb-Douglas and Cochrane-Orcutt Regression models revealed that IC has significant and positive impact on agricultural production in India and Kerala. Cobb-Douglas model for the Pananchery Panchayat also pointed out the significant contribution of IC in agricultural production.

As far as the problems of farmers of Pananchery Panchayat are concerned, availability of credit is not an important one. This might be one of the reasons for the high productivity compared to State average, in many of the crops cultivated in Pananchery, given the significance of institutional credit in agricultural production. The major problem related to IC as pointed out by them is the absence of initiatives and technically qualified staff for providing consultancy, bank related and marketing services to farmers from Krishibhavan, Panchayat and commodity boards. The farmers, especially illiterate are in dire need of qualified staff at Panchayat level for filling up of various forms and preparation of documents

and proposals to be submitted to banks for financing, providing market intelligence services and making them competent to trade in futures markets in agricultural commodities so as to fetch reasonable prices for their products. The agricultural officers, according to the farmers are preoccupied with their routine functions. Hence it is suggested that the services of additional personnel competent to provide technical consultancy and guidance with respect to the financing and commodity market intelligence services may be provided to the farmers at the Panchayat level.

Annexure

Kerala Agricultural University
College of Co-operation Banking and Management
Impact of institutional credit on agricultural production in Kerala
Survey Schedule for farmers in Pananchery Panchayat
(For academic purpose only)

1. Name of the respondent:
2. Age:
3. Sex: M/F
4. Type of house: (a) Hut / Tiled / Terraced
    (b) Owned / Rented
5. Marital status: Single / Married / Widowed
6. Educational status:
7. Facilities at house: fridge/ washing machine/microwave/two wheeler/car/mobile phone/water connection/bore well/motor pump/computer/internet facility

8. Are you a member in any associations/clubs/samities (Name & Year):
9. Occupational status of the respondent

Occupation	Primary	Secondary	Monthly Income	
			Primary	Secondary
a) Agricultural and allied				
b) Services and business				
c) Agricultural labourers				
d) Non agricultural labourers				
e) others (specify)				

10. Details of members of the household

Sl no	Name	Sex		Age	Main occupation	Monthly Income
		M	F			
1						
2						
3						
4						
5						

11. Details of ownership of land

Land type	Irrigated		Unirrigated	
	cultivated	uncultivated	cultivated	uncultivated
Owned				
Leased (Specify lease rent)				

12. Details of cropping pattern

Crops	Owned area		Leased area		Mixed / Single crop	Production			Cost of cultivation from		
	Area	No of plants	Area	No. of plants		Qty	Price	Total	Total	Owned Fund	Borrowed Fund

13. Pattern of utilisation of credit

13.1. Types of loan availed: ST/crop loan/MT/LT/KCC/others (specify):
13.2. Have you ever availed non-institutional sources of finance? Yes/No
If yes, details of availed non-institutional finance:
    Source: Purposes:
    Amount: Fully repaid/outstanding:
    Term:
    Interest rate:
    Security:

13.3. Details of present institutional sources of finance (including micro-finance institutions)

Source	Purpose	Loan amount sanctioned	Date of sanction	Interest	Term	Security	Overdue

13.4.Details of facilities/subsidies from other sources (krishibhavan, panchayaths etc):
    a) in cash (amount):
    b) in kind (if any specify) :

Sl No.	Inputs	Weight (Kg.)	Amount (Rs.)
1	Seeds		
2	Fertilizer		
3	Pesticides		
4	Others (specify)		
	Total		

13.5. Details of purpose-wise loan amount utilisation

Inputs	Purpose						No./Qty required	Cost	Total amount
Labour									
Seeds/seedling									
Fertiliser									
Pesticides									
Others									

13.6. Details of loan amount utilisation for investments in agricultural assets

Sl no	Assets	Year of investment	Cost of purchase	Source of finance	Rate of interest	Security
	Pump set					
	Irrigation equipments					
	Agricultural implements					

14. Impact of credit

14.1. Details of impact on income

Sl No	Crops	Income (in Rs.)					
		Before taking the loan			After taking the loan		
		Qty	Price	Total income	Qty	Price	Total income

14.2. Details of impact on standard of living

Sl No	Standard of living	Before taking the loan	After taking the loan
	Water availability		
	Change in food habits		
	Electrification		
	Education provided		
	Internet accessibility		
	Vehicles owned		

14.4. Are you satisfied with the availability of inputs in time and in required quantity? Yes/No. Give reasons.

14.5. Whether the loan amount is adequate to meet farm expenses? Yes/No. Give reasons.

14.6. What all are the problems you have faced in, obtaining credit and agricultural production?

14.7. Any suggestions for improving your accessibility to credit and improving agricultural production: