

**PRODUCTION AND MARKETING MANAGEMENT OF
COFFEE BASED CROPPING SYSTEMS IN KODAGU
DISTRICT**

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**PRODUCTION AND MARKETING MANAGEMENT OF
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DISTRICT**

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IN

AGRIBUSINESS

BY

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CERTIFICATE

This is to certify that the thesis entitled "PRODUCTION AND MARKETING MANAGEMENT OF COFFEE BASED CROPPING SYSTEMS IN KODAGU DISTRICT" submitted by Miss KAVYA V. H. for the degree of MASTER OF BUSINESS ADMINISTRATION in AGRIBUSINESS to the University of Agricultural Sciences, Dharwad, is a record of bonafide research work done by her during the period of her study in this University, under my guidance and supervision and the thesis has not previously formed the basis of the award of any degree, diploma, associateship, fellowship or other similar titles.

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1. INTRODUCTION

Pattern of crops taken up for a given piece of land, or sequence in which the crops are cultivated on piece of land over a fixed period and their interaction with farm resources and other farm enterprises is called cropping system. The importance of cropping system can be considered in a wide perspective as combination of activities leading to diversification in agriculture. It has importance for both the farmers and nation as a whole. The main objective of cropping system is combination of crops to be grown on limited farm or land area and with the given quantity of labour, capital and management resources. But it is a problem of determining the pattern of cropping system to be encouraged through national programmes with the limited availability of land resources, capital and labour. Adoption of suitable cropping system by farmers, suitable to each agro-climatic region or zone plays an important role in achieving the cropping system objective.

Botanically, coffee belongs to the genus *coffea* of the family Rubiaceae. There are more than seventy commercially cultivated species under the genus *coffea*, most of which are native of Africa including two species in India viz., *Coffea arabica* and *Coffea canephora*.

Coffee is a single largest commodity entering the international trade next to petroleum and petroleum products in the world. Coffee is the native of tropical rain forest of Ethiopia and Central Africa and now it is cultivated in many different equatorial regions: in Africa, Central America, South America, West Indies, South or South East Asia, and Pacific islands.

Coffee in India is grown as a silvi- horti crop under a tree cover for optimal performance. Coffee can be grown with other crops such as pepper, cardamom, mandarin, banana, arecanut and ginger and Spice crops are the major coffee based cropping systems which serve as a source of additional income. Annual crop could be grown as an intercrop amidst young coffee in new clearings to get some additional revenue in the initial years. Perennial crops could be grown as a inter cropping also suppress the weed growth and helps to increase the yield.

In the modern urban life coffee as a beverage, is a great socializes. It is also used as an important therapeutic agent to stimulate heart, respiratory system and as a diuretic. Coffee consumption in India is growing at a six per cent per annum compare to the global two per cent. In India, the per capita consumption of coffee is around 85 grams while it is six Kgs in the US.

Indian coffee is considered as the world's best shade-grown 'mild' coffees. Because Indian coffee is the most extraordinary of beverages, offering intriguing subtlety and stimulating intensity. India is the only country that grows all of its coffee under shade. Typically mild and not too acidic, these coffees possess an exotic full-bodied taste and a fine aroma. It is often said, the Indian coffee grower pours his life into the crop. India has consistently produced and exported a remarkable variety of high quality coffees for over one hundred and fifty years.

1.1. History of coffee in India

The journey of Indian coffee originates from a fairy tale in an interesting and unique journey made by a Sufi saint, Baba Budan from India over 400 years ago, while on a pilgrimage to Mecca. He made this 'now famous' journey from Mocha, a port city of Yemen that overlooks the Red Sea, to his homeland. Besides being a trading hub for coffee, it was the source of the popular Mocha coffee beans. Baba Budan discovered coffee in the form of a dark and sweet liquid called Qahwah on the way. As he found the drink to be quite refreshing, he decided to bring it back home; and brought back seven coffee beans from Mocha. He planted these beans in Chikmagalur, in Karnataka, which was the real genesis of the Indian coffee industry. The hills where he planted these beans are now named Baba Budan Hills.

Subsequently, coffee plantations continued to thrive in India over the period of British Raj and beyond. The Dutch began to grow coffee in the Malabar region, but a major transition happened when the British led a relentless drive to set up Arabica coffee plantations across the hilly regions in South India where they found the climatic conditions to be adopted for the crop. It all started with an ambitious and enterprising British manager named J H Jolly who was working for trading company Parry & Co. He felt that the coffee beans that are grown in the plantations of Chandragiri had huge potential and sent a petition to the Mysore government of the day for 40 acres of land to grow the crop. The success of this encouraged more people to take the plunge into the coffee plantation business, and led to the proliferation of plantations across the region. Slowly but steadily, a vibrant ecosystem also began to evolve.

Today, India is home to 16 unique varieties of coffees that are sourced from 13 distinct coffee growing regions. Coffee in India is grown under a canopy of thick natural shade in ecologically sensitive regions of the Western and Eastern Ghats.

1.2. World coffee Scenario

Coffee is an important commercial crop of the tropics. There are over 125 countries consuming coffee and about fifty per cent of them produce coffee. The major coffee growing countries of the world are broadly grouped under four regions they are: Africa, North and Central America, South America, Asia and Oceania regions. The major coffee producing countries are Brazil (33.16 %), Vietnam (15.06 %), Indonesia (11.60 %), Colombia (10.39 %), Mexico (4.73 %), India (4.5 %), Ethiopia (3.96 %), Guatemala (3.3 %), Honduras (2.90 %), Uganda (2.83 %) and others (7.57 %). The total world production of coffee during 2014-15 was 77.5 lakh metric tons out of which India's production was 3,27,000 metric tonnes in 2014-15. Robusta variety accounted for 2, 29,000 metric tonnes (70 %) of this production, while Arabica accounted for 98,000 metric tonnes (30 %). India has emerged as the seventh largest coffee producer globally; after Brazil, Vietnam, Columbia, Indonesia, Ethiopia and Honduras. It accounted for 2 per cent of the area under production and 3.7 per cent of the production in 2012 as compared to 3.18 per cent of production in 1992-93. In 2013-14, India accounted for 3.46 per cent of global coffee production and 4.52 per cent of global coffee exports.

It is estimated that more than 20 million people throughout the world earn their living from coffee. Majority of them are involved in its production and 40 per cent of them consume coffee on a regular basis. Thus, coffee is extremely important in the economies of many countries and in world trade in general.

1.3. Indian coffee scenario

Indian coffee is said to be the finest coffee grown in the shade rather than direct sunlight anywhere in the world. There are approximately 2, 50,000 coffee growers in India. Coffee production in India is dominated in the hill tracts of South Indian states. The largest coffee growing states in India are Karnataka accounting 55 per cent followed by Kerala 20.4 per cent and Tamil Nadu 7.5 per cent of India's total production. Almost 80 per cent of the country's coffee production is exported and 70 per cent is bound for Germany, Russian federation, Spain, Belgium, Slovenia, United States, Japan, Greece, Netherlands and France and Italy accounts for 29 per cent of the exports.

Indian coffee, grown mostly in southern India under monsoon rainfall conditions, is also termed as "Indian monsooned coffee". India is the only country that grows all of its coffee under shade. Typically mild and not too acidic, these coffees possess an exotic full-bodied taste and a fine aroma. Coffee is grown in three regions of India with Karnataka, Kerala and Tamil Nadu forming the traditional coffee growing region of South India followed by the new areas developed in the non-traditional areas of Andhra Pradesh and Orissa in the eastern coast of the country and with a third region comprising the states of Assam, Manipur, Meghalaya, Mizoram, Tripura, Nagaland and Arunachal Pradesh of Northeastern India, popularly known as "Seven Sister States of India". The two well known species of coffee grown in India are the Arabica and Robusta. The first variety that was introduced in the Baba Budan Giri hill ranges of Karnataka in the 17th century.

Among the coffee growing states, Karnataka stands first in the production of 2, 33,230 metric tonnes and area 71,372 acres. Its share to the total India's production was 33.61 per cent which was followed by Kerala accounting area and production of 77,385 acres and 67,700 metric tonnes. Tamil Nadu accounts area and production of 1,51,868 acres and 17,875 metric tonnes and nontraditional states are accounting 1,572 acres and 8,195 metric tonnes.

1.4. Status of Coffee in Karnataka

Coffee is cultivated predominantly three states in India namely, Karnataka, Kerala and Tamil Nadu. Karnataka has a pride place in the production of coffee accounting for 71.03 per cent of India's total production. Kerala, Tamil Nadu and nontraditional area accounted for 20.46, 6.68 and 1.83 per cent of country's total production respectively. In Karnataka, coffee cultivation is confined to three districts, namely Kodagu, Chickmagalur and Hassan. These districts respectively accounts for 45.66, 38.99 and 15.45 per cent of the area, and 54.06, 34.10 and 11.84 per cent of the production of coffee in the state. On an average 3, 67,227 person per day are employed in coffee plantations in the state of which Kodagu district accounts for 52.70 per cent (246022 person per day), followed by Chikmagalur 28.4 per cent (134029 person per day) and Hassan 18.9 per cent (90796 person per day).

1.5. The coffee board of India

In 1940's, the coffee industry in India was in a desperate state due to the II World war resulting in very low prices and ravages of pests and diseases. At this time, the Government of India established the 'Coffee Board' through a constitutional act "Coffee Act VII of 1942" under the administrative control of Ministry of Commerce and Industry. The Board comprises 33 members including the Chairman, who is the Chief Executive and appointed by the Government of India. The remaining 32 members represent the various interests such as coffee growing industry, coffee trade interests, curing establishments, interests of labour and consumers, representatives of governments of the principal coffee growing states and Members of Parliament.

Coffee Board serves as the friend, philosopher and guide to the coffee sector covering the entire value chain. The core activities are primarily directed towards research & development, transfer of technology, quality improvement, extending development support to growing sector, promotion of coffee in export and domestic markets. The activities of the Board are broadly aimed at:

- (i) Enhancement of production, productivity & quality.
- (ii) Export promotion for achieving higher value returns for Indian Coffee.
- (iii) Supporting development of Domestic market.

1.6. Export scenario

India is the third largest producer and exporter of coffee in Asia, and the sixth largest producer and fifth largest exporter of coffee in the world. The country accounts for 3.9 per cent of the global coffee production. The Arabica and Robusta varieties accounted for 30 per cent (98,000 MT) and 70 per cent (2, 29,000 MT) of India's overall coffee production in 2014–15.

Of the total coffee produced in India, 70 per cent is exported and 30 per cent is consumed domestically. In 2014, coffee consumption in India was 115.02 million kg. In 2014–15, India's coffee export volume was 2, 86,545 metric tonnes and value at US \$ 810.1 million.

1.7. Pricing and marketing of coffee

The first coffee control conference was arranged by government in September 1940. The conference recommended that the private marketing in India should be prohibited and replaced by an authority the "Coffee Board". The coffee board use to fix minimum release price for each grade of coffee marketed internally and this was based on the cost of production incurred by the growers. Under this system, it was mandatory on the part of coffee cultivators to surrender all his produce to the pool and used to receive returns on the basis of the quality and quantity of a pooled produce.

The concept pooled system which worked over 50 years gave way to partial pooling system with the initiation of ISQ (International Sale Quota). There was constant demand from the farmers for partial selling and consequently there was an allotment of thirty per cent Internal Sale Quota in 1992. According to this, the grower were given the choices of selling on this own, the thirty per cent of total produce in the internal market. Following this FSQ was initiated in place of ISQ. This announcement gave the grower the option of selling fifty per cent of his produce on his own either in the internal market or outside the country. In the year 1996, 100 per cent FSQ was allowed to the coffee growers. Now most part of the coffee is either sold directly to rosters (coffee curing works), companies and exporters or through purchase agents. A small portion is sold through auction, out of which sixty per cent find its way to the export market and remaining forty per cent is absorbed in the domestic market.

The International price in New York and London terminals became the bench mark for Arabica and Robusta coffee price at which all sales transaction were finalized. Thus in India also the price of the coffee is based on the price announced in international market. There was a general decline in price received by coffee farmer until 1991-92 price then fairly recovered before raising sharply following Brazilian frost and drought of 1004-96. During the same period coffee marketing also degradable in India, which was a significant step which affected the Indian coffee market considerably. Prices were reasonably higher during 1994-95 to 1997-98 seasons but from 1998-99 onwards again there was a sharp decline which prolonged up to 2002-03. And now it is increased slightly.

Coffee prices have been highly fluctuating over the years. The forecasting coffee prices will be useful for both the producer and policy maker in proper planning and farming suitable policies.

Growing of perennial crops require huge amount of establishment and maintenance expenditure compare to annual crops. Thus it is important to know the benefits derived from such huge investment which is spread over a long period of time.

Kodagu district stands first with respect to area and production of coffee. District is an abode of thick forest, national parks, wild life sanctuaries and large coffee plantation as well as coffee board. The district is diversified with pepper, cardamom, mandarin and other spice crops. In this district silver oak and other forest trees are commonly grown in all plantation as a shade trees.

In Kodagu district majority of the farmers are small farmers (i.e, 2-10 ha). In order to achieve higher net income from unit area, there is need to adopt mixed cropping system by selecting suitable intercrop in various agro climatic regions. Hence, there is a need to assess suitability of finding profitable coffee based cropping system. And also coffee growing farmers are facing several problems in production and marketing of coffee. Therefore, this made the researcher to study and analyze the profitable of coffee based cropping system and also to study the problems of coffee with regard its production and marketing and to suggest appropriate policy measures.

Keeping in view the importance of coffee in the state economy, the present study made an attempt to analyze the production and marketing of coffee based cropping system in Kodagu district.

1.8. The specific objectives are:

- 1) To estimate the growth in area, production and productivity of coffee in Karnataka.
- 2) To study production management of selected coffee based cropping systems in Kodagu district.
- 3) To study marketing management of selected coffee based cropping systems in Kodagu district.
- 4) To analyse financial feasibility of coffee based cropping systems.
- 5) To identify the constraints faced in production and marketing of coffee and associated crops and suggest appropriate policy measures.

1.9. Presentation of thesis

The thesis is presented in six chapters.

Chapter-I Introduction: In this chapter, the nature, importance of the present study and the specific objectives of the study have been indicated.

Chapter-II Review of literature: It presents a comprehensive review of the relevant research work done on related topics by different economists.

Chapter-III Methodology: It outlines the features of the study area, sampling design followed, relevant data and analytical tools used in the study.

Chapter-IV Results: It is devoted to present the main findings of the study through tables and graphs.

Chapter-V Discussion: It presents meaningful interpretation and discussion of the results of the study.

Chapter- VI Summary and policy implications: This chapter provides summary of the entire research work and suggests the policy implications emerged from the findings.

2. REVIEW OF LITERATURE

With a view to evaluate the objectives of the study, it was considered desirable to have knowledge of the findings of some earlier studies and the methods adopted for arriving at the same. Such a review of literature connected with the main objective of the study, it is hoped, would provide a basis either for confirming the earlier findings or for contradicting the same and thereby to suggest issues for further improvement. Consistent with the objectives of the study, the review of literature is presented in this chapter under the following heads:

2.1. Studies related to growth rates

Gemtesa (1991) compared the performance of Ethiopian coffee exports during the pre-revolution and post-revolution periods. The exponential growth model of the form $Y_t = a b^t e^u$ was employed. The results showed that, the export growth in the pre-revolution period was lower (1.51 per cent) when compared to the post-revolution period (1.77 per cent).

Jeromi and Ramanathan (1993) studied the growth of world pepper market during the period 1975 to 1990. A model of type $y_t = a e^{bt}$ was used to estimate the growth rate. The results showed that among the exporting countries, Sri Lanka registered the highest annual compound growth rate of 24.6 per cent. In case of India, positive and significant growth rate was recorded. The growth rate in total export from the other producing countries was statistically not significant.

Ashalatha (2000) analyzed growth rate of cashew export in two periods. During the period I covering 1956-57 to 1998-99, it was observed that growth rate in kernel export, raw cashewnut import, CNSL – unit value of export is showing positive trend while CNSL quantity showed negative growth rate and non-significant due to declining in the import of raw nuts (-0.75per cent) and prices of cashew kernel in world market during 1980-1990.

Lorena Soto-Pinto *et al.* (2000) studied on shade effect on coffee production at the northern Tzeltal zone of the state of Chiapas, Mexico. The objectives of investigating the effect of shade structure on coffee grain yield and assessing the potential uses of associated plant species. Results showed that shade cover percentage and coffee shrub density had significant effects on yields. Maintaining coffee shrub density as a constant, a regression equation related yield to percentage shade by a quadratic polynomial. Coffee density had a significant effect on yields but shade tree density had no effect.

Mahesh (2000) studied the export performance of Indian tea for the period from 1979-80 to 1998-99 using an exponential growth model. The results revealed that the export of Indian tea exhibited a negative growth rate of 1.15 per cent, whereas, the export value and unit price recorded annual growth rates of 8.82 and 7.65 per cent, respectively.

Babur reddy (2001) worked out growth rate of coffee in India with respect to area, production and productivity for the period of 1950-51 to 1999-2000. The compound annual growth rate of the area, yield and production was worked out as 2.86, 2.25 and 4.66 per cent per annum respectively.

Namasivayam and Richard (2004) analyzed the trend in area, production and productivity of coconut in India for the period of 1977-78 to 2001-02. The analysis done separately three phase i.e., 1977-78 to 1986-87 was I phase, 1987-88 to 1996-97 was II phase and from 1997-98 to 2001-02 was III phase. The indices revealed that area, production and productivity over the year were in III period, productivity was negative.

Jose and Jayasekhar (2008) studied the growth in area, production and productivity of arecanut in India during the period from 1971-2001. The study revealed that area, production of arecanut in India increased tremendously at the rate of 2.2 per cent and 3.2 per cent respectively. The rate of increase in both area and production was mainly due to favorable price prevailed during the period.

Krishnadas (2010) while studying the production and export performance of major Indian spices viz. chilli, black pepper, turmeric, coriander and cumin, they analyzed for the period from 1979-80 to 2006-07 using state wise and national level time series data. The statistical tools used namely, compound growth rate analysis, coefficient of variation, Hazell's decomposition analysis, Markov chain analysis and multiple regression analysis were employed. The results revealed that the growth in area under chilli was found to be negative, while production showed increasing growth due to increased productivity. The area, production and productivity of black pepper and turmeric showed positive and significant growth. The coriander area growth was found to be meager, while production showed productivity led growth. The growth in productivity of cumin was found to be negative, while production showed area led growth. The black pepper and production were found to be stable than other spices.

Nagoor (2010) analyzed various trade aspects of Indian coffee. It is observed that Indian coffee is becoming more trade oriented after liberalization. The analysis revealed that during 1950s, the production shares of Arabica and Robusta in India was 82.10 per cent and 17.90 per cent respectively. By the year 2009-10, the share of Arabica decreased to 32.67 percent and the share of Robusta increased to 67.33 percent. The export share of instant coffee and Robusta parchment has increased. It is also observed that between 2006 and 2007 international Robusta group coffee price were lower than that of Indian domestic price of coffee. The author opines that if international prices are not attractive and lower than domestic market price, the exporters will look for domestic market and also imports will increase.

Upendranadh (2010) studied the importance of small and medium growers in coffee productions was analyzed both in terms of the number of holdings as well as production. According to the author there is an upward trend in area and production in non-traditional areas and in the traditional areas it has reached a plateau.

Satya ranjan (2011) studied on economic analysis of production and marketing of rubber was conducted in West and South Tripura districts. Primary data was collected from 120 farmers and 20 market intermediaries spread over these two districts. Secondary data was collected from rubber board. The data collected were subjected to tabular, CGR and financial analysis. The results revealed that a positive and significant growth in area and production was observed in both districts and state as a whole, while productivity was found to be increasing but non-significant.

Reddy and samaya (2012) studied the growth in area, production and productivity and export of Indian coffee for the period of 1990-1991 to 2009-2010. The study revealed that the growth in area and production were growing at 2.92 and 2.81 per cent per annum respectively. The quantity exported from India was grown at compound annual rate of 3.80 per annum whereas, the total value of export was grown at the rate of 8.41 per cent per annum.

Kannan (2013) studied on growth and performance of area, production and productivity of natural rubber in India. The present study explores the growth performance of natural rubber in India as well as major producing states in India during 1981-82 to 2010-11, by using compound growth rate and co-efficient of variation. The study reveals that the growth and co-efficient of variation in tapped area, production and yield of natural rubber in India registered a significant and positive signs. While the growth in area and production in major producing states have been declining, the productivity has increased from 891 kg per hectare to 1327 kg per hectare during the study period.

2.2. Studies related to estimation of the production management

Balwinder and Okereke (1982) compared the average returns and average costs for processing palm oil and palm kernels. The average processing cost worked out to Rs.19.8 per liter of oil and that of kernels worked out to Rs.6.72 per kg respectively. The average price received by the farmer was Rs.19.8 per liter of palm oil and Rs.11.19 per unit of kernel.

Hasan and Raghuram (1987) realized 28 per cent recovery in cashew nut processing. The processing cost of cashew nut was estimated at Rs.87.06 per kg. The cost of procuring raw material was estimated to be 42.5 per cent while, labour cost accounted for Rs.56.6 per cent. The cost of shelling and peeling together accounted for Rs.40.76 per kg out of a total labour cost of Rs. 49.76.

Raikar (1990) in his study on investment in production and marketing of cashew in Karnataka observed that the utilization of installed capacity depends on the volume of cashew nuts procured. The per quintal total cost of processing worked out to be Rs.553.54. Interest on capital was the major component in the total cost of processing of cashew nuts constituting 53.62 per cent of the total cost followed by wages for piece rate workers (20.36%) and the cost of tins (11.71%). The cost of production of kernels worked out to Rs.1,976.55 per quintal of raw nuts processed. It was found that raw material cost alone formed 72 per cent of the total cost and remaining 28 per cent cost was shared by processing cost.

Balasubramanian and Rema (1996) studied pricing and transaction trend of raw cashew nut in India. It was observed that 80.50 per cent of cost of production of kernels per quintal of cashew nut was contributed by raw material cost (70%) and labour cost (10.5%) and remaining items of costs like purchase tax, fuel cost, packing material, selling, handling etc contributed only 19.5 per cent of total cost of production.

Korikanthimath and Govardhan Roa (2000) while studying on intensive cultivation of cardamom in high elevation and high rainfall. The economic viability and feasibility of cardamom production in areas of high elevation and rainfall were evaluated in Heravanad, North Coorg, Karnataka, India. The study was conducted during 1993-94 to 1998-99. The labour costs accounted for the largest percentage of the total costs during the establishment period 34.23 per cent of Rs.64,429.67/ha and bearing period 59.68 per cent of Rs. 37,614.44/ha. The average yield was 309 kg/ha, whereas the mean gross and net returns were Rs.96,960.00 and Rs.44,852.62/ha, respectively. The average production cost for dry cardamom was 168.63 rupees/kg.

Maibangsa and Subramanian (2000) studied on economic feasibility of small-scale rubber plantations in Assam. A survey was conducted during December 1997 to February 1998 in Kamrup, Karbi Anglong and Goalpara districts of Assam, India to determine the cost structure and economic feasibility of small-scale rubber plantations for the agricultural year 1996-97. The total cost of production of rubber per hectare per year was US \$ 592.40. The average yield of rubber sheet and scrap rubber was 1022 and 256 kg/ha, respectively, with an estimated gross return of US \$ 1,229.40 per hectare per annum. The net return over total cost of production was US \$ 637.00 per hectare per annum respectively.

Ray *et al.* (2000) studied on performance of areca based high density multispecies cropping system under different levels of fertilizers. An arecanut-based high density multispecies cropping system model was studied under three levels of fertilizer management i.e. full, two-thirds and one-third of the recommended fertilizer rate. The component crops included in the system were pepper trained on arecanut palms, banana in a triangular system, turmeric spaced 30 cm × 30 cm and pineapple in two rows spaced 60 cm × 30 cm between 2 arecanut palms. Nine years of mean economic yield data revealed that the full and two-third recommended rate of fertilizer resulted in higher production with arecanut yield of 2,405 kg/ha, dry pepper yield of 1,252 kg/ha, pineapple fruit yield of 987 kg/ha and 2,127 kg of turmeric/ha. However, in bananas, yield did not vary much between the full and two-third rates of fertilizer (6,313-6,331 kg/ha). With the one-third rate of fertilizer all the crops recorded the lowest yields (1,975 kg/ha of arecanuts, 884 kg/ha of pepper, 5,165 kg/ha of bananas, 543 kg/ha of pineapples and 1,801 kg/ha of turmeric). Therefore the two-thirds rate was economically more viable for the system as a whole.

Sundravaradarajan and Ramanathan (2003) estimated the establishment cost of cashew plantation for the first year at Rs. 7,690, Rs. 8,664 and Rs. 9,491 for marginal, small, large farmers respectively. The maintenance cost of cashew plantation in the case of marginal farmers were Rs. 4,059, Rs.4,410, Rs.4,910, Rs.5,385, Rs.5,841, Rs. 6,332, Rs. 6,771 and Rs. 6,990 for second, third, fourth, fifth, sixth, seventh, eighth, ninth year respectively and income of large farmers the maintenance cost were Rs. 5,040, Rs. 5,250, Rs.5,764, Rs. 6,145, Rs. 6,558, Rs. 7,021, Rs. 7,438, Rs. 7,745 for second, third, fourth, fifth, sixth, seventh, eighth, ninth year respectively. The input output ratios per hectare were 1.43, 1.55 and 1.83 for respective farmers.

Gupta and Prasanth (2004) studied marketing and processing of cashew nut in Goa state. The study revealed that the processing of cashew nut produces two products i.e., cashew nut kernel and cashew shell. He worked out the processing of cashew nut in both small and large processing units. The recovery of cashew kernel in small and large processing units was almost same with 24 kg per quintal and also recovery of cashew shell was 70 kg per quintal. Gross returns obtained in small and large processing units were Rs.5,204.60 and Rs.5,165.00, respectively and the net return per quintal was Rs.123.38 in small and Rs.191.31 in large processing units.

Rajeshwari (2004) made an attempt to study the cost and returns of coconut based farming system in Tumkur district of Karnataka. The farmers following farming system I viz., coconut + arecanut + ragi + dairy enterprise realize the highest farm income of Rs. 85,600 per farm and the cost of cultivation was Rs.1, 59,645. The major components of cost of production were amortized establishment cost, operational cost, rental value of land and material cost.

Guledgudda (2005) in his attempt to study on production and export performance of cashew- an economic analysis. A multistage random sampling procedure was adopted in selection of the sample farmers. The result revealed that the establishment cost of cashew plantations was higher in Dakshina Kannada than Belgaum. The extent of input use and cost of cultivation of cashew nut was higher in Dakshina Kannada than Belgaum. The reasons for higher costs in Dakshina Kannada are the higher use of inputs and higher wage rates.

Umesh *et al.* (2005) reported that the establishment cost of Cashew was Rs. 15,631 per hectare in all varieties studied during the first three years. The maintenance cost per hectare from fourth year onwards varied from Rs. 5,881 to Rs. 8,254 in chintamani-1, Rs. 5,640 to Rs. 8,254 in ullal-4, Rs. 5,812 to Rs. 7,882 in ullal-3 and Rs. 5,821 to Rs. 7,229 in ullal-2, the net return of cashew orchard per hector were fairly high in the order of Rs. 61,314, Rs. 60,425, Rs. 49,672 and Rs. 34,231 in chintamani-1, ullal-4, ullal-3 and ullai-2.

Varghese (2007) studied the economics of cardamom cultivation in Kerala. The result showed that cost per acre was highest in case of large size group (Rs. 38,668.44) followed by medium (37,371.28) and small group was far below than the other two counterpart. Since every small and marginal farmer was having cows and buffaloes at home, they were applying more manure and cow dung.

Satya ranjan (2011) studied on economic analysis of production and marketing of rubber was conducted in West and South Tripura districts. Primary data was collected from 120 farmers and 20 market intermediaries spread over these two districts. Secondary data was collected from rubber board. The data collected were subjected to tabular, CGR and financial analysis. The results revealed that in West Tripura, per hectare total cost of establishment was Rs.2,50,307.27 and Rs. 2,33,333.16 in small and large plantations, respectively whereas in South Tripura it was Rs. 2,41,010.49 and Rs. 2,27,429.86 in that order. In West Tripura, the per hectare maintenance cost was Rs. 80,392.48 and Rs. 81,204.66 in small and large plantations, respectively whereas in South Tripura it was Rs. 80,933.17 and Rs. 82,114.84 in that order. The per hectare average yield of rubber sheet was 1460.18 kg and 1415.44 kg in West and South Tripura, respectively whereas the yield of scrap rubber was 128.84 kg and 126.58 kg in that order.

2.3. Studies related to marketing channel, marketing cost and price spread

Agarwal and Singh (2003) identified the marketing channel for cumin in Nagaar district of Rajasthan, as well as determined the marketable surplus and marketing pattern and margin for cumin seeds in the area. The marketable surplus of cumin seed was 98 per cent of the total production. Two marketing channels were identified: one is through village traders then to wholesalers, and the other one is direct to wholesalers. The producers share in consumer's rupee was 61.36 per cent in village level scale and 69.87 per cent in sale at regulated market.

Joy (2004) studied the marketing of coffee in Wayanad district of Kerala and found that withdrawal of Coffee Board has led to the emergence of intermediaries in trade. Middlemen sell the coffee directly from farmers to wholesalers who in turn export it. The expenses on transportation, storing, and marketing which constituted only 26 per cent of the total cost in 1980 increased to 67 per cent in 1990. All the burden of the increase in marketing costs fell upon the farmers and reduced their profits.

Devi *et al.* (2004) an economics of coffee cultivation and its marketing in Visakhapatnam district of Andhra Pradesh. The analysis revealed that based on data collected from 90 small tribal coffee growers and 30 traders in Visakhapatnam district, Andhra Pradesh, it determines the establishment and maintenance costs of Arabica coffee plantations, as well as the returns, profitability and economic viability; and identifies the marketing channels for coffee in the district, and determine the marketing costs, margins and efficiency. It is concluded that coffee cultivation is a profitable enterprise and that marketing through the channel "Girijan Cooperative Corporation Ltd. - Andhra Pradesh Forest Development Corporation - retailer/roaster" is more efficient.

Uma *et al.* (2004) studied the price spread and marketing channels of coffee in Visakhapatnam District of Andhra Pradesh. The study reveals that four channels were identified for marketing of coffee.

Channel I: Producer-commission agents-Wholesalers- Retailer cum Roaster-Consumer.

Channel II: Producer- Girijan co-operative society- Wholesalers-Retailer cum Roaster-Consumer.

Channel III: Producer- Girijan co-operative society- Retailer cum Roaster- Consumer.

Channel IV: Producer- Girijan co-operative society - Exporter-Terminal market.

The producer's share in consumer rupee was maximum in channel IV (43.06) followed by channel II (38.09) and channel I (34.46). Among the three channels, marketing efficiency was found to be more in Channel III by 55.45 per cent.

Guledgudda (2005) in his attempt to study on production and export performance of cashew-an economic analysis. A multistage random sampling procedure was adopted in selection of the sample farmers. Among the five marketing channels identified, the producer's share in processor's rupee was highest in channel-V and lowest in channel-II.

Wayan (2005) studied marketing of coffee in North Sumatra and found that market performance is relatively efficient as indicated by the relatively fair profit margin gained by collectors, traders, and exporters and high farm gate price. The profit margins range from 2.8 – 3.8 per cent of FOB price while farm gate price is around 86.4 per cent.

Namasivayam and Paul (2006) studied the price-spread marketing of coconut in Tamil Nadu with reference to Theni district, which is the prominent producer of coconut in the state. They identified the following three marketing channels:

Channel-I: producer → pre harvest contractor → commission agents → wholesalers' → retailers → consumers

Channel-II: producer → commission agents → wholesalers → retailers → consumers

Channel-III: producer → wholesalers → retailers → consumers

The channel III was the most favored channel as maximum (47 per cent) quantity passed through this channel. The producer's share in consumer's rupee was maximum in channel- III (58.73) followed by channel-II (58.32) and channel-I (50.20). It is revealed that the marketing efficiency was higher in channel-III (3.17) followed by channel –II (2.87) and channel-I (2.81).

Gondalia and Patel (2007) studied marketing of Aonla in Gujrat. They identified three marketing channels, they were,

Channel I: Producer-wholesaler-retailers-consumers

Channel II: Producer-pre-harvest contractors-wholesalers

Channel III: Producer- processors.

Marketing cost and marketing margins came to 240.37 and 507.33 per quintal, respectively. The producer's share in consumer's rupee was 58.26 per cent. The marketing efficiency was 1.40. The distribution of total marketing cost implied that the cost of weight loss due to damage and spoilage had the lion share of 26.01 per cent.

Nagaraja and Basavaiah (2011) Coconut production and marketing in India: a case of Chitradurga district. Investigation was carried out in Chitradurga district of Karnataka during the year 2007-08 on coconut production. The four hundred sample size of each wholesaler, trader and retailer was selected. Cross sectional data were collected from the sampled coconut growers and market intermediaries by personal interview method with the help of pretested schedule. There were different channels of coconut marketing were identified i.e.,

Channel-I: Farmers → Consumer

Channel-II: Farmers → Pooling agent → Consumer

Channel-III: Farmers → Pooling agent → Merchant broker → Consumer

Satya ranjan (2011) studied on economic analysis of production and marketing of rubber was conducted in West and South Tripura districts. Primary data was collected from 120 farmers and 20 market intermediaries spread over these two districts. Secondary data was collected from rubber board. The data collected were subjected to tabular, CGR and financial analysis. The result revealed that among the two channels for marketing of rubber sheet and one channel for marketing of scrap rubber, the producer's share in factory's rupee was almost same in all cases.

Koujalagi (2012) focused on the study of production, marketing and export performance of pomegranate in Karnataka. A sample size of 100 farmers and 30 market intermediaries were selected using multistage random sampling. The analytical tools were used for study, tabular analysis, growth

rate analysis, instability analysis; financial feasibility analysis, Markov Chain analysis and SWOT analysis were employed. The result obtained that among three channels were identified in the present study channel-I: producer - commission agent cum wholesaler - retailer - consumer, channel-II: producer - distant wholesaler and channel-III: producer - exporter. The second channel was the most popular channel in the study area wherein the farmer incurred a cost of Rs. 33.86/ton and Rs. 35.78/ton in marketing of pomegranate and received a net price of Rs.33,656.19/ton and Rs. 33,851.23/ton in Bagalkot and Koppal districts respectively.

Malave *et al.* (2012) conducted a study on “Economics of marketing of raw cashew nut in Konkan region of Maharashtra” in which they studied the various channel of marketing of raw cashew nuts. Five marketing channels were observed in the study area. These were as follows:

Channel-I: Grower → village merchant → wholesaler → processor

Channel-II: Grower → village merchant → processor

Channel-III: Grower → village merchant → factory agent → processor

Channel-IV: Grower → wholesaler → processor

Channel-V: Grower → processor

Channel-I was most popular in the study area as 27 growers (45%) sold their 22.13 cent produce through this channel followed by channel-II, channel-IV, channel-V, channel-III with 12 growers (20%), 10 growers (16.67%), 6 growers (10%), 5 growers (8.33%). The study revealed that the marketing efficiency was much higher in channel-V. The highest marketing margin is in channel-IV.

Karunakaran (2013) Arecanut marketing in Kerala - method of sale and channels. The study revealed that in Kerala arecanut growers follow different methods of sale, majority of the farmers follow the method of selling arecanut to the traders in the village immediately after harvest. Arecanut marketing channel involves a number of market intermediaries. Most of the produce passes through village traders, itinerant merchants, private wholesalers, the CAMPCO and the retailers. Lower price spread and better price to the arecanut growers indicate higher efficiency in cooperative marketing channel than any other marketing channel in Kerala.

2.4. Studies related to financial analysis aspects

Korikanthimath *et al.* (2002) Cultivation of cardamom (*Elettaria cardamom*) in valley bottoms under evergreen forest shade. A field trial was conducted at Hakathur, Coorg (Karnataka) to study the production potential and economics of cultivation of cardamom in valley bottoms under evergreen forest shade situations. The study revealed that the discounting cash flow measures *viz.* Net Present Worth (NPW) of Rs. 5,23,455/ha; Benefit Cost Ratio (BCR) of 3.53; Pay Back Period (PBP) of 2.14 years and Internal Rate of Return (IRR) of 59.08 % showed that cardamom is an economically viable and feasible crop for cultivation under valley bottoms which retain soil moisture round the year, most suited for optimum growth and yield.

Rajesh (2006) worked out the economics of vanilla cultivation of Uttar Kannada district of Karnataka. The NPV of cash inflow per ha was Rs. 18,56,659.40 on small farm and 24,48,524.8 on large farmer. BC ratio was 10.71 on small farmer and 13.71 on large farmer. The IRR was 58 % on small farmer and 65 % of large farmer. The breakeven point for small farmer was 145.5 and 127.9 kg for large farmer. In vanilla grown as pure crop, the NPV per ha was 49,42,593.61 on small farmer and 53,73,993.35 on large farmer.

Deorukhakar *et al.* (2007) Economics of arecanut cultivation in Ratnagiri district of Maharashtra state. Study was conducted during 2002-03. The study revealed that the benefit cost ratios for small, medium-sized and large orchards, and the and overall benefit cost ratio were 2.06, 2.55, 2.10 and 2.24, respectively. The medium-sized orchard was more profitable than a small or large orchard.

Goswami and Challa (2007) studied on economic analysis of smallholder rubber plantations in West Garo Hills District of Meghalaya. This study estimates the costs and returns of smallholder rubber plantations in West Garo Hills district and also measures the extent of labour absorption in smallholder rubber plantations and also evaluates the productivity of capital invested in such plantations. The study was conducted during the year 1998-99. The result revealed that the positive net present value, a benefit-cost ratio of 2.41% and an internal rate of return of 14.40% imply that investments made in smallholder rubber plantations are highly remunerative.

Dubey *et al.* (2010) studied on prospects of rubber plantation in Tripura as an alternative to shifting cultivation. The study resulted that a positive net present value, a benefit-cost ratio of 2.41 and an internal rate of return of 14.40 per cent implies that investment in small holder rubber plantations is a profitable proposition.

Reddy *et al.* (2010) A comparative study on economics of mulberry with other commercial crops of Andhra Pradesh. A study was taken up to study the economics of mulberry with other commercial crops of Andhra Pradesh as there was declining trend in mulberry cultivation and rapid improvement in the acreage of horticultural crops namely mango, sapota, citrus grapes, banana and musk melon including beetle nut. The study indicated that B:C ratio was 1.41 for mulberry and 2.72, 3.80, 4.84, 3.78, 2.85, 2.17, 5.09 and 4.01 for mango, sapota, beetle nut, citrus, pomegranate, grapes, banana and musk melon respectively.

Ilham and Saliem (2011) studied on feasibility of the oil palm-cattle integration system through cows-breeding business credit program. This article aims to analyze financial feasibility of an integrated beef cattle farm business on areas under oil palm plantations with different patterns of raising cattle. The analysis is done based on previous studies related to an integrated cattle farming under oil palm plantation. Integrated cattle breeding farms with oil palm plantation is a feasible business to carry out with its IRR values varying from 21 to 29 per cent, the values of BC ratios between 1.35 to 2.67, and payback period of 4.91 to 6.4 years.

Satya ranjan (2011) studied on economic analysis of production and marketing of rubber was conducted in West and South Tripura districts. Primary data was collected from 120 farmers and 20 market intermediaries spread over these two districts. Secondary data was collected from rubber board. The data collected were subjected to tabular, CGR and financial analysis. The results revealed that financial analysis revealed that rubber enterprise has maximum NPV, IRR, BCR and PBP.

Koujalagi (2012) focused on the study of production, marketing and export performance of pomegranate in Karnataka. A sample size of 100 farmers and 30 market intermediaries were selected using multistage random sampling. The analytical tools were used for study, tabular analysis, growth rate analysis, instability analysis, financial feasibility analysis, Markov Chain analysis and SWOT analysis were employed. Financial analysis revealed that the values of NPV, B:C ratio and IRR were Rs. 3,02,602.65, 2.98, 19.76 % and Rs. 3,87,900.02, 3.62 and 22.45 % for Bagalkot and Koppal districts, respectively discounted at 9 per cent opportunity cost of capital are fairly high reflecting greater financial viability of investment in Pomegranate cultivation in Bagalkot and Koppal districts.

Acharya *et al.* (2015) studied on profitability and resource use efficiency of coffee production in palpa district, Nepal. A sample size of 110 coffee growers was selected using multistage random sampling. The primary data and other sources for secondary data collection and was analysed by using SPSS and Microsoft Excel. The result revealed that BCR of 1.39, NPV Rs. 13582.07, IRR of 32.50 % and less than 5 years of PBP of coffee production. It shows that the coffee business may be the suitable and financially feasible business in the mid hills of Nepal.

Nogueira *et al.* (2015) studied on natural rubber market and economic viability of rubber tree crop in Brazil. This paper aims at putting natural rubber market in Brazil in context and analyzing the economic viability of rubber crop. The results show that it is necessary to invest in order to promote production growth, so that the country gets self-sufficiency of natural rubber. The national market is strongly influenced by international market fluctuations. It was possible to conclude that investment in the natural rubber production from rubber tree is economically viable with Net Present Value (NPV) Rs. 4,405.07/ha, Internal Rate of Return (IRR) 10.82 per cent, Benefit-Cost Ratio (BCR) of 1.16 and Equivalent Periodic Benefit (BPE) Rs. 416.36/ha/year.

Siam *et al.* (2015) the objectives of this research were to study the economics of green houses, through identifying constraints of production capacity and economic efficiency in Egypt in general, and studying the targeted vegetables crops in particular. This research was based on published secondary data from official establishments such as Ministry of Agriculture and CAPMAS. It also depended on data compiled from a form of random sample of about 130 green houses in Bahariya Oasises in 2014. It used sampling fraction about 3 per cent of cucumber, pepper and green beans houses with number of 50, 40 and 40 houses respectively. Financial analysis reveals that the most profitable crop was pepper, followed by green beans then cucumber. IRR of the three crops were 295, 97 and 95 per cent respectively. This indicates that the invested pound in cucumber, pepper and green beans in plastic house profits 0.95, 2.95 and 0.97 pound, respectively. Payback period for the capital is estimated by about 1.06, 0.34 and 1.03 year, respectively, showed that the project is an economically viable and feasible.

2.5. Studies related to analysis of constraints in production and marketing

Ramakumar (2001) Costs and margins in coconut marketing: some evidence from Kerala. The paper attempts to understand certain aspects of marketing of coconut in 4 districts of Kerala State, India. The study is based on primary data collected through a field survey of 120 coconut growers, 24 copra makers and 24 oil mills, in the agricultural year of 1996-97. The study revealed that the most important problem identified in marketing was the lack of adequate and fair price for coconut and its products and the fluctuation in the prices.

Radhakrishna (2003) in his study revealed the coffee crisis that depressed coffee price over the past three years had caused immense economic and social costs and there was an urgent need to restructure the industry. There is a crisis eroding the livelihood of 25 million coffee producers around the world.

Rajeshwari (2004) in her attempt to the study the problem and prospectus of coconut based farming system in Tumkur district of Karnataka obtained that the major problem faced by the farmers were mite infestation in coconut gardens, lack of awareness about the WTO, scarcity of the family labour, lack of transportation and marketing facility. The other problem include were less reliable market in the context of global scenario, low yield and non available of support prices.

Deorukhakar *et al.* (2007) in their study marketing of arecanut in Ratnagiri district of Maharashtra identified the constraints in the production and marketing of arecanut in the study area. Under production constraints water scarcity during summer season (33.33%), non-availability of agro-chemicals in villages (32.22%) and non-availability of credit from commercial banks (28.89%) were found to be major. Under the marketing constraints payment recovery took long period (20.00%) and monopoly of village merchants (12.22%) were identified.

Rane and Bagade (2006) studied economics of production and marketing of banana in Sidhudurg district of Maharashtra. The study revealed that the farmers were facing the problem of bunchy top disease of banana in production of banana.

Vanishree (2007) in her attempt to study the production and marketing of Jasmine in Chitradurga District –An economic analysis. The objective of study was to analyze the production and marketing of Jasmine in Chitradurga District. A multistage random sampling procedure was adopted in selection of study area. Taluk (3), Villages (4), Respondents (120). The major problems confronting the cultivators are incidence of pest and diseases, high commission charges, violent price fluctuations and non existence of well developed marketing system.

Naveen (2009) studied on economics of production and value addition to wine grapes was conducted in Bijapur district of Karnataka. Primary data was collected from 60 wine grape growers spread over in the district. For analysis of data tabular presentation method and financial analysis were adopted. Opinion survey was conducted to know the problems in the production of wine grapes and wine. Result reveled that high initial investment cost and high cost of labour were the major problems in production of wine grapes. Similarly, marketing of wine and high excise duties were the major problems in winery.

Kerutagi *et al.* (2009) conducted a study in Belgaum and Dharwad district of Northern Karnataka to identify the constraint in sapota marketing. The study revealed that the major problem in sapota marketing expressed by the farmer were lack of storage facility (94.44 %), collection of higher commission charges (83.33 %), high transportation cost due to lack of nearer markets and non availability of proper market information.

Vinod Anavrat (2010) studied on marketing constraints and technology needs of Nagpur Mandarin growers. The study revealed that farmers were not getting remunerative prices was the major constraints as expressed by 82.28 percent respondents, financial constraints compels 68.57 percent orchardists for preferential selling to the pre-harvest contractors. The lack of refrigerated storage facility in the market for the storage of Nagapur Mandarin fruits was also a major constraints expressed by 62.85 percent farmers.

3. MATERIAL AND METHODS

Use of appropriate methodology is important to carry out a systematic analysis of any research problem. This chapter deals with the methodology followed in the present study which includes the nature and source of data, techniques employed and statistical procedures followed. The details of each are presented under the following headings:

3.1 Description of study area

The Kodagu district occupies the summit and the Eastern and Western slopes of the Western Ghats. Kodagu district in Karnataka state (75°25'–76°14' E, 12°15'–12°45' N) is a major coffee-growing region located in the Western Ghats mountains. The district has a mountainous configuration with valleys and ravines. In Kodagu, agriculture forms a lifeline for majority of households. The main crops are coffee, spices (cardamom, pepper, ginger and turmeric) and paddy. Most of the spices are grown as intercrops in coffee plantation. Fruits such as orange, guava, sapota, lime, pineapple and banana were grown in large quantities earlier. Presently, with the exception of banana cultivation other fruit crops are declining. The district produces nearly one-third of Indian coffee, mostly in agro forestry systems under native tree cover. Altogether, forests and agro-forests account for nearly 80 per cent of the Kodagu district. Forest covers almost 50 per cent of the district, making it one of the most densely forested districts in the country. Central Kodagu is dominated by agricultural land, especially coffee estates that cover 30 per cent of the total area of the district, with Arabica and Robusta varieties of coffee. Coffee in Kodagu is grown under high tree shade which supports rich biodiversity. The district is bounded on the North by Dakshina Kannada district and Sakleshpur taluk of Hassan district and on the South by Wynaad taluk of Kerala. On the West, it is bounded by Dakshina Kannada and Malabar and on the East, by Hassan and Mysore districts. The west, northwest and southwest boundary runs along the foot of the Western Ghats, which overlook the low lands of South Canara and Malabar. On the North and East for a short way, the Cauvery and the Hemavathy rivers mark the boundary between Mysore and Kodagu. On the south, the Brahmagiri range of hills forms the line of division from the Wynaad division. The map of Kodagu District is shown in Fig. 1.

3.1.1 Climate

The climate is pleasant throughout the year. Even during the summer months of March to May the mean daily temperature remains at 28.6 degree Celsius. It receives an annual rainfall of 2725 mm spread over six months, most of it from the south-west monsoon during June to September. It is supplemented by cyclonic rains from the north-east in November and December. The Geographic and demographic profile of Kodagu district is presented in Table 3.1.

3.1.2 Economic wealth

The economic mainstay of the district is coffee, cardamom and pepper. Paddy is staple food crop cultivated once a year and most of the agriculture in the district is rainfed. Horticultural crops like oranges, bananas and cardamom were inter-planted in the coffee estates. The two popular varieties of coffee grown are Arabica and Robusta. Other crops cultivated are coconut, arecanut, ginger and some of the spices. Kodagu has the highest per capita income in Karnataka. Kodagu is known for growing excellent quality coffee, pepper and cardamom. Bee keeping, another environment friendly economic activity was popular in the district. Kodagu honey is also known for its unique flavor and quality (<http://www.citKodagu.in>).



Karnataka



Kodagu

Fig. 1. Map showing the study region in Karnataka

Table 3.1 Geographic and demographic profile of the study area

Sl. No.	Particulars		Kodagu
1	Geographical area (hectares)		4,10,775
2	Forests (hectares)		1,34,597
3	Taluks (numbers)		3
4	Villages (numbers)		303
5	No. of Gram Panchayats		97
6	No. of Town Panchayats		05
7	Population (numbers)	Male Female Total	2,74,831 (50.10) 2,73,730 (49.90) 5,48,561 (100)
8	Density of population (per sq. km)		113
9	Literacy rate (%)		78.17
10	Average rainfall (mm)		2,725.5
11	Per capita Income (Rs. per annum)		3,535

Source: District at a glance (2014-15)

Note: Figures in parentheses indicates respective percentages to the total population

3.1.3 Geographic and demographic profile of the study area

Kodagu district in Karnataka state is a major coffee growing region located in the Western Ghats Mountains. It consists of three taluks viz; Somwarpet, Madikeri and Virajpet. The population of the Kodagu district was 5, 48,561 (2011 census) and out of the total population 78.17 per cent of the population is literate. The average rainfall of the district was 2,725.5 mm per annum (Table 3.1). Total geographical area of Kodagu district is 4, 10,775 ha out of this 1, 34,597 ha is under forest, 47,245 ha land is not available for cultivation, 54,971 ha is uncultivable land and total net sown area is 1, 65,035 ha (Table 3.2).

3.1.4 Cropping pattern of the study area

The cropping pattern in Kodagu district as shown Table 3.3 during 2014-15, indicated that out of the net cultivated area, plantation crops formed the important component with 97.499 per cent followed by fruits crops (2.183 %), vegetables (0.299 %) and flower crops (0.018 %). Major plantation crops grown are coffee, cardamom, pepper, arecanut and ginger. Major fruit crops grown are banana, citrus, mango, guava and sapota. Major flower crops are anthurium.

3.2 Sampling procedure

The study was conducted in Kodagu district of Karnataka state. For present study, multistage sampling technique was followed. In Karnataka, Kodagu district accounts for 54.06 per cent of total production of coffee. Hence, Kodagu district was selected purposively.

The second stage comprised of selection of taluk. From the Kodagu district all the taluks were selected.

In the third stage, from the three taluks, 13 coffee planters from Madikeri taluk, 14 coffee planters from Somwarpet taluk and 13 coffee planters from Virajpet taluk were randomly selected for the study. The number of respondent selected from each taluk is depicted in figure (2).

To study the marketing aspects of coffee based cropping system, 20 commission agents, 20 preharvest contractors and in the study the final product is consider as coffee bean so the final consumer is consider as curing agency hence, instead of 20 consumers, 40 curing agency were randomly selected from the study area.

In the study different coffee based cropping system were identified. Of these cropping system, more than 80 per cent of the planters are following two major cropping systems, i.e. cropping system-I (coffee + pepper) and cropping system-II (coffee + cardamom). So two major coffee based cropping systems were selected for detailed analysis of the system. From the two cropping systems, 26 respondent were comes under the group of cropping system-I and 14 respondents were comes under the group of cropping system-II.

So the total sampling size was 40 farmers and 80 middlemen's. Thus the total sampling size was 120.

Table 3.2 Land utilization pattern in Kodagu district

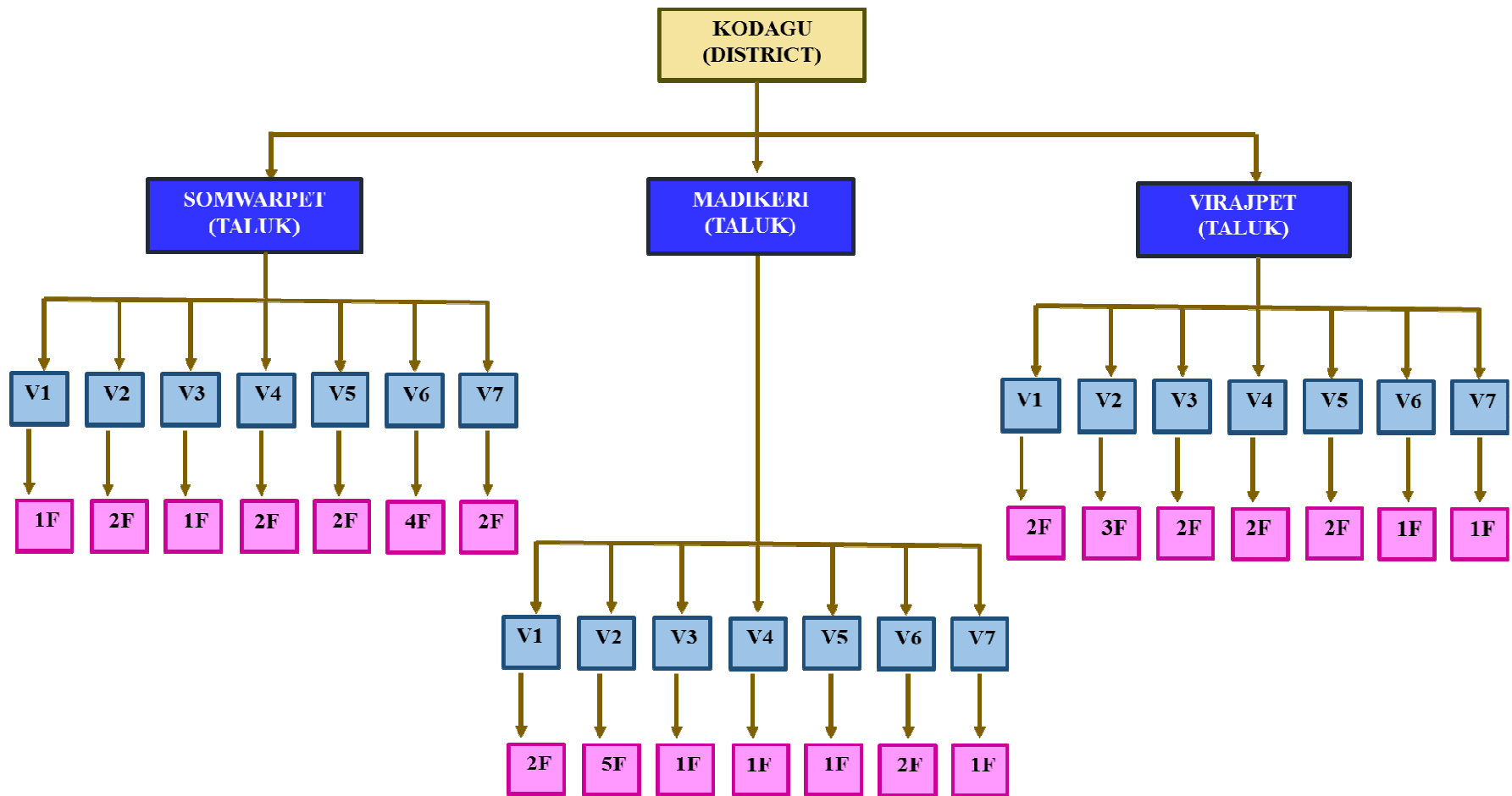
Sl. No	Particulars	Area in hectares	Percentage to geographical area
1.	Area under forest	1,34,597	32.76
2.	Land not available for cultivation		
	i. Non agricultural uses	23,961	5.83
	ii. Barren land	31,010	7.54
	Total	54,971	13.38
3.	Other uncultivated land		
	i. Cultivable waste	9,128	2.22
	ii. Permanent pastures	14,774	3.59
	iii. Trees and grooves	23,343	5.68
	Total	47,245	11.50
4.	Fallow land		
	i. Current fallow	4,928	1.19
	ii. Other fallow	3,999	0.97
	Total	8,927	2.17
5.	Net sown area	1,65,035	40.17
6.	Area sown more than once	13,444	3.27
7.	Geographical area	4,10,775	100.00

Source: District at a glance (2014-15)

Table 3.3 Cropping pattern of the study area

Sl.No	Crops	Area (000ha)	Percentage
1.	Fruits		
	Banana	1.483	1.13
	Citrus	1.122	0.86
	Mango	0.104	0.07
	Guava	0.072	0.05
	Sapota	0.062	0.04
	Total	2.843	2.18
2.	Vegetables		
	Sweet potato	0.128	0.09
	Knol- khol	0.096	0.07
	Potato	0.085	0.06
	Tapioca	0.047	0.03
	Radish	0.034	0.02
	Total	0.39	0.29
3.	Plantation & Spice crops		
	Coffee	103.325	79.34
	Cardamom	9.043	6.94
	Pepper	8.880	6.81
	Areca nut	2.994	2.29
	Ginger	2.729	2.09
	Total	126.971	97.49
4.	Flower crops		
	Anthodium	0.024	0.01
	Total	0.024	0.01
	Total	130.228	100.00

Source: District at a glance (2014-15)



V = Village
F = Farmer

Fig. 2. Number of coffee planters selected for the study

3.3 Nature and source of the data:

Primary and secondary data were collected for the study:

Primary data were collected with the aid of well structured and comprehensive schedules excluding prefaced for the study. The schedule was prepared after discussing with various specialists and planters. The schedule was subjected to pre-testing to know the lacuna and for further improvement. The study was conducted during January to March months in the year 2016. The primary data were collected from the sample estate managers (coffee planters), preharvest contractors, commission agents, wholesalers (curing agencies) and consumers by personal interview methods. The primary data based on the record maintained by the coffee planters / estate managers. In the case where records were maintained, the data obtained were based on the memory of the planters or estate managers.

Secondary data on the area, production and productivity of coffee in Karnataka and India were collected, for the period 1995 to 2015 was obtained from Coffee Board, Bangalore.

3.4 Analytical tools

The following were the major analytical tools used in the analysis of the data collected for the study.

3.4.1 Growth rate analysis

For computing compound growth rate of area, production and productivity of coffee, the exponential function of the following form was used.

$$Y = a b^t e^{Ut} \dots\dots\dots (1)$$

Where,

Y = Area / Yield / Production

a = Intercept

b = Regression coefficient

'a' and 'b' are the parameters to be estimated

t = time period

Ut= Disturbance term in year't'

The equation (1) was transformed into log linear form and written as;

$$\log Y = \log a + t \log b + Ut \dots\dots\dots (2)$$

Equation (2) was estimated by using Ordinary Least Squares (OLS) technique.

Compound growth rate (g) was then computed

$$g = (b - 1) 100 \dots\dots\dots (3)$$

Where,

g: Compound growth rate in per cent per annum

b: Antilog of log b

The standard error of the growth rate was estimated and tested for its significance with 't' statistic.

3.4.2 Financial feasibility analysis

The techniques used for the financial analysis were:

1. Pay Back Period (PBP)
2. Net Present Value / worth (NPV)
3. Benefit-Cost Ratio (B: C Ratio)
4. Internal Rate of Return (IRR)

The discount rate for financial analysis was assumed to be 12 per cent because it was long term lending rate of interest during the study period (2014-15).

3.4.3 Tabular analysis

The technique of tabular analysis was employed for determining the investment pattern in the coffee gardens. This analysis was used to estimate the cost of establishment of coffee plantation during non-bearing period, maintenance cost of coffee plantation during bearing period, cost structure, returns and profits.

3.4.3.1 Establishment cost

The establishment period of coffee plantation is about three years. The costs incurred in establishing a coffee plantation during the first three years were compared by prevailing wage rates and input prices. The establishment period up to three years was taken as 1st, 2nd and 3rd year. From fourth year returns started hence cost incurred was compared as maintenance cost from 4th, 5th, and up to 30th years i.e. during bearing period. The economic life of coffee plantation is estimated to be 30 years.

The establishment cost was classified into material cost and labour cost. Material cost included the cost incurred such as removal of old trees and cleaning, fencing, seedling cost, line marking, fertilizers, PPC, shade plants, stakes, fuel etc.

Labour cost included the cost incurred such as removal of old trees and cleaning, land preparation, fencing, line marking, staking, opening and closing of pits, planting, opening drains, application of FYM, fertilizers and PPC, irrigation, watch and ward, weeding and other miscellaneous costs.

3.4.3.2 Maintenance cost

The expenditure on cultivation included the cost of inputs labour during bearing period.

The inputs used in the plantation were FYM, fertilizer, PPC, fuel, harvesting materials and other miscellaneous expenses. The actual expenditure incurred on labour for operation in coffee plantation during bearing period; application of FYM, fertilizers, PPC, irrigation, pruning, shade regulators, watch and ward, weeding, harvesting and processing etc., were used in computing the labour cost. The labour wages varied depending on the size of holding and location of study area. Fixed cost includes land revenue, land rent, maintenance of farm implements, depreciation and amortized establishment cost.

Depreciation on machinery and equipments were calculated by using the straight line method i.e. dividing the original cost less junk value of the item, by the expected life of the time.

$$\text{Depreciation} = \frac{\text{Purchase value} - \text{Junk value}}{\text{Expected life of the item}}$$

3.4.3.3 Yield and returns

The gross returns were calculated by taking the actual prices obtained by the planters. Gross returns include the value of both main product and subsidiary products.

Net returns were calculated by deducting the total costs of production from gross returns.

3.4.4 Marketing channel, marketing cost and price spread

An attempt was made to study some aspects of marketing from the view point of coffee producer-seller. The aspects include the marketing channels, marketing costs and price spread.

Marketing channel refers to the alternate routes of product flow from the producer to final destiny. Coffee is marketed in the form of green bean and processed bean. However in this study, the marketing channel is limited only up to the point of sale to curing agencies.

Marketing cost is the cost incurred by the producer-seller from the point of production up to sale. The cost per tonne was worked out by adding different component namely packing, loading and unloading, packing material, transportation cost and commission charges paid.

Price spread was worked out by computing the differences between the prices received by the producers and prices paid by the consumer.

$$\text{Price spread} = P_p - P_f$$

Where,

P_p = prices paid by the consumer

P_f = prices received by the producer

3.4.5 Garrett Ranking Technique

To know the acceptance of farmers and constraints in production and marketing of coffee Garrett's ranking technique was used. Basically it gives the change of orders of constraints and advantages into numerical scores. The major advantage of this technique as compared to simple frequency distribution is that the constraints and advantages are arranged based on their importance from the point of view of respondents. Hence the same number of respondents on two or more constraints may have been given different rank (Kumar and Pandey, 1999).

Garrett's formula for converting ranks into per cent was given by

$$\text{Per cent position} = 100 * (R_{ij} - 0.5) / N_j$$

Where,

R_{ij} = rank given for i^{th} factor by j^{th} individual

N_j = number of factors ranked by j^{th} individual

The per cent position of each rank then converted into scores referring to the Table given by Garret and Woodsworth (1969). For each factor, the scores of individual respondents were added together and divided by the total number of the respondents for whom scores were added. These mean scores for all the factors were arranged in descending order, ranks were given and most important factors were identified. Garrett's ranking technique was adopted for studying problems faced by coffee planters in production and marketing.

Definition of terms and concepts used

- i. Fixed costs: These include depreciation on farm implements and machinery, land revenue, rental value of land and interest on fixed capital.
- ii. Variable costs: The variable costs include cost of seed, FYM, fertilizers, wages of human, bullock and machine labour, plant protection chemicals and interest on operational capital at the rate of 8 per cent per annum.
- iii. Fertilizer cost: The fertilizers cost was calculated at the actual price paid by farmers.
- iv. Land revenue: These were the charges actually paid by the cultivators to the revenue authority.
- v. Land rent: The prevailing land rent for agricultural enterprises were imputed for the sample farmers, since all land holdings were observed to be owner operated.
- vi. Interest on fixed capital: Interest on fixed capital was calculated at 12 per cent per annum, which is the prevailing rate of investment credit. The items considered under fixed capital are implements and machinery.
- vii. Interest on working capital: This was calculated on the entire working cost of the enterprise at the prevailing bank rate interest of 8 per cent per annum.
- viii. Price spread: The difference between the price paid by consumer and price received by the producers.
- ix. Gross returns: Gross returns were obtained by multiplying the total produce with its unit value.
- x. Net returns: Net return is return realized after deducting the cost incurred by producers from sales price.

$$\text{Net Returns} = \text{Gross Returns} - \text{Total Cost}$$

- xi. Marketing channels: Marketing channels are defined as the routes through which, producer seller disposes off their produce, until they reach the final consumers.
- xii. Marketing margins: The difference between the price paid and price received by a specific marketing agency. Total marketing margin included cost involved in moving the coffee bean from producer to consumer (curing agency) and profits of various market functionaries. The absolute value of the total marketing margin varies from market to market, channel to channel and time to time.
- xiii. Commission: The charges are usually made in cash paid by the producer, seller to the commission agents at the time of sales.
- xiv. Miscellaneous charges: The expenditure incurred towards handling, electricity charges, cleaning, charity contribution in cash and kind, etc., were considered as miscellaneous charges.
- xv. Benefit cost ratio: Benefit cost ratio was obtained by dividing the gross returns by total cost of cultivation.

4. RESULTS

In consonance with the objectives of the study, the data collected from primary and secondary sources were subjected to analysis using various statistical tools and techniques to draw meaningful conclusions. The major findings of the study are presented in this chapter under the following sub-heads.

4.1 Growth in Area, Production and Productivity of Coffee in Karnataka and India

The compound growth rates for area, production and productivity of coffee for the period of twenty years from 1995-96 to 2014-15 is depicted in Table 4.1.

It is observed from the table that the area under coffee in Karnataka was growing at the rate of 0.994 per cent per annum. Similarly in India, it has increased at the rate of 2.026 per cent per annum. The production of coffee in India was increased at the rate of 1.529 per cent annually. Similarly in the case of Karnataka state, it has increased at the rate of 1.742 per cent annually. The productivity of the coffee in India was declining at the rate of -0.484 per cent per annum. While in Karnataka state, it has increased at the rate of 0.935 per cent per annum.

The growth rate of coffee area in India was found to be significant at 1 per cent and in production and productivity was found to be non significant. Correspondingly growth rates in area, production and productivity in Karnataka were found to be significant at 1 per cent level.

4.2 General characteristics of sample planters

The general characteristics of sample coffee growers in the study area are presented in Table 4.2. The present study covered 40 coffee growers consisting of 26 planters for cropping system-I (coffee + pepper) and 14 planters for cropping system-II (coffee + cardamom). It could be observed from the table that the average family size of the coffee growers was four for both in cropping system-I and cropping system-II, which comprises one male, one female and two children. The average age of the coffee growers was 38 in cropping system-I and 40 in cropping system-II, respectively. The main occupation of the sample coffee growers was agriculture. As far as the education was concerned, 100 per cent of the coffee growers were literate in both the cropping systems. The average area under coffee was 6-10 acres in both the cropping systems respectively. The varieties cultivated by the sample coffee growers were in cropping system-I, about 53.84 per cent of planters grow Robusta variety followed by 38.46 per cent Arabica + Robusta and 7.69 Arabica. In cropping system-II, about 57.14 per cent of planters grow Robusta variety followed by 28.57 per cent Arabica + Robusta and 14.28 Arabica. The plant population of sample coffee growers were 1573/ha and 1050/ha in cropping system-I and cropping system-II respectively. The total land holdings possessed by the sample coffee in cropping system-I was 12.15 ha, out of which 66.91 per cent is irrigated land and 34.40 per cent is rainfed land. In cropping system-II, the land holding was 5.75 ha, out of which 67.93 per cent is irrigated land and 32.17 per cent are rainfed land.

Table 4.1: Compound growth rates of area, production and productivity of coffee in India and Karnataka during 1995-96 to 2014-15

	Compound growth rate								
	Area			Production			Productivity		
	Arabica	Robusta	Total	Arabica	Robusta	Total	Arabica	Robusta	Total
Karnataka	0.001 ^{NS}	2.104 ^{**}	0.994 ^{**}	-0.985 [*]	3.845 ^{**}	1.742 ^{**}	0.507 ^{**}	1.182 ^{**}	0.935 ^{**}
	(0.28)	(0.56)	(0.99)	(0.25)	(0.80)	(0.57)	(0.27)	(0.58)	(0.67)
India	1.813 ^{**}	2.218 ^{**}	2.026 ^{**}	-0.412 ^{NS}	2.693 ^{**}	1.529 ^{**}	-2.188 ^{**}	0.467 ^{NS}	-0.484 ^{NS}
	(0.89)	(0.79)	(0.88)	(0.07)	(0.70)	(0.54)	(0.78)	(0.10)	(0.18)

Source: Coffee Board, Bangalore
Indiastat.com

Note: Figure in the parenthesis indicates R² value

* Significant at 5 percent level, ** Significant at 1 percent level, NS- Non significant

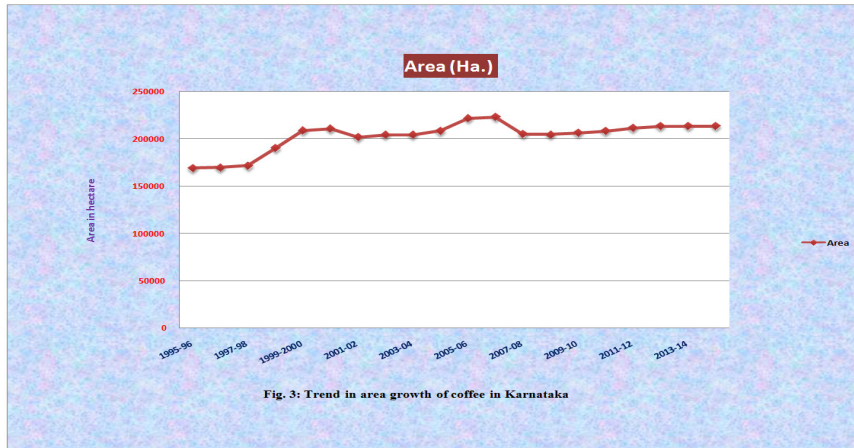


Fig. 3: Trend in area growth of coffee in Karnataka

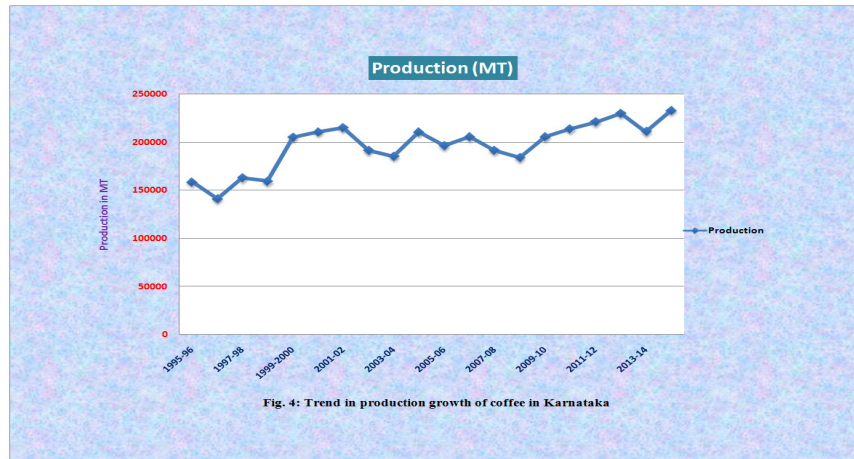


Fig. 4: Trend in production growth of coffee in Karnataka

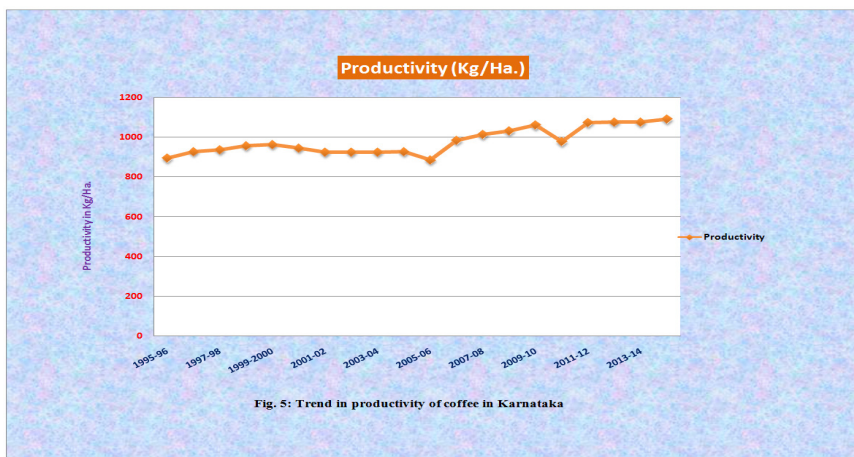


Fig. 5: Trend in productivity of coffee in Karnataka

Table 4.2: General characteristics of sample respondents in the study area

Sl. No	Particulars	Units	Cropping System-I (n=26)	Cropping System-II (n=14)
1	Sample size	Nos	25	14
2	Average family size			
	I. Male	Nos	1	1
	II. Female		1	1
	III. Children		2	2
	Total		4	4
3	Family type			
	I. Nuclear	Nos	20	12
	II. Joint		06	02
4	Age of the sample farmer	Years	38	40
5	Education			
	I. Primary	Nos	-	
	II. High school		-	1 (7.14)
	III. College		11 (42.30)	8 (57.14)
	IV. Degree and above		15 (57.69)	5(35.71)
6	Occupation			
	I. Agriculture as a main	Nos	22(84.61)	10(71.42)
	II. Subsidiary occupation		04(15.38)	04(28.57)
	a. Business		02	02
	b. Service		02	02
7	Area under coffee (ha)	Nos	6-10	6-10
8	Varieties			
	I. Arabica	Nos	02 (7.69)	02 (14.28)
	II. Robusta		14 (53.84)	08 (57.14)
	III. Arabica + Robusta		10 (38.46)	04 (28.57)
9	Plant population	Nos	1573	1050
10	Average age of plantation	years	15-20	15-20
11	Land holdings			
	I. Irrigated	Nos	8.13 (66.91)	3.90 (67.93)
	II. Rain fed		4.18 (34.40)	1.85 (32.17)
	Total		12.15	5.75

Note: Figures in parentheses indicate percentage



Plate 1: Coffee estate intercropping with pepper



Plate 2: Coffee estate intercropped with cardamom

4.3 Input use pattern in identified coffee based cropping systems

This has been presented under the following sub heads.

4.3.1 Input use pattern coffee based cropping systems during investment period (three years)

The input use pattern followed in cropping system-I and cropping system-II sample planters during investment period per hectare is presented in Table 4.3 indicating that number of coffee, pepper and cardamom seedlings used in cropping system-I were 1,573.61, 769.23, 50, and cropping system-II were 1,050.00, 600.30, 20 per ha. The amount of FYM used in cropping system-I and cropping system-II was 14.34 tonnes and 15.14 tonnes. The amount of fertilizers used in cropping system-I and cropping system-II was 13.23 quintals and 14.85 quintals. The amount of PPC used in cropping system-I and cropping system-II was 12.45 quintals and 12.99 quintals.

The sample planters employed on an average 158.08 man days in cropping system-I and 168.96 man days in cropping system-II. The machine labour used by the respondent was 14.13 hours in cropping system-I and 16.49 hours in cropping system-II respectively.

4.3.2 Input use pattern coffee based cropping systems during bearing period

The input use pattern followed in cropping system-I and cropping system-II sample planters during bearing period per hectare is presented in Table 4.3 it is indicated that the amount of FYM used in cropping system-I and cropping system-II was 6.15 tonnes and 6.88 tonnes. The amount of fertilizers used in cropping system-I and cropping system-II was 7.50 quintals and 8.20 quintals, the plant protection chemicals used 15 and 18 liters in cropping system-I and cropping system-II. The amount of weedicide used 4.22 and 4.48 liters in cropping system-I and cropping system-II.

The sample planters employed on an average 130.77 man days in cropping system-I and 139.53 man days in cropping system-II. The machine labour used by the respondents was 2.16 hours in cropping system-I and 2.56 hours in cropping system-II, respectively.

4.4 Labour use pattern in coffee based cropping systems

The labour use pattern followed in cropping system-I and cropping system-II by sample planters during investment period per hectare is presented in Table 4.4 it indicates that maximum proportion of human labour was employed in cropping system-I for fencing (18.73 MD), opening and closing pits (18.23 MD), land preparation (13.03 MD), irrigation, watch and ward (12.06 MD), jungle cleaning (10.88 MD), application of fertilizers (7.15 MD), planting of coffee seedlings (6.53 MD), line marking (5.40 MD), planting of pepper seedlings (5.19 MD), application of FYM (5.15 MD) and staking (2.28 MD) respectively. In case of cropping system-II, for fencing (20.42 MD), opening and closing pits (20.28 MD), irrigation, watch and wart (13.47 MD), land preparation (12.28 MD), jungle cleaning (10.07 MD), application of fertilizers (9.42 MD), planting of coffee seedlings (6.03 MD), planting of cardamom seedlings (5.44 MD), line marking (5.35 MD), application of FYM (5.40 MD) and staking (2.25 MD) respectively.

Table 4.3: Input use pattern in coffee based cropping systems

(Units/year/ha)

Sl. No	Inputs	Units	During establishment period		During bearing period	
			Cropping system-I (n=26)	Cropping system-II (n=14)	Cropping system-I (n=26)	Cropping system-II (n=14)
1.	Seedlings (coffee)	Nos	15,731.61	1,050.00	-	-
2.	Seedlings (pepper/cardamom)	Nos	769.23	600.30	-	-
3.	Seedlings (shade trees)	Nos	50	20	-	-
4.	Manure (FYM)	Tonnes	14.34	15.14	6.15	6.88
5.	Fertilizers	Quintals	13.23	14.85	7.50	8.20
6.	Weedicides	Liters	-	-	4.22	4.48
7.	PPC	Liters	12.45	12.99	15	18
8.	Human labour	MD	158.08	168.96	130.77	139.53
9.	Machine labour	Hours	14.13	16.49	2.16	2.56

Table 4.4: Labour use pattern in coffee based cropping systems

(Units/year/ha)

Sl. No	Inputs	During establishment period				During bearing period			
		Cropping system-I (n=26)		Cropping system-II (n=14)		Cropping system-I (n=26)		Cropping system-II (n=14)	
		Human labour (MD)	Machine labour (hrs)	Human labour (MD)	Machine labour (hrs)	Human labour (MD)	Machine labour (hrs)	Human labour (MD)	Machine labour (hrs)
1.	Jungle cleaning	10.88	4.25	10.07	5.02	-	-	-	-
2.	Land preparation	13.03	6.52	12.28	6.55	-	-	-	-
3.	Line marking	5.40	-	5.35	-	-	-	-	-
4.	Opening and closing pits	18.23	3.36	20.28	4.92	-	-	-	-
5.	Planting (coffee)	15.53	-	16.03	-	-	-	-	-
6.	Planting (pepper/cardamom)	12.19	-	14.44	-	-	-	-	-
7.	Staking	2.28	-	2.25	-	-	-	-	-
8.	Application of FYM	14.15	-	16.40	-	7.15	-	7.28	-
9.	Application of fertilizers	16.15	-	18.42	-	9.22	-	11.26	-
10.	Application of PPC	12.45	-	12.99	-	4.34	-	4.46	-
11.	Fencing	18.73	-	20.42	-	-	-	-	-
12.	Irrigation, watch and ward	19.06	-	20.03	-	12.06	-	13.47	-
13.	Pruning	-	-	-	-	20	-	16	-
14.	Harvesting and processing	-	-	-	-	70	-	82	-
15.	Cleaning/weeding	-	-	-	-	8	2.16	5.06	2.56
	Total	158.08	14.13	168.96	16.49	130.77	2.16	139.53	2.56

The maximum proportion of machine labour was employed for land preparation (6.52 %) followed by removal of old trees (4.25 %) and opening and closing of pits (3.36 %) in cropping system-I and in case of cropping system-II, for land preparation (6.55 %) followed by removal of old trees (5.02 %) and opening and closing of pits (4.92 %) respectively.

The labour use pattern followed in cropping system-I and cropping system-II sample planters during bearing period per hectare is presented in Table 4.4 indicated that maximum proportion of human labour was employed in cropping system-I for harvesting (70 %) followed by pruning (20 %), irrigation, watch and ward (12.06 %), application of fertilizers (9.22 %), cleaning/weeding (8 %), application of FYM (7.15 %) and application of plant protection chemicals (4.34 %) and in case of cropping system-II, for harvesting (82 %) followed by pruning (16%), irrigation, watch and ward (13.47 %), application of fertilizers (11.26 %), application of FYM (7.28 %), cleaning/weeding (5.06 %), and application of plant protection chemicals (4.46 %) and in case of cropping system-II respectively.

The machine labour was employed only for cleaning/ weeding (2.16 %) and (2.56 %) in cropping system-I and cropping system-II, respectively.

4.5 Investment on selected coffee based cropping systems in the study area

The establishment cost incurred per hectare of coffee plantation was estimated considering the quantity of inputs and labour used and their respective market price and wages prevailed in the study area.

The establishment of coffee plantation required three years. The establishment cost in coffee plantations were classified into investment and maintenance cost. The investment cost was considered for bearing period of establishment with the maintenance cost was three year period up to the bearing stage. The investment cost included the cost of land preparation, digging of pith, planting, shade tree planting, cost on sprinklers and drippers and fencing etc. The maintenance cost included labour cost for various operations and material cost and fixed cost during gestation period.

4.5.1 Establishment cost of coffee plantation

The results of the analysis of cost of establishment of cropping system-I (coffee + pepper) and cropping system-II (coffee + cardamom) plantation are presented in Table 4.5. The per hectare total cost of establishment incurred under cropping system-I and cropping system-II were Rs.9,23,116.55 and Rs. 9,76,801.5 respectively.

4.5.2 Establishment cost of cropping system-I coffee plantation (coffee + pepper)

In case of cropping system-I, the share of investment in the total establishment cost (Rs. 6,69,140.95) worked out to 72.48 per cent. The major expenditure among the investment cost was on farm vehicle and vehicle shed (3, 20,000.18) which accounts 34.66 per cent. The other major components of costs were labour quarters, godowns and drying yard (1, 26,282.05) which constituted about 13.67 per cent. The other item of costs were sprinklers and drippers, fencing, pump set and pump house, wells and tanks, farm implements, digging of piths, seedling costs, planting costs, land preparation, line marking and staking and opening drains constituted 10.60, 4.54, 2.95, 1.79, 1.43, 0.88, 0.71, 0.42, 0.41, 0.19 and 0.17 per cent respectively.

Table 4.5: Investment pattern in coffee based cropping systems

Sl. No	Particulars	Cropping system-I (coffee + pepper) (n=26)		Cropping system-II (coffee + cardamom) (n=14)	
		Value (Rs/ha)	Per cent	Value (Rs/ha)	Per cent
A	Investment costs				
	1. Labour quarters + gowdowns + drying yard	1,26,282.05	13.67	1,05,529.25	10.80
	2. Farm vehicle + vehicle shed	3,20,000.18	34.66	3,76,071.44	38.50
	3. Sprinklers + drippers	97,869.57	10.60	82,428.57	8.43
	4. Fencing	42,000.63	4.54	64,285.71	6.58
	5. Pump set + pump house	27,291.67	2.95	33,571.43	3.43
	6. Wells + tanks	16,533.33	1.79	14,875.00	1.52
	7. Farm implements	13,230.75	1.43	14,185.69	1.45
	8. Seedlings(coffee + pepper/cardamom + shade tree)	6,636.53	0.71	12,317.85	1.26
	9. Land preparation	3,846.15	0.41	3,510.71	0.35
	10. Opening drains	1,574.15	0.17	2,802.00	0.28
	11. Line marking + staking	1,776.91	0.19	1,664.27	0.17
	12. Digging of pits	8,187.50	0.88	7,228.52	0.74
	13. Planting (coffee + pepper + shade tree)	3,911.53	0.42	7,660.70	0.78
	Total	6,69,140.95	72.42	7,26,131.14	74.29
B	Maintenance cost during gestation period				
	I Year	85,070.48	9.21	92,396.75	9.45
	II Year	69,384.75	7.51	75,579.90	7.73
	III Year	99,520.37	10.78	82,693.74	8.46
	Subtotal (I+II+III)	2,53,975.6	27.50	2,50,670.40	25.67
	Total establishment cost (A+B)	9,23,116.55	100.00	9,76,801.50	100.00

The maintenance cost incurred during gestation period has increased from Rs. 85,070.48 to Rs. 99,520.37 (third year). The total maintenance cost (Rs. 2, 53,975.6) up to bearing period accounted for 25.97 per cent of the total establishment cost.

4.5.3 Establishment cost of cropping system-II coffee plantation (coffee + cardamom)

In case of cropping system-II, the share of investment in the total establishment cost (Rs. 7, 26,131.14) worked out to 74.33 per cent. The major expenditure in the investment was on farm vehicle and vehicle shed (Rs. 3, 76,071.44) which accounted 38.50 per cent. The other major components of costs were labour quarters, godowns and drying yard (Rs. 1, 05,529.25) which constituted 10.80 per cent. The other item of costs were sprinklers, drippers, fencing, pump set and pump house, wells and tanks, farm implements, seedling costs, planting costs, digging of pit, land preparation, opening drains and line marking and staking constituted 8.43, 6.58, 3.43, 1.52, 1.45, 1.26, 0.78, 0.74, 0.35, 0.28 and 0.17 per cent respectively.

The maintenance cost incurred during gestation period has decreased from Rs. 92,396.75 to Rs. 82,693.74 (third year). The total maintenance cost (Rs 2, 50,670.4) up to bearing period accounted for 25.67 per cent of the total establishment cost.

4.6 Cost incurred in selected coffee based cropping systems in the study area

Cost incurred in selected coffee based cropping systems in the study area is presented under the following sub heads.

4.6.1 Cost incurred in selected coffee based cropping systems during gestation period

The maintenance cost of coffee plantations during bearing period included expenditure on labour, material cost and fixed cost such as apportioned establishment cost, land rent, land revenue, and depreciation on machinery. The labour cost included the expenditure on labour in performing various operations like weeding, manure and fertilizer application, irrigation, watch and ward, pruning, application of plant protection chemicals, harvesting and processing, shade regulator, fencing and miscellaneous charges. The material cost included the expenditure on material input such as fertilizers, manures, plant protection chemicals, weedicide and miscellaneous items.

It can be observed from the Table 4.6 and Table 4.7 that the total maintenance cost of cropping system-I was Rs. 2,53,975.6 and for cropping system-II was Rs. 2,50,670.39 which was less than cropping system-I.

In the total maintenance cost of cropping system-I, the variable cost (Rs. 1, 42,069.42) constituted the highest proportion 55.93 per cent. While the fixed cost (Rs. 1, 11,906.18) constituted 44.06 per cent. Among the variable costs, the expenditure on labour and material input cost (Rs. 50,355.11) 19.82 per cent and (Rs. 58,605.45) 23.07 per cent, respectively. A major portion of the labour cost incurred on the application of manures and fertilizers (12,271.12) which accounted for 4.83 per cent of total maintenance cost followed by weeding, irrigation, watch and ward, planting, fencing, application of plant protection chemicals and miscellaneous which accounted 3.72, 3.12, 2.65, 2.03, 1.20, and 1.18 per cent respectively.

Table 4.6: Cost incurred for coffee based cropping system-I (coffee + pepper) during gestation period

(Rs/year/ha)

Sl. No	Particulars	I Year	II Year	III Year	Total	Per cent
I	Variable cost					
A	Material cost					
	1. Planting material (coffee + pepper)	13,717.53	1,811.53	1,565.37	17,094.43	6.73
	2.Manures	2,788.46	3,763.46	4,282.69	10,834.61	4.26
	3.Fertilizers	5,021.37	7,880.76	8,461.46	21,863.59	8.60
	4.PPC	500.00	1,219.32	1,538.46	2,757.78	1.08
	5.Planting material (shade tree)	1,786.53	247.82	17.69	2,052.04	0.80
	6.Herbicides	368.00	334.00	301.00	1,003.00	0.39
	7.Others	1,000.00	1,000.00	1,000.00	3,000.00	1.18
	Total material cost	25,181.89	16,256.89	17,166.67	58,605.45	23.07
B	Labour cost					
	1. Planting(coffee+ pepper)	3,911.53	1,629.80	1,200.96	6,742.29	2.65
	2.Application of manures and Fertilizers	4,053.83	4,564.41	3,652.88	12,271.12	4.83
	3.Weeding	2,094.23	3,087.50	3,288.46	9,470.19	3.72
	4.Application of PPC's	1,000.00	1,237.50	1,834.61	4,072.11	1.20
	5.Planting (shade plants)	300.00	300.00	300.00	900.00	0.35
	6.Irrigation, watch and ward	2,629.80	2,607.73	2,711.53	7,949.06	3.12
	7.Fencing	5,172.11	-	-	5,172.11	2.03
	8.Miscellaneous	1,000.00	1,000.00	1,000.00	3,000.00	1.18
	Total labour cost	19,461.50	13,726.94	17,166.67	50,355.11	19.82
	A+B	44,643.39	29,983.83	34,333.34	1,08,960.56	42.90
	Interest on working capital	3,125.03	2,098.86	27,884.97	7,627.23	3.00
	Total variable cost (I)	47,768.42	32,082.69	62,218.31	1,42,069.42	55.93
II	Fixed cost					
	1. Land revenue	646.00	646.00	646.00	1,938.00	0.76
	2.Maintenance of farm equipments	1,000.00	1,000.00	1,000.00	3,000.00	1.18
	3.Depreciation	20,945.13	20,945.13	20,945.13	62,835.39	24.74
	4.Land rent	12,000.00	12,000.00	12,000.00	36,000.00	14.17
	Interest on fixed capital @ 12%	2,710.93	2,710.93	2,710.93	8,132.79	3.20
	Total fixed cost (II)	37,302.06	37,302.06	37,302.06	1,11,906.18	44.06
	Total cost (I + II)	85,070.48	69,384.75	99,520.37	2,53,975.60	100.00

Table 4.7: Cost incurred for coffee based cropping system-II (coffee + cardamom) during gestation period

(Rs/year/ha)

Sl. No	Particulars	I Year	II Year	III Year	Total	Per cent
I.	Variable cost					
A	Material cost					
	1.Planting material (coffee + cardamom)	14,235.71	2,050.00	2,050.00	18,335.71	7.31
	2.Manures	2,928.57	3,857.14	4,857.14	11,642.85	4.64
	3.Fertilizers	8,000	11,825.57	14,728.57	34,854.14	13.90
	4.PPC	300	2,621.36	3,499.76	6,121.12	2.44
	5.Planting material (shade tree)	1,082.14	200.00	15.17	1,297.31	0.51
	6.Herbicides	300.00	300.00	300.00	900.00	0.35
	7.Others	1,000.00	1,000.00	1,000.00	3,000.00	1.19
	Total material cost	27,846.42	21,854.07	26,450.64	76,151.13	30.37
B	Labour cost					
	1.Planting(coffee+ cardamom)	7,660.67	1,467.78	1,078.57	10,207.02	4.07
	2. Application of manures and fertilizers	4,949.99	5,560.71	6,434.27	16,944.97	6.75
	3.Weeding	2,767.85	3,655.31	3,857.14	11,280.3	4.50
	4.Application of PPC's	1,000.00	1,300.00	2,577.85	4,877.85	1.54
	5.Planting(shade plants)	300.00	300.00	300.00	900.00	0.35
	6.Irrigation, watch and ward	2,451.78	2,490.00	2,577.85	7,519.63	2.99
	7.Fencing	6,367.85	-	-	6,367.85	2.54
	8.Miscellaneous	1,000.00	1,000.00	1,000.00	3,000.00	1.19
	Total labour cost	26,498.14	15,773.8	17,825.68	60,097.62	23.97
	A+B	53,344.56	37,627.87	44,276.32	1,36,248.64	54.35
	Interest on working capital	3,734.11	2,633.95	3,099.34	9,537.40	3.80
	Total variable cost(I)	57,078.67	40,261.82	47,375.66	1,44,716.15	57.73
II.	Fixed cost					
	1.Land revenue	646.00	646.00	646.00	1,938.00	0.77
	2.Maintenance of farm equipments	1,000.00	1,000.00	1,000.00	3,000.00	1.19
	3.Depreciation	19,173.72	19,173.72	19,173.72	57,521.16	22.94
	4.Land rent	12,000.00	12,000.00	12,000.00	36,000.00	14.36
	Interest on fixed capital @ 12%	2,498.36	2,498.36	2,498.36	7,495.08	2.99
	Total fixed cost (II)	35,318.08	35,318.08	35,318.08	1,05,954.24	34.60
	Total cost (I + II)	92,396.75	75,579.90	82,693.74	2,50,670.39	100.00

A major portion of the material cost incurred was on the fertilizers (21,863.59) which accounted for 8.60 per cent of total maintenance cost followed by planting material, manure, miscellaneous, plant protection chemicals, planting material (shade tree) and herbicide which accounted 6.73, 4.26, 1.18, 1.08, 0.80, and 0.39 per cent respectively.

In the total maintenance cost of cropping system-II, the variable cost (Rs. 1,44,716.15) constituted the highest proportion (57.73%). While the fixed cost (Rs. 105954.24) constituted 34.60 per cent. Among the variable cost, the expenditure on labour and material input were (Rs. 60,097.62) constituted 23.97 per cent and (Rs. 76,151.13) constituted 30.37 per cent. A major portion of the labour cost was incurred on the application of manures and fertilizers (16,944.97) which accounted for 6.75 per cent of total maintenance cost followed by weeding, planting, irrigation, watch and ward, fencing, application of plant protection chemicals and miscellaneous which accounted 4.50, 4.07, 2.99, 2.54, 1.54 and 1.19 per cent respectively.

A major portion of the material cost was incurred on the fertilizers (34,854.14) which accounted for 13.90 per cent of total maintenance cost followed by planting material, manure, plant protection chemicals, miscellaneous, planting material (shade tree) and herbicide which accounted 7.31, 4.64, 2.44, 1.19, 0.51 and 0.35 per cent respectively.

When cropping system-I and cropping system-II were compared with respect to labour cost and material cost per hectare, it was observed that cropping system-I incurred slightly higher cost than the cropping system-II, which was, Rs. 1,08,960.56 and Rs. 1,36,248.64 respectively.

When cropping system-I and cropping system-II were compared with respect to variable cost per ha, it was observed that cropping system-II incurred slightly higher cost than the cropping system-I, which was Rs. 1,44,716.15 and Rs. 1,42,069.42 respectively.

When cropping system-I and cropping system-II were compared with respect to fixed cost per ha, it was observed that cropping system-I incurred slightly higher cost than the cropping system-II, which was Rs. 1,11,906.18 and Rs. 105954.24 respectively for cropping system-I and cropping system-II.

4.6.2 Cost incurred in selected coffee based cropping systems during bearing period

The coffee plants started bearing from fourth year onwards. The maintenance cost during bearing period included expenditure on labour, material cost and fixed cost such as apportioned establishment cost, land rent, land revenue, and depreciation on machinery. The labour cost included the expenditure on labour in performing various operations like weeding, manure and fertilizer application, irrigation, watch and ward, pruning, application of plant protection chemicals, harvesting and processing, shade regulator, fencing and miscellaneous charges. The material cost included the expenditure on material input such as fertilizers, manures, plant protection chemicals, weedicide and miscellaneous items.

It can be observed from the Table: 4.8 that the total maintenance cost of cropping system-I was Rs. 1,07,217.1 and for cropping system-II was Rs. 1,08,460.7 which was more than cropping system-I.

Table 4.8: Cost incurred for coffee based cropping systems during bearing period

Sl. No	Particulars	Cropping system-I (coffee + pepper) (n=26)		Cropping system-II (coffee + cardamom) (n=14)	
		Value (Rs./ha)	Per cent	Value (Rs./ha)	Per cent
I	Variable cost				
A	Material cost				
	1.Manure	6,153.84	5.73	6,285.71	5.79
	2.Fertilizer	9,000.00	8.39	9,285.71	8.56
	3.PPC	2,000.00	1.86	2,500.00	2.30
	4.Weedicide	2,000.00	1.86	2,000.00	1.84
	5.Miscellaneous	3,000.00	2.79	3,000.00	2.76
	Total material cost(A)	22,153.84	20.66	23,071.42	21.27
B	Labour cost				
	1.Application of manure and fertilizer	3,000.00	2.79	3,600.00	3.31
	2.Irrigation, watch and ward	2,487.50	2.32	2,550.00	2.35
	3.Weeding	4,865.38	4.53	4,732.14	4.36
	4.Application of PPC	1,990.38	1.85	1,753.57	1.61
	5.Pruning	6,000.00	5.59	4,800.00	4.42
	6.Harvesting and processing	18,000.00	16.78	21,000.00	19.36
	7.Miscellaneous	3,000.00	2.79	3,000.00	2.76
	Total labour cost	39,343.26	36.69	41,435.71	38.20
	(A+B)	61,497.10	57.35	64,507.13	59.47
	Interest on working capital	4,304.79	4.01	4,515.49	4.16
	Total variable cost(A+B)	65,801.17	61.37	69,022.62	63.63
II	Fixed cost				
	1.Amortization establishment	4,673.07	4.35	4,678.57	4.31
	2.Land revenue	646.00	0.60	646.00	0.59
	3.Depreciation	20,945.13	19.53	19,173.7	17.67
	4.Land rent	12,000	11.19	12,000	11.06
	Interest on fixed capital	3,151.7	2.93	2,939.79	2.71
	Total fixed cost	41,415.9	38.62	39,438.1	36.36
	Total cost(I+II)	1,07,217.1	100.00	1,08,461	100.00

In the total maintenance cost of cropping system-I, the variable cost (Rs. 65,801.17) constituted the highest proportion (61.37 %). While the fixed cost (Rs. 41,415.9) constituted 38.61 per cent. Among the variable cost, the expenditure on labour and material input cost (Rs. 39,343.26) 36.69 per cent and (Rs. 22,153.84) 20.66 per cent, respectively. A major portion of the labour cost was incurred on the harvesting and processing (Rs. 18,000.00) which accounted for 16.78 per cent of total maintenance cost followed by pruning, weeding, application of manure and fertilizer, irrigation, watch and ward and application of plant protection chemicals which accounted 5.59, 4.53, 2.79, 2.32, and 1.85 per cent, respectively.

A major portion of the material cost was incurred on the fertilizers (Rs, 9,000.00) which accounted for 8.39 per cent of total maintenance cost followed by manure, plant protection chemical and weedicide which accounted 5.73, 1.86, and 1.86 per cent respectively.

In the total maintenance cost of cropping system-II, the variable cost (Rs. 69,022.62) constituted the highest proportion (63.63 %). While the fixed cost (Rs. 39438.1) constituted 36.36 per cent. Among the variable cost, the expenditure on labour and material input cost (Rs. 41,435.71) constituted 38.20 per cent and (Rs. 23,071.42) constituted 21.27 per cent. A major portion of the labour cost was incurred on the harvesting and processing (Rs. 21,000.00) which accounted for 19.36 per cent of total maintenance cost followed by pruning, weeding, application of manure and fertilizer, irrigation, watch and ward and application of plant protection chemicals which accounted 4.42, 4.36, 3.31, 2.35, and 1.61 per cent respectively.

A major portion of the material cost was incurred on the fertilizers (9,285.00) which accounted for 8.56 per cent of total maintenance cost followed by manure, plant protection chemical and weedicide which accounted 5.79, 2.30 and 1.84 per cent respectively.

When cropping system-I and cropping system-II were compared with respect to labour cost and material cost per hectare, it was observed that cropping system-II (Rs. 64,507.13) incurred slightly higher cost than the cropping system-I (Rs. 61,497.10).

When cropping system-I and cropping system-II were compared with respect to fixed cost per hectare, it was observed that cropping system-I incurred slightly higher cost than the cropping system-II, which was Rs. 41,415.9 and Rs. 39,438.08 respectively for cropping system-I and cropping system-II.

4.7 Yield and returns in selected coffee based cropping systems in the study area

Yield and returns observed in selected coffee based cropping systems in the study area are presented in the following sub heads.

4.7.1 Annual yield and returns from cropping system-I (coffee + pepper)

The yield obtained and returns realized from the sale of coffee and its associated crops are presented in Table: 4.9

Table 4.9: Yield and returns in selected coffee based cropping systems in the study area

Sl. No	Particulars	Cropping system-I (coffee + pepper) (n=26)			Cropping system-II (coffee + cardamom) (n=14)		
		Coffee	Pepper	Total	Coffee	Cardamom	Total
1.	Yield obtained (Kg/ha)	3,003.85	315.38	-	2,914.29	364.20	-
2.	Sales prices (Rs/kg)	50.06	666.67	-	49.99	350.05	-
3.	Total returns realized (Rs/ha)	15,0385	2,10,254	3,60,639.00	14,5714	1,27,488.21	2,53,177.56
4.	Annual cost (Rs/ha)	1,02,666.3			1,02,597.6		
5.	Net returns (Rs/ha)	2,57,972.00			1,50,579.96		

It can be seen from the table that the per hectare average quantity of coffee obtained by the sample farmers was 3,003.85 Kg which yielded on an average gross returns of Rs. 1,50,385. And the per hectare average quantity of pepper obtained by the sample farmers was 3,15.38 Kg which yielded on an average gross return of Rs. 2,10,254. The total average net returns per hectare were worked out for both the crops to be Rs. 2,57,972.00.

4.7.2 Annual yield and return from cropping system-II (coffee + pepper)

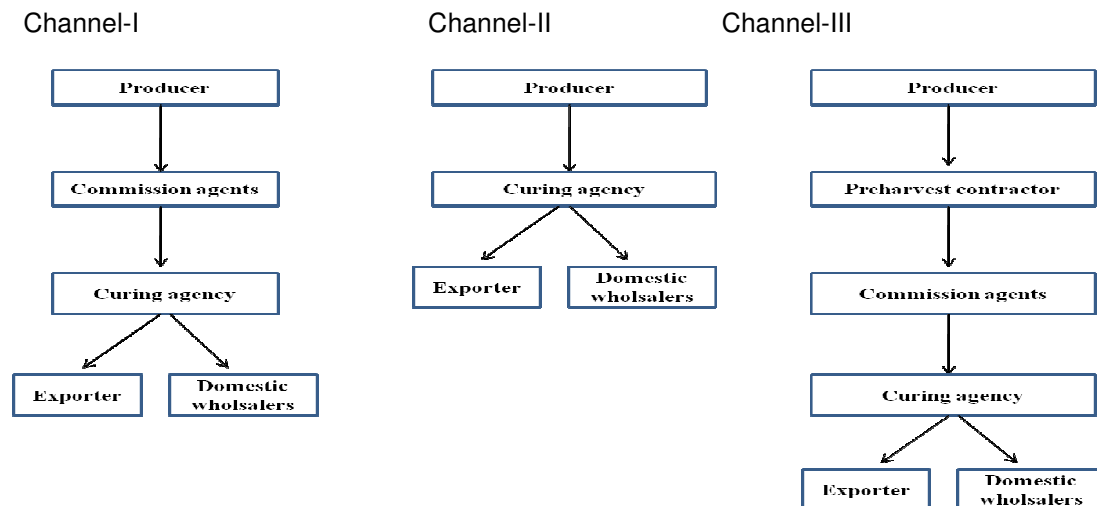
The yield obtained and returns realized from the sale of coffee and its associated crops are presented in Table: 4.9

It can be seen from the table that the per hectare average quantity of coffee obtained by the sample farmers was 2,914.29 Kg which yielded on an average gross returns of Rs. 1,45,714. And the per hectare average quantity of cardamom obtained by the sample farmers was 364.20 Kg which yielded on an average gross return of Rs. 1,27,488.21. The total average net returns per hectare were worked out for both the crops to be Rs. 150,579.96.

4.8 Marketing management of selected coffee based cropping systems in the study area

4.8.1 Marketing of coffee

In the effort of studying the marketing aspects of coffee, three channels were identified and marketing cost and margin and price spread have been worked out for three channels. The sample farmers marketed their coffee from their estate through the following three channels.



The details of cost incurred by marketing intermediaries are presented in Table: 4.12. In channel-I producers sold produce to wholesaler cum commission agent, wholesaler cum commission agent sold produce to the curing agency. In channel-II the producer himself sold produce to the curing agency. In channel-III producer gave contract to the preharvest contractor, preharvest contractor sold produce to wholesaler cum commission agent, wholesaler cum commission agent sold produce to the curing agency.

Table 4.10: Marketing cost incurred by coffee producer

Sl.No	Particulars	Cost (Rs/q)	Per cent
1	Packaging material cost	-	-
2	Loading and Unloading	-	-
3	Transportation	-	-
4	Weighing charges	30.33	5.57
5	Labour charges	130.00	23.91
6	Commission charges	333.33	61.31
7	Miscellaneous	50.00	9.19
	Total	543.66	100.00

Table 4.11: Marketing cost incurred by various intermediaries in the marketing of coffee

Sl.No	Particulars	Channel-I				Channel-II		Channel-II					
		Commission agents		Curing agency		Curing agency		Pre harvest contractor		Commission agents		Curing agency	
		Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent
1	Transportation cost	189.62	31.17	278.80	36.57	278.80	36.57	-	-	189.62	31.17	278.80	36.57
2	Packaging material cost	12.96	2.13	30.12	3.95	30.12	3.95	10.96	1.03	12.96	2.13	30.12	3.95
3	Weighing, loading and unloading cost	112.03	18.41	65.51	8.59	65.51	8.59	98.00	9.25	112.03	18.41	65.51	8.59
4	Tax , rent and license fee	77.60	12.75	78.14	10.24	78.14	10.24	67.00	6.32	77.60	12.75	78.14	10.24
5	Commission charge	172.90	28.42	-	-	-	-	33.00	3.11	172.90	28.42	-	-
6	Processing cost	-	-	285.50	37.44	285.50	37.44	166.00	15.67	-	-	285.50	37.44
7	Watch and ward	-	-	-	-	-	-	200.00	18.88	-	-	-	-
8	Miscellaneous	43.22	7.10	24.28	3.18	24.28	3.18	484.00	45.69	43.22	7.10	24.28	3.18
	Total	608.33	100.00	62.35	100.00	762.35	100.00	1,058.96	100.00	608.33	100.00	762.35	100.00

4.8.1.1 Marketing cost incurred by various intermediaries

4.8.1.1.1 Marketing cost incurred by preharvest contractor

From Table 4.11 the cost incurred in the marketing of coffee through channel-III by preharvest contractor was Rs. 1058.96 per quintal. The value of harvesting cost alone constituted 44.09 per cent (Rs. 467.00 per quintal) followed by value of watch and ward (18.88 %), processing cost (15.67 %), weighing, loading and unloading charges (9.25 %), Rent (5.53 %), commission charges (3.11 %), packaging material (1.03 %) and miscellaneous 1.60 %).

4.8.1.1.2 Marketing cost incurred by wholesaler cum commission agents

Total marketing cost incurred by wholesaler cum commission agents in channel-I and channel-III was Rs. 608.33 per quintal respectively. Among various components, transportation charges alone constituted 31.17 per cent followed by commission charges (28.42%), weighing, loading and unloading cost (18.41%), tax and rent (12.75%), packaging material cost (2.13%).

4.8.1.1.3 Marketing cost incurred by curing agency

From the Table: 4.12 the cost incurred in marketing of coffee through channel-I and channel-II and channel-III by curing agency was Rs. 762.35. The value of processing cost alone constituted 37.44 per cent (Rs. 285.50 per quintal) followed by value of transportation cost (36.57%), , weighing, loading and unloading cost (8.59%), Rent (6.81), packaging material cost (3.95%) and miscellaneous (3.18%).

4.8.1.2 Price spread in marketing of coffee

Coffee was marketed through various intermediaries starting from farmer to ultimate consumer. The intermediaries involved have rendered variety of services in the process of marketing of coffee with a view to earn some profit. The margin of intermediaries can act as an indicator of efficiency of the marketing system.

Marketing cost and margin of the agencies involved in the marketing of coffee are given in the Table 12. The producer's share in consumer's rupee was 61.04 per cent in channel-I, where as, it was 74.74 per cent in case of channel-II, whereas, it was 27.39 per cent in case of channel-III. Correspondingly, net price received by the producer per quintal of coffee was highest in channel-II (Rs. 5,456.34 per quintal) followed by channel-I (Rs. 4,456.34) and (Rs. 2000.00) by channel-III. The price spread was higher in case of channel-III (Rs.5,300.00 per quintal) followed by channel-I (Rs.2,300.00 per quintal) and channel-II (Rs.1,300.00). The total marketing cost incurred by intermediaries amounted to Rs. 1,370.68, Rs. 762.35 and Rs. 2,429.64 per quintal in channel-I, channel-II and channel-III respectively. In coffee marketing, the market margin of all intermediaries was Rs. 929.32 (12.73 % of consumer price), Rs. 470.65 (6.44 % of consumer's price) and Rs. 2,647.32 (36.26 % of consumer's price) per quintal channel-I, channel-II and channel-III respectively.

4.8.2 Marketing of pepper

In the effort of study the marketing aspects of pepper, two channels were identified and marketing cost and margin and price spread have been worked out for two channels. The sample farmers marketed their pepper from their estate through the following two channels.

Table 4.12: Marketing cost, margin, and price spread in marketing of coffee in channel- I, channel-II and channel-III

Sl. No	Particulars	Channel-I		Channel-II		Channel-III	
		Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent
1	Gross price received by producer	5,000.00	68.49	6,000	82.19	2,000.00	27.39
2	Marketing cost of producer	543.66	7.44	543.66	7.44	-	-
3	Producer's net price	4,456.34	61.04	5,456.34	74.74	2,000.00	27.39
4	Marketing cost incurred by						
	I. Commission agents	608.33	8.33	-	-	608.33	8.33
	II. Curing agency	962.35	13.18	962.35	13.18	762.35	10.44
	III. Pre harvest contractor	-	-	-	-	1,058.96	16.64
	Total marketing cost	1,470.68	20.14	962.35	13.18	2,429.64	35.42
5	Margin earned by						
	I. Commission agents	391.67	5.36	-	-	391.67	5.36
	II. Curing agency	337.65	4.62	270.65	6.44	537.65	7.368
	III. Pre harvest contractor	-	-	-	-	1,941.04	24.45
	Total margin	729.32	9.99	270.65	6.44	2,870.36	36.26
6	Selling price of						
	I. Producers	5,000.00	68.49	6,000.00	82.19	2,000.00	27.39
	II. Pre harvest contractor	-	-	-	-	5,000.00	68.49
	III. Commission agents	6,000.00	82.19	-	-	6,000.00	82.19
	IV. Curing agency	7,300.00	100.00	7,300.00	100.00	7,300.00	100.00
7	Price spread	2,300.00	-	1,300.00	-	5,300.00	-
8	Producer's share in consumer's rupee (%)	61.04	-	74.74	-	27.39	-

Channel-I Farmer → Traders → Wholesaler cum commission agent → Retailers →

Consumers

Channel-II Farmer → Wholesaler cum commission agent → Retailers →

Consumers

The details of cost incurred by marketing intermediaries is presented in Table 4.14. In channel-I producers sold produce to the traders and traders sold it to wholesalers cum commission agents, wholesalers cum commission agents in turn sold it to retailers and finally reach to the consumers. In channel-II, the producer sold produce to the wholesale cum commission agent and wholesaler cum commission agents sold to retailers and ultimately reaches to the consumers.

4.8.2.1 Marketing cost incurred by various intermediaries

4.8.2.1.1 Marketing cost incurred by Traders

From Table 4.14 the cost incurred in the marketing of pepper through channel-I by traders was Rs. 369.55 per quintal. The value of storage loss constituted (49.72 %) followed by grading charge (16.65 %), transportation charges (12.47 %), storing (9.60 %), loading and unloading charges (4.98 %), packing cost (4.07 %), and miscellaneous (2.48 %).

4.8.2.1.2 Marketing cost incurred by wholesaler cum commission agents

Total marketing cost incurred by wholesaler cum commission agents in both channel-I and channel-II was Rs. 233.94 per quintal respectively. Among various components, the transportation charges (41.17 %) followed by grading charges alone constituting (30.20 %) loading and unloading charges (15.24 %), miscellaneous (7.62 %) and packing cost (5.75 %).

4.8.2.1.3 Marketing cost incurred by retailers

Total marketing cost incurred by retailers in channel-I and channel-II was Rs. 1,540.50 and Rs. 1,540.50 per quintal respectively. Among various components, the storing loss alone constituted 35.37 per cent (Rs.545.00 per quintal) followed by value of storing cost (24.66 %), transportation charges (17.36 %), packaging charges (10.25 %), grading (4.80 %), loading and unloading charges (2.82 %).

4.8.2.2 Price spread in marketing of pepper

Pepper was marketed through various intermediaries starting from farmer to ultimate consumer. The intermediaries involved rendered variety of service in the process of marketing of pepper with a view to earn some profit. The margin of intermediaries can act as an indicator of efficiency of the marketing system.

Marketing cost and margin of the agencies involved in the marketing of pepper are given in the Table 4.15. The producer's share in consumer's rupee was 93.52 per cent in channel-I, where as it was 94.31 per cent in case of channel-II. Correspondingly net price received by the producer per quintal of pepper was highest in channel-II (Rs. 59,891.34 per quintal) followed by channel-I (Rs. 59,391.34).

Table 4.13: Marketing cost incurred by pepper producer

Sl.No	Particulars	Cost (Rs/q)	Per cent
1	Packaging material cost	55.00	9.03
2	Loading and Unloading	-	-
3	Transportation	-	-
4	Weighing charges	20.33	3.34
5	Labour charges	150.00	24.64
6	Commission charges	333.33	54.76
7	Miscellaneous	50.00	8.21
	Total	608.66	100.00

The price spread was marginally higher in case of channel-I (Rs.3,500.00 per quintal) as compared to channel-II (Rs.3,000.00 per quintal). The total marketing cost incurred by intermediaries amounted to Rs. 2,143.99 and Rs. 1,774.44 per quintal in channel-I and channel-II respectively. In pepper marketing, the market margins of all intermediaries were Rs. 1,356.01 (2.13 % of consumer price) and Rs. 725.56 (1.14 % of consumer price) per quintal in channel-I and channel-II respectively.

4.8.3 Marketing of cardamom

In the effort of studying the marketing aspects of cardamom, two channels were identified and marketing cost and margin and price spread have been worked out. The sample farmers marketed their produce from their estate through the following two channels.

Channel-I Farmer → Traders → Wholesaler cum commission agent → Retailers →
Consumers

Channel-II Farmer → Wholesaler cum commission agent → Retailers → Consumers

The details of cost incurred by marketing intermediaries are presented in Table 4.17. In channel-I, producers sold produce to the Traders and Traders sold it to wholesalers cum commission agents, wholesalers cum commission agents in turn sold it to retailers and finally reach to the consumers. In channel-II, the producer sold produce to the wholesale cum commission agent and wholesaler cum commission agents sold to retailers and ultimately reaches to the consumers.

4.8.3.1 Marketing cost incurred by various intermediaries

4.8.3.1.1 Marketing cost incurred by Traders

From Table: 4.17 the cost incurred in the marketing of cardamom through channel-I and channel-II by traders was Rs. 287.96 per quintal. The value of transportation charges constituted 44.91 per cent (Rs.129.33) followed by value of grading charges (18.28 %), storing (12.81 %), loading and unloading charges (10.99 %), storage loss (6.12 %), packaging charge (4.11 %) and miscellaneous charges (2.74 %).

4.8.3.1.2 Marketing cost incurred by wholesaler cum commission agents

Total marketing cost incurred by wholesaler cum commission agents in channel-I and was Rs. 158.47 per quintal respectively. Among various components, the transportation charges (44.90 %) followed by grading cost alone constituted (19.34 %), loading and unloading charges (17.45 %), value of packaging charges (9.56 %), and miscellaneous charges (8.72 %).

4.8.3.1.3 Marketing cost incurred by retailers

Total marketing cost incurred by retailers in channel-I and channel-II was Rs. 759.66 each per quintal respectively. Among various components, the packaging cost alone constituted 30.10 per cent (Rs. 228.66 per quintal) followed by value of transportation charges (27.20 %), grading charges (13.25 %), storing (12.15 %), loading and unloading charges (7.19 %), storage loss (6.49 %) and miscellaneous charges (3.59 %).

Table 4.14: Marketing cost incurred by various intermediaries in the marketing of pepper

Sl. No	Particulars	Channel – I					
		Traders		Wholesaler cum Commission agents		Retailers	
		Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent
1	Transportation charges	46.09	12.47	96.33	41.17	267.50	17.36
2	Storing	35.48	9.60	-	-	380.00	24.66
4	Storage losses	183.76	49.72	-	-	545.00	35.37
5	Packaging charges	15.05	4.07	13.46	5.75	158.00	10.25
6	Grading charges	61.56	16.65	70.66	30.20	74.00	4.80
7	Loading and unloading charges	18.41	4.98	35.66	15.24	43.50	2.82
8	Miscellaneous	9.20	2.48	17.83	7.62	72.50	4.70
	Total	369.55	100.00	233.94	100.00	1540.5	100.00
Sl.No	Particulars	Channel – II					
		Wholesaler cum Commission agents		Retailers			
		Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent		
1	Transportation charges	96.33	41.17	267.50	17.36		
2	Storing	-	-	380.00	24.66		
4	Storage losses	-	-	545.00	35.37		
5	Packaging charges	13.46	5.75	158.00	10.25		
6	Grading charges	70.66	30.20	74.00	4.80		
7	Loading and unloading charges	35.66	15.24	43.5.00	2.82		
8	Miscellaneous	17.83	7.62	72.5.00	4.70		
	Total	233.94	100.00	1540.5	100.00		

Table 4.15: Marketing cost, margin, and price spread in marketing of pepper in channel-I and channel-II

Sl. No	Particulars	Channel-I		Channel-II	
		Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent
1	Gross price received by producer	60,000.00	94.48	60,500.00	95.27
2	Marketing cost of producer	608.66	0.95	608.66	0.95
3	Producer's net price	59,391.34	93.52	59,891.34	94.31
4	Marketing cost incurred by				
	i. Traders	369.55	0.58	-	-
	ii. Wholesaler cum CA	233.94	0.36	233.94	0.36
	iii. Retailers	1540.50	2.42	1540.50	2.42
	Total marketing cost	2,143.99	3.37	1,774.44	2.79
5	Margin earned by				
	i. Traders	630.45	0.99	-	-
	ii. Wholesaler cum CA	266.06	0.41	266.06	0.41
	iii. Retailers	459.50	0.72	459.50	0.72
	Total margin	1,356.01	2.13	725.56	1.14
6	Selling price of				
	i. Producers	60,000.00	94.48	60,500.00	95.27
	ii. Traders	61,000.00	96.06	-	-
	iii. Wholesaler cum CA	61,500.00	96.85	61,500.00	96.85
	iv. Retailers	63,500.00	100.00	63,500.00	100.00
7	Price spread	3,500.00	-	3,000.00	-
8	Producer's share in consumer's rupee (%)	93.52	-	94.31	-

4.8.3.2 Price spread in marketing of cardamom

Cardamom was marketed through various intermediaries starting from farmer to ultimate consumer. The intermediaries involved have rendered variety of service in the process of marketing of cardamom with a view to earn some profit. The margin of intermediaries can act as an indicator of efficiency of the marketing system.

Marketing cost and margin of the agencies involved in the marketing of cardamom are given in the Table 4.18. The producer's share in consumer's rupee was 88.65 per cent in channel-I, where as it was 90.17 per cent in case of channel-II. Correspondingly net price received by the producer per quintal of pepper was highest in channel-II (Rs. 29,757.57 per quintal) followed by channel-I (Rs. 29,257.57). The price spread was marginally higher in case of channel-I (Rs.3, 000.00 per quintal) as compared to channel-II (Rs.2, 500.00 per quintal). The total marketing cost incurred by intermediaries amounted to Rs. 1,420.43 and Rs. 1,242.96 per quintal in channel-I and channel-II respectively. In cardamom marketing, the market margin of all intermediaries was Rs. 1,579.57 (4.29 % of consumer price) and Rs. 1,257.04 (3.75 % of consumer's price) per quintal channel-I and channel-II respectively.

4.9 Cash flow and financial feasibility of investment in selected coffee based cropping systems

4.9.1 Cash flow in coffee plantation

Cash flows in cropping system-I and cropping system-II are presented in Table 4.19 and Table 4.20 respectively.

4.9.1.1 Cropping system-I (coffee + pepper)

The cost per hectare in cropping system-I during gestation period was Rs. 85,070.48, Rs. 69,384.75 and Rs. 99,520.37 during 1st, 2nd and 3rd year respectively. And Rs. 95,217.00 for 4th and 5th year respectively. From sixth year onwards, cost per hectare was Rs. 1, 00,063.16 and it remained same till twenty years then onwards it was Rs. 1,08,063.16 up to thirty years. The return started flowing from fourth year and went on increasing up to twenty years and started declining.

4.9.1.2 Cropping system-II (coffee + cardamom)

The cost per hectare in cropping system-II coffee plantation during gestation period was Rs. 92,396.75, Rs. 75,579.9 and Rs. 82,693.74 during 1st, 2nd and 3rd year respectively. And Rs. 96,460.70 for 4th and Rs. 95,217.00 5th year respectively. From sixth to twentieth year the cost per hectare was Rs. 1, 00,063.16 and from twenty first year onwards cost per hectare was Rs. 1, 00,063.16 it remained same till thirty year. The return started flowing from fourth year and went on increasing up to twenty years and started declining.

4.9.2 Financial feasibility of investment in the coffee plantation

To evaluate the feasibility of investment in the selected cropping system, the criteria such as Net Present Value/worth, Benefit-Cost Ratio, Pay Back Period and Internal Rate of Return were used and the results are presented in Table: 4.21.

Table 4.16: Marketing cost incurred by cardamom producer

Sl.No	Particulars	Cost (Rs/q)	Per cent
1	Packaging material cost	36.00	5.27
2	Loading and Unloading	60.16	8.81
3	Transportation	200.60	29.39
4	Weighing charges	10.34	1.51
5	Labour charges	100.00	14.65
6	Commission charges	225.33	33.01
7	Miscellaneous	50.00	7.32
	Total	682.43	100.00

Table 4.17: Marketing cost incurred by various intermediaries in the marketing of Cardamom

Sl. No	Particulars	Channel – I					
		Wholesaler cum Commission agents		Traders		Retailers	
		Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent
1	Transportation charges	71.16	44.90	129.33	44.91	206.66	27.20
2	Storing	-	-	36.91	12.81	92.33	12.15
4	Storage losses	-	-	17.63	6.12	49.36	6.49
5	Packaging charges	15.16	9.56	11.86	4.11	228.66	30.10
6	Grading charges	30.66	19.34	52.66	18.28	100.66	13.25
7	Loading and unloading charges	27.66	17.45	31.66	10.99	54.66	7.19
8	Miscellaneous	13.83	8.72	7.91	2.74	27.33	3.59
	Total	158.47	100.00	287.96	100.00	759.66	100.00
Sl.No	Particulars	Channel – II					
		Auction centre		Traders		Retailers	
		Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent
1	Transportation charges	-	-	129.33	44.91	206.66	27.20
2	Storing	-	-	36.91	12.81	92.33	12.15
4	Storage losses	-	-	17.63	6.12	49.36	6.49
5	Packaging charges	-	-	11.86	4.11	228.66	30.10
6	Grading charges	-	-	52.66	18.28	100.66	13.25
7	Loading and unloading charges	-	-	31.66	10.99	54.66	7.19
8	Miscellaneous	100.00	100	7.91	2.74	27.33	3.59
	Total	100.00	100.00	287.96	100.00	759.66	100.00

Table 4.18: Marketing cost, margin, and price spread in marketing of cardamom in channel-I and channel-II

Sl. No	Particulars	Channel-I		Channel-II	
		Cost (Rs/q)	Per cent	Cost (Rs/q)	Per cent
1	Gross price received by producer	30,000	88.65	30,500	90.17
2	Marketing cost of producer	742.43	0.07	742.43	0.07
3	Producer's net price	29,257.57	88.58	29,757.57	90.10
4	Marketing cost incurred by				
	i. Action centre	-	-	100.00	0.30
	ii. Commission agent	277.47	0.84	-	-
	iii. Traders	337.96	1.02	337.96	1.02
	iv. Retailers	805.00	2.43	805.00	2.43
	Total marketing cost	1,420.43	4.29	1,242.96	3.75
5	Margin earned by				
	i. Action centre	-	-	100.00	0.30
	ii. Commission agent	222.53	0.67	-	-
	iii. Traders	662.04	2.00	462.04	1.40
	iv. Retailers	695.00	2.10	695.00	2.10
	Total margin	1,579.57	4.77	1,257.04	3.8
6	Selling price of				
	i. Producer	30,000	90.90	30,500	92.42
	ii. Action centre	-	-	30,700	93.03
	iii. Commission agent	30,500	92.42	-	-
	iv. Traders	31,500	95.45	31,500	95.45
	v. Retailers	33,000	100.00	33,000	100.00
7	Price spread	3,000	-	2,500	-
8	Producer's share in consumer's rupee (%)	88.65	-	90.17	-

Table 4.19: Cash flow analysis of cropping system-I (coffee + pepper)

Sl.No	Cash outflow	Cash inflow	Net cash flow	D.F. at 12%	Discounted net cash inflows at 12%
1.	85,070.48	0	-85,070.48	0.892857	-7,,955.8
2.	69,384.75	0	-69,384.75	0.797194	-55,313.1
3.	99,520.37	0	-99,520.37	0.711178	-70,836.6
4.	95,217.00	91,600.00	-3,617.00	0.635518	-2298.67
5.	95,217.00	1,39,900.00	44,683.00	0.567427	25,354.34
6.	1,00,063.16	1,49,900.00	49,836.84	0.506631	25,248.89
7.	1,00,063.16	1,62,400.00	62,336.84	0.452349	28,198.01
8.	1,00,063.16	1,89,900.00	89,836.84	0.403883	36,283.57
9.	1,00,063.16	2,41,500.00	1,41,436.84	0.36061	51,003.54
10.	1,00,063.16	2,41,500.00	1,41,436.84	0.321973	45,538.84
11.	1,00,063.16	2,91,500.00	1,88,436.84	0.287476	54,171.07
12.	1,00,063.16	3,29,800.00	2,26,736.84	0.256675	58,197.68
13.	1,00,063.16	3,29,800.00	2,23,736.84	0.229174	51,274.67
14.	1,00,063.16	3,39,800.00	2,33,736.84	0.20462	47,827.23
15.	1,00,063.16	3,73,100.00	2,67,036.84	0.182696	48,786.56
16.	1,00,063.16	3,83,100.00	2,77,036.84	0.163122	45,190.8
17.	1,00,063.16	4,16,400.00	3,10,336.84	0.145644	45,198.7
18.	1,00,063.16	4,16,400.00	3,10,336.84	0.13004	40,356.2
19.	1,00,063.16	4,16,400.00	3,10,336.84	0.116107	36,032.28
20.	1,06,063.16	4,16,400.00	3,10,336.84	0.103667	32,171.69
21.	1,08,063.16	3,73,100.00	2,65,036.84	0.09256	24,531.81
22.	1,08,063.16	3,73,100.00	2,65,036.84	0.082643	21,903.44
23.	1,08,063.16	3,73,100.00	2,65,036.84	0.073788	19,556.54
24.	1,08,063.16	3,39,800.00	2,31,736.84	0.065882	15,267.29
25.	1,08,063.16	3,39,800.00	2,31,736.84	0.058823	13,631.46
26.	1,08,063.16	3,29,800.00	2,21,736.84	0.052521	11,645.84
27.	1,08,063.16	3,29,800.00	2,21,736.84	0.046894	10,398.13
28.	1,08,063.16	2,91,500.00	18,3436.84	0.041869	7,680.317
29.	1,08,063.16	1,62,400.00	54,336.84	0.037383	2,031.274
30.	1,08,063.16	1,39,900.00	31,836.84	0.033378	1,062.65

Table 4.20: Cash flow analysis of cropping system-II (coffee + cardamom)

Sl.No	Cash outflow	Cash inflow	Net cash flow	D.F. at 12%	Discounted net cash inflows at 12%
1.	92,396.75	0	-92,396.8	0.892857	-82,497.10
2.	75,579.9	0	-75,579.9	0.797194	-60,251.80
3.	82,693.74	0	-82,693.7	0.711781	-58,859.80
4.	96,460.70	55,000.00	-41,460.7	0.635518	-26,349.00
5.	95,217.00	85,000. 00	-10,217	0.567427	-5,797.40
6.	1,00,063.16	95,000. 00	-5,063.16	0.506631	-2,565.15
7.	1,00,063.16	1,22,500. 00	22,436.84	0.452349	10,149.28
8.	1,00,063.16	1,65,500. 00	65,436.84	0.403883	26,428.83
9.	1,00,063.16	2,00,000. 00	99,936.84	0.360611	36,038.22
10.	1,00,063.16	2,00,000. 00	99,936.84	0.321973	32,176.96
11.	1,03,063.16	2,15,000. 00	1,11,936.8	0.287476	32,179.16
12.	1,03,063.16	2,20,000. 00	1,16,936.8	0.256675	30,014.76
13.	1,06,063.16	2,20,000. 00	1,13,936.8	0.229174	26,111.36
14.	1,06,063.16	2,45,000. 00	1,38,936.8	0.204620	28,429.26
15.	1,06,063.16	2,45,000. 00	1,38,936.8	0.182696	25,383.2
16.	1,06,063.16	2,60,000. 00	1,53,936.8	0.163122	25,110.49
17.	1,06,063.16	2,60,000. 00	1,53,936.8	0.145644	22,419.98
18.	1,06,063.16	2,85,000. 00	1,78,936.8	0.13004	23,268.95
19.	1,06,063.16	2,85,000. 00	1,78,936.8	0.116107	20,775.82
20.	1,06,063.16	2,85,000. 00	1,78,936.8	0.103667	18,549.85
21.	1,08,063.16	2,85,000. 00	1,76,936.8	0.092506	16,377.27
22.	1,08,063.16	2,45,000. 00	1,36,936.8	0.082643	11,316.87
23.	1,08,063.16	2,20,000. 00	1,11,936.8	0.073788	8,259.59
24.	1,08,063.16	2,15,000. 00	1,06,936.8	0.065882	7,045.21
25.	1,08,063.16	2,00,000. 00	91,936.84	0.058823	5,408.00
26.	1,08,063.16	1,65,000. 00	56,936.84	0.052521	2,990.38
27.	1,08,063.16	1,22,500. 00	14,436.84	0.046894	677.00
28.	1,08,063.16	85,000. 00	14,436.84	0.041869	604.45
29.	1,08,063.16	85,000. 00	14,436.84	0.037383	539.69
30.	1,08,063.16	85,000. 00	14,436.84	0.033378	481.87

4.9.2.1 Net present value (NPV)

Net present value of an investment is the difference between the present value of series of inflows (returns) and outflows (costs) over the economic life period of coffee plantation. The result of the financial feasibility analysis in Kodagu district indicated that per hectare NPV at 12 per cent discount rate for the entire life period of coffee plantation (30 years) was found to be Rs. 7,76,230.56 for cropping system-I and Rs. 7,75,936.98 for cropping system-II.

The NPV was positive for both the categories of plantation in the study area indicating that the investment in coffee plantation is financial feasibility and economically viable whereas, the NPV was higher in cropping system-I as compared to cropping system-II.

4.9.2.2 Internal rate of return (IRR)

IRR indicates an important basis of investment and better than other criteria of evaluation, which do not consider the reinvestment opportunities. This criterion measures the rate of return that can be realized by the investment in the coffee plantation. The value of IRR generally depends on the magnitude of returns realized in each year over the economic life period and more particularly in the initial years of coffee plantation. It could be noted that, the IRR was found to be 27 and 17 per cent in cropping systems-I and cropping system-II in study region indicating that the investment in the orchards was highly profitable, economically feasible and financially viable.

4.9.2.3 Benefit cost ratio

The BCR criterion indicates the rate of return per rupee invested in selected coffee plantation. The benefit cost ratio at 12 per cent discount rate was 3.51 and 2.46 respectively for cropping system-I and cropping system-II in study area.

4.9.2.4 Pay Back period

PBP is the period required to recover the initial investment made in establishing the coffee plantation. In the present study, the payback period was 11.1 and 15.5 years in cropping systems-I and cropping system-II respectively.

4.10 Constraints associated with production and marketing of coffee and associated crops in the study area.

An opinion survey was conducted to identify the problems faced by the growers at different stages of production and marketing of coffee and its associated crops like pepper and cardamom in the study area. Problems were analyzed using Garrett's Ranking technique and the results are presented in this section.

4.10.1 Production problems faced by the coffee, pepper and cardamom growers

Nine major production problems were identified in coffee growers, seven major production problems were identified in pepper and cardamom growers and the results are presented in Table 4.22, 4.23 and 4.24. The results revealed that in coffee, pepper and cardamom the major production problems faced by the sample growers were weather extremity (I rank). With regards coffee production, non-availability of skilled labour was ranked II, followed by damaged by pest and diseases, soil infestation, problem of timely getting input, non-availability of credit during appropriate time, hygroscopic nature of coffee, irrigation problem and problem of coffee bean pulping were the major production problem respectively.

Table 4.21: Financial feasibility measures in cropping system-I and II

Sl. No	Particulars	Cropping system-I (coffee + pepper)	Cropping system-II (coffee + pepper)
1.	NPV @ 12% (Rs/ha)	7,76,230.56	7,75,936.98
2.	IRR (%)	27	17
3.	B:C Ratio	3.51	2.46
4.	Payback period (years)	11.1	15.5

Table 4.22: Constraints in production and marketing of coffee

Sl.No	Problems	Garrett score	Rank
I	Production problems		
	a. Weather extremity	74.08	I
	b. Non-availability of skilled labour	72.92	II
	c. Damage by pest and diseases	63.45	III
	d. Soil infestation	58.75	IV
	e. Problems of getting inputs	48.25	V
	f. Non-availability of credit	47.28	VI
	g. Hygroscopic nature of coffee	43.52	VII
	h. Irrigation problems	39.95	VIII
	i. Pulper problem	33.45	IX
II	Marketing problems		
	a. High fluctuation of price	75.80	I
	b. Lower price	74.50	II
	c. Inadequate market information	63.45	III
	d. Non-availability of skilled labour	55.25	IV
	e. No incentives for quality bean supply	50.95	V
	f. High Transportation costs	49.35	VI
	g. High loading & unloading cost	42.95	VII
	h. No profit with respect to coffee production business	38.02	VIII

Table 4.23: Constraints in production and marketing of Pepper

Sl.No	Problems	Garrett score	Rank
I	Production problems		
	a. Weather extremity	68.42	I
	b. Non-availability of skilled labour	66.00	II
	c. Damaged by pest and diseases	62.84	III
	d. Soil infestation	48.07	IV
	e. Problems of getting inputs	47.69	V
	f. Non-availability of credit	41.80	VI
	g. Irrigation problems	40.00	VII
II	Marketing problems		
	a. Lower price	74.19	I
	b. High fluctuation of price	73.73	II
	c. Inadequate market information	64.07	III
	d. Non-availability of skilled labour	54.61	IV
	e. High Transportation costs	47.00	V
	f. No incentives for qualitative produce supply	44.80	VI
	g. High loading & unloading cost	39.26	VII
	h. No profit with respect to pepper production business	33.03	VIII

Table 4.24: Constraints in production and marketing of cardamom

Sl.No	Problems	Garrett score	Rank
I	Production problems		
	a. Weather extremity	78.28	I
	b. Damaged by pest and diseases	66.28	II
	c. Non-availability of skilled labour	61.28	III
	d. Soil infestation	54.28	IV
	e. Irrigation problem	44.85	V
	f. Problems of getting inputs	44.71	VI
	g. Non-availability of credit	31.85	VII
II	Marketing problems		
	a. Lower price	74.00	I
	b. High fluctuation of price	71.28	II
	c. Inadequate market information	66.71	III
	d. Non-availability of skilled labour	55.50	IV
	e. No incentives for qualitative produce supply	47.85	V
	f. High loading & unloading cost	43.14	VI
	g. High Transportation costs	41.42	VII
	h. No profit with respect to cardamom production business	31.00	VIII

In case of pepper rank II was given to non-availability of skilled labour during peak season, pest and disease attack, soil infestation, non-availability of inputs during peak time, non-available credit during appropriate time and non-availability of water were the major production problems.

In case of cardamom rank II was given to pest and disease attack, non-availability of skilled labour during peak season, soil infestation, non-availability of water, non-availability of inputs during peak time and non-availability credit during appropriate time were the major production problems.

4.10.2 Marketing problems faced by the coffee, pepper and cardamom growers

Eight major marketing problems were identified as the major ones with the help of Garrett's ranking technique and the results are presented in Table 4.22, 4.23 and 4.24. The major marketing problem faced by the coffee was high fluctuation of price for the produce was ranked I and in pepper and cardamom growers was lack of remunerative price for the produce was ranked I. With regards to coffee marketing, lesser price was ranked II followed by inadequate market information, non-availability of skilled labour during peak season, no incentives for the supply of qualitative coffee bean, high transportation cost, high loading and unloading cost and no profit with respect to production of coffee.

In marketing of pepper high price fluctuation and was ranked II followed by inadequate market information, non-availability of skilled labour during peak season, high transportation cost, no incentives for the supply of qualitative produce, high loading and unloading cost and no profit with respect to the production of pepper.

In marketing of cardamom high price fluctuation and was ranked II followed by inadequate market information, non-availability of skilled labour during peak season, no incentives for the supply of qualitative produce, high transportation cost, high loading and unloading cost and no profit with respect to the production of cardamom.

5. DISCUSSION

The results of the investigation presented in the preceding chapter are discussed in detail in this chapter. The main focus here is to throw a light on some of the causes responsible for the major trends observed in the findings. This kind of analysis is hoped to identify such of the policy measures and execute corrections that can be implemented to overcome the constraints encountered by coffee growers. Keeping objective of the study in view the results are discussed under the following heads:

5.1 Growth in area, production and productivity of coffee in India and Karnataka during 1995-96 to 2014-15

The compound growth rates for area, production and productivity of coffee for the period of twenty years from 1995-96 to 2014-15 presented in Table 4.2 are discussed below.

It is observed from the table that the area under coffee in Karnataka was growing at the rate of 0.994 per cent per annum. Similarly in India it was growing at the rate of 2.026 per cent per annum. The production of coffee in India was increasing at the rate of 1.529 per cent annually. Similarly in the case of Karnataka state, it was increase at the rate of 1.742 per cent annually. The productivity of the coffee in India was declining at the rate of -0.484 per cent per annum. While in Karnataka state, it was increasing at the rate of 0.935 per cent per annum.

The growth rate in India, in case of area and production was found to be significant at 1 per cent level and in production was found to be non significant. The growth rate in Karnataka in case of area, production and productivity was found to be significant at 1 per cent level respectively. Similar results were found by Babur reddy (2001).

The results indicated that, there is a significant growth in the bearing area, production and productivity of coffee in Karnataka. This is primarily attributed to increased and stable prices of coffee over the years. But, this growth is appreciable majorly in the case of Robusta coffee. The other reasons for increased growth rates of Robusta coffee were the variety is tolerant to pests and diseases, less labour intensive as compared to Arabica coffee. Hence, planters preferred Robusta coffee over Arabica. On the contrary, Arabica coffee exhibited a very less growth compared to Robusta.

And also the results indicated that, there is a decline in the productivity of coffee in India. This is because in other coffee growing states and non-traditional coffee growing states, the coffee yield is decreasing year by year due to poor field management, practicing of improper post harvest practices, aged coffee plantations and changing climatic conditions.

5.2 General characteristics of the sample respondents

It is revealed from the Table: 4.2 that the average age of the sample respondents was relatively high in cropping system-II (40 years) as compare to cropping system-I (38 years). This showed that the sample respondent were dynamic, capable of risk taking and open to new ideas for improvement of coffee profitability, the planters could realize remunerative prices for coffee and hence, they were ensured of higher income from coffee as compared to other perennial crops.

So far as the literacy was concerned, it was observed that all of the respondents were literates both in case of cropping system-I and cropping system-II (100%), having their education ranging from primary to degree level. These results are in tune with the findings of Chethana (2008). Coffee being a high investment enterprise has been perceived by these respondents mostly due to their education. This might have enabled the respondents to allocate the manageable size of the area under coffee plantation to get higher returns over other crops.

The occupational pattern of the samples respondents revealed that, 91.66 per cent of the cropping system-I and 71.42 per cent of the cropping system-II planters were involved in agriculture as a main occupation for their livelihood and employment.

So far as plant population was concerned, the cropping system-I growers were maintaining more plant population (1573 plants per hectare) than cropping system-II growers (1050 plants per hectare) because it was observed in cropping system-I (coffee + pepper) when coffee grown with pepper as a intercrop we can cover more number of coffee plants when compared with cropping system-II (coffee + cardamom). Among the total land holdings of 12.15 hectare the area under irrigated condition was (66.91 %) in cropping system-I and among the total land holdings of 5.75 hectare the area under irrigated condition was (67.82 %) in cropping system-II because of the reason that majority of growers are medium and large area holders so the planters were financially sound and were capable enough to afford irrigation facility like opening wells and purchasing of sprinklers, drips and motors.

5.3 Input use pattern in coffee based cropping systems

5.3.1 Input use pattern in identified coffee based cropping systems during investment period

The input use pattern followed in cropping system-I and cropping system-II sample planters during investment period per ha presented in Table 4.3, indicated that number of coffee, pepper/cardamom and shade plant seedlings used in cropping system-I were 15,731.61, 769.23, 50, and cropping system-II were 1,050.00, 600.30, 20 per hectare. The results revealed that the sample planters were using around recommended quantity of seed rate given as per the package of practices. The amount of FYM used in cropping system-I and cropping system-II was 14.34 tonnes and 15.14 tonnes. Cropping system-II utilized high amount of FYM as compare to the cropping system-I because cardamom plant required high amount of FYM then a pepper. The amount of fertilizers and PPC used in cropping system-I and cropping system-II was 13.23 quintals, 12.45 liters and 14.85 quintals, 12.99 liters, respectively. Cropping system-II incurred high amount of fertilizers as compare to the cropping system-I as the reason is same as explained in case of FYM.

The sample planters employed on an average 158.08 man days in cropping system-I and 168.96 man days in cropping system-II, because in cardamom cultivation planting, opening and closing of pits, application of FYM and fertilizers incurred more number of labour as compared to the cropping system-II. The machine labour used by the respondents was 14.13 hours in cropping system-I and 16.49 hours in cropping system-II, because in case of cropping system-II the field operations like opening and closing of pits required more man days than cropping system-I.

5.3.2 Input use pattern in identified coffee based cropping systems during bearing period

The input use pattern followed in cropping system-I and cropping system-II sample planters during bearing period per ha presented in Table 4.3, indicating that the amount of FYM used in cropping system-II is more than cropping system-I i.e. 6.15 tonnes and 6.88 tonnes and amount of fertilizers used in cropping system-II was higher than cropping system-I i.e. 8.20 and 7.50 quintals, use of plant protection chemicals was also high in cropping system-I than cropping system-II i.e. 15 and 18 liters, amount of weedicide used was also high in cropping system-I and cropping system-II i.e. 4.22 and 4.48 liters because cultivation of coffee with cardamom require high amount of inputs like fertilizers and PPC than cultivation of coffee with pepper.

The sample planters employed on an average 130.77 man days in cropping system-I and 139.53 man days in cropping system-II. The machine labour used by the respondent was 2.16 hours in cropping system-I and 2.56 hours in cropping system-II because in cropping system-II, cleaning/weeding, harvesting and processing incurred more man days than cropping system-I .

5.4 Labour use pattern in coffee based cropping systems

The labour use pattern followed in selected cropping systems planters during investment period per hectare is presented in Table: 4.4, the results revealed that the maximum proportion of human labour was employed in cropping system-I and cropping system-II are follows, fencing (18.73 % and 20.42 %), opening and closing pits (18.23 % and 20.28 %), land preparation (13.03 % and 12.28 %), irrigation, watch and ward (12.06 % and 13.47 %), jungle cleaning (10.88 % and 10.07 %), because these operations exclusively depends on human labour. Human labour employed was low for application of fertilizers (7.15 % and 9.42 %), planting of coffee seedlings (6.53 % and 6.03 %), line marking (5.40 % and 5.35 %), planting of pepper/cardamom seedlings (5.19 % and 5.44 %), application of FYM (5.15 % and 5.40 %) and staking (2.28 % and 2.25 %) operations, because these operations generally required less number of human labour compared to fencing, land preparation etc.

The maximum proportion of machine labour was employed for land preparation (6.52 %) followed by jungle cleaning (4.25 %) and opening and closing of pits (3.36 %) in cropping system-I and in case of cropping system-II, for land preparation (6.55 %) followed by jungle cleaning (5.02 %) and opening and closing of pits (4.92 %), because land preparation, jungle cleaning required machine labour because it is difficult to conduct by human labours.

The labour use pattern followed in cropping system-I and cropping system-II sample planters during bearing period per hectare is presented in Table: 4.4, indicating that maximum proportion of human labour was employed for harvesting (70 % and 82 %) followed by pruning (20 % and 16 %), irrigation, watch and wart (12.06 % and 13.47 %), application of fertilizers (9.22 % and 11.26 %), cleaning/weeding (8 % and 5.06 %) because these operations exclusively depends on human labour. Human labour employed was low for application of FYM (7.15 % and 7.28 %) and application of plant protection chemicals (4.34 % and 4.46 %), because these operations generally required less number of human labour compared to harvesting, pruning etc.

The machine labour was employed during bearing period is only for cleaning/ weeding (2.16 %) and (2.56 %) in cropping system-I and cropping system-II respectively.

5.5 Investment on selected coffee based cropping systems in the study area

The investment pattern in coffee has similar to the one found in any plantation. Heavy investment needed for establishment of coffee plantation. Coffee is a perennial plantation crop which continues to yield up to thirty years under good field management conditions. The cost of coffee plantation up to bearing included not only the cost incurred in the investment cost that is at the time of planting but also the cost incurred in maintaining the plants till the time of bearing that is up to four year of planting.

For establishing coffee plantation investment has to be made on tanks, wells, sprinklers and drippers, pump house and pump sets, labour quarters, godown, drying yard, vehicles and vehicle shed, land preparation, manure and fertilizer, digging of pits, planting and planting material and these costs are incurred during zero year (investment cost) and during next three years farmer have to maintain the plantation by applying fertilizers, manures, PPC, irrigation etc, the cost incurred by the farmer on all these items for the three years are together as cost of maintenance.

5.5.1 Cost incurred in the selected coffee based cropping system during establishment period

It revealed from the Table 4.5 that the investment in coffee plantation was higher in case of cropping system-II (Rs. 9,76,801.5 per hectare) than the cropping system-I (Rs 9,23,116.55 per hectare). The investment in case of cropping system-II was more than cropping system-I due to high cardamom seedling cost and application of more manures and fertilizers.

It was also observed from the Table: 4.6 and 4.7 that the maintenance cost during gestation period for cropping system-I increased over the years (up to three years). This was due to the more care that had been taken during the initial period of establishment of coffee plantation like gap filling, weeding, application of PPC, irrigation, manure and fertilizer application, watch and ward. The maintenance cost during gestation period for cropping system-II was decreased over the years (up to three years). This was due to the investment on permanent structures are constructed in the initial year so the cost incurred more in the first year as compared to second and third years.

Farm vehicles laid a major share in the total investment cost in both the cropping systems because in the study area most of the estates located in interior place and undulated land found in the study area so when the planters hire the vehicle on rental basis it leads to the high costs so the most of the planters purchased their own vehicle. Hence, the farm vehicle and vehicle shed laid a major share.

Labour quarters, godowns and drying yard constituted the second highest share in both the systems. Because all those were permanent structures it was essential for coffee production and it incurred high cost. Some other investment items include such as sprinklers and drippers, fencing, wells and tanks, pump house, manures and fertilizers, seedling costs, land preparation etc.

Further it was observed that the maintenance cost incurred by the cropping system-I plantation during gestation period on both labour and material cost was more than cropping system-II. This was mainly due to higher expenditure made on labour costs, manures and fertilizers, weeding and other cultural operations. And also it was reported that application of manures and fertilizers continuously increased over the years to maintain the plantations

5.6 Cost incurred in selected coffee based cropping systems during bearing period

Maintenance cost of coffee plantation during bearing period that is from fourth year onwards was vary in each years as mentioned in the Table: 4.8.

The total annual cost incurred per hectare of coffee in cropping system-I and cropping system-II were Rs. 1,07,217.1 and Rs. 1,08,461.00 respectively. Among them variable cost constituted 61.37 and 63.63 per cent. And fixed cost constituted 38.62 and 36.36 per cent respectively.

It observed that the variable cost was more in cropping system-II then the cropping system-I, due to the reason that cropping system-II planters employed more number of labours for planting, weeding, harvesting and processing then cropping system-I.

It was also observed that both the cropping systems spent same amount on manure, fertilizers, plant protection chemicals and application of PPC in coffee plantation with the aim to get large profit from their limited land.

Among the fixed cost, depreciation cost constituted more in both the cropping systems, because maintenance of coffee plantation required more number of farm implements and farm vehicles for transportation of labours, materials, undulated land and not well established road could be found in the study area so the wear and tear will be more hence, depreciation cost was high. Cunha *et al.* (2015) observed the similar results in their study on technical and economic analysis of different coffee (*Coffea arabica* L.) transplanting systems.

Among total maintenance cost, the major proportion of variable cost constituted 61.37 and 63.63 per cent for cropping system-I and cropping system-II. So the higher amount of maintenance cost was only due to the higher amount of variable cost i.e. labour and material cost.

5.7 Yield and returns in selected coffee based cropping systems in the study area

It was observed from the Table 4.9 that in Kodagu district, the average yield obtained per hectare was more in case of cropping system-I, which includes coffee (3,003.85 kgs/ha) and pepper (315.38 kgs/ha) than the cropping system-II, which includes coffee (2,914.29 kgs/ha) and cardamom (364.20 kgs/ha). In case of cropping system-I when coffee grow with pepper the plant population is more so finally the yield is more as compared with cropping system-II i.e. with cardamom. These results are in tune with the findings of Chethana (2008) in her study on economic analysis of coffee production system for exploring the socio-economic feasibility of geographical indications for Kodagu coffee.

The gross return realized per hectare in case of cropping system-I coffee plantation was found to be marginally higher, coffee (Rs. 1,50,385.00), pepper (Rs. 2,10,254.00) and totally (Rs. 3,60,639.00) than cropping system-II, coffee (Rs. 1,45,714.00), cardamom (Rs. 1,27,488.21) and totally (Rs. 2,53,177.56). Since, in cropping system-I coffee is grown with pepper so pepper fetches more price i.e. Rs. 666.67 /kg than cropping system-II when coffee is grown with cardamom fetches Rs. 300.05/ kg.

The average total net returns per hectare in cropping system-I (Rs. 2,57,972.00) was also higher than that of cropping system-II (Rs. 1,50,579.96) the reason for this is the higher average return per hectare coupled with lower investment and maintenance cost as compared with cropping system-II. The lower cost coupled with higher returns realized by cropping system-I coffee growers resulted in higher net returns than cropping system-II coffee growers in the study area.

5.8 Marketing management of selected coffee based cropping systems in the study area

5.8.1 Cost and margins in marketing of coffee

Marketing consists of agencies that perform the various marketing functions in sequence as the produce moves from the producer to the ultimate consumers, here the consumer means till it reaches to curing agency.

The marketing activities mainly included loading, unloading, transportation, bagging and weighing etc. from the study, it was observed that the transportation and processing charges together performed the main component of marketing of coffee, followed by expenditure on commission charges and harvesting charges.

In the study area, it was observed that the producer dispatched his produce to the local commission agent as well as directly to the curers, and also to the preharvest contractor.

5.8.1.1 Marketing cost incurred by producer in channel-I, channel-II and channel-III

In the study area, three marketing channels were observed for coffee is depicted in result chapter.

Out of the total marketing costs incurred by the coffee growers, the commission charges constituted around 61.31 per cent (Rs.333.33/quintal). Some farmers invariably sold all their produce to the local commission agents, since their production share was merged and with holding capacity was also low and may not be economical for them to sell to the cures located at taluk level.

The labour cost in marketing accounted for 23.91 per cent (Rs. 130.00/ quintal). Because the labour wages is more in the study area and also coffee cultivation is a labour intensive work.

The next item in the marketing cost was weighing charges accounted for 5.57 per cent (Rs. 108.33/quintal) followed by miscellaneous charges. Planter does not incurred the transportation charges, loading, unloading charges and packaging material costs because soon after the harvesting of coffee, all those work were carried out by commission agents at the farm itself. So the planter was free from these charges.

5.8.1.2 Marketing cost incurred by intermediaries

Intermediaries are the individuals or agencies who specialized in performing various marketing functions involved in the purchase and sale of coffee from producers to consumers. Commission agent was also one among them. In the present study commission agent is one who acted as an agent between producers and curers.

It is observed from the Table 4.11 that, the marketing cost incurred by the commission agents was Rs. 608.33 per quintal of coffee. The major cost incurred for marketing of coffee was on transportation (31.17 %) and followed by commission charges (28.42 %). Coffee was not sold immediately after procurement, to the curers by the commission agents; instead they did some sort of processing and stored the produce in godowns, anticipating for the better price. Assessing the global price information, competition is strong and agents appear to operate on tight margin. Agents would receive price daily from their patron curers and make contracts with planters based on these prices. Most of the respondents followed price movement in London and New York closely before selling their coffee to agents.

As indicated earlier commission cost share was substantial (28.42 %). The reason for the high commission charge involved in marketing of coffee in case of commission agents is the tight competition.

It was also observed from the Table 4.11 that, the marketing cost incurred by the curing agency was Rs. 962.35 per quintal of coffee. The major cost incurred for marketing of coffee was processing cost (37.44 %) and it is followed by transportation charges (36.57 %). Since processing has to be done before the produce reaches the consumer so in the curing agency some of the processing like drying, curing and roasting was done. The other item of the marketing cost include transportation, the curing agency borne some transportation charges to get the produce from producers as well as from commission agents. The remaining item of marketing cost such as packaging material cost (3.95 %). Gunny sacs were exclusively used for storing, since it enables better air circulation preventing the fungal growth and protecting the good quality of coffee. So gunny sacs were preferred over plastic sacs though price per plastic sac was relatively lower than gunny sac. Thus, the cost of packaging material was relatively high. The curing agency also had borne various expenditures like weighing, loading and unloading cost (8.59 %), rent (6.81 %), tax and license fee (3.14 %), and so on.

It was also observed from the Table 4.11 that, the marketing cost incurred by the preharvest contractor was Rs. 1,058.96 per quintal of coffee. This type of channel i.e. channel-III followed by the planters who were taken agriculture as a secondary occupation, due to time constraints the planters give contractor for harvesting and selling of produce to some agents called preharvest contractors. The major cost incurred for marketing of coffee was on miscellaneous cost which includes harvesting cost (44.09 %) and it is followed by watch and ward charges (18.88 %). Harvesting of coffee at the right stage is important practice to be followed in the coffee production it requires more labour, so the cost is high. After harvesting the produce was kept for drying about several days so the watchmen or labour is required to look after the produce about whole the day and to protect from the robbing. The other item of the marketing cost included processing (15.67 %). Processing after harvesting like drying, pulping etc incurred high cost. The preharvest contractor also had borne various expenditures like weighing, loading and unloading cost (78.06 %), Rent (5.51 %), commission charges (2.71 %) and so on.

5.8.1.3 Price spread in marketing of coffee in different channel

Marketing of coffee like any other commodity involved the participation of a number of intermediaries between the producer and the final consumer. Commission agents purchased the produce directly from the farm at lower price and sold the same to curers at higher prices to gain profit. Preharvest contractor also made some contract with planters by giving lower price and sold the same to commission agents with higher prices to gain profit. Curing agency also purchased produce from commission agents or directly from planters and sold the same to exporters or wholesalers at higher price to gain profit. The size of marketing margin increased with an increased participation of intermediaries. Both the size and composition of the marketing margin varied across different marketing channels. The price spread was relatively more in channel-III followed by channel-I and channel-II. Hence, producers share in consumers rupee was more in channel-II followed by channel-I and channel-III.

The price spread in coffee market as given in Table 4.12 revealed that the price spread in channel-I was Rs. 2,300.00 per quintal. In channel-I, the farmers could realize 61.04 per cent of the consumers price with a net price of Rs. 4456.34 per quintal, here the cures sale price is considered as consumer price. The rest 39.96 per cent was comprised of marketing cost and profit margin of the intermediaries. The total cost incurred in marketing of coffee in channel-I by the producer worked out to Rs. 4370.68 per quintal. The total profit margin of the curing units on an average found to be Rs.729.32 per quintal.

In channel-II, the price spread estimated at Rs. 1,300.00 per quintal. Farmers could realize 74.74 per cent of the consumer price with a net price of Rs. 5,456.34 per quintal. This was due to the absence of intermediaries in channel-II. The rest 25.26 per cent was comprised of marketing cost and profit margin of the curers. The total cost incurred in marketing of coffee in channel-II by the producer worked out to Rs. 962.35 per quintal. The total profit margin of the curing units on an average found to be Rs 270.65 per quintal.

In channel-III, the price spread was estimated to be Rs. 5,300.00 per quintal. Here farmers could realize 27.39 per cent of the consumer price with a net price of Rs. 1,378.34 per quintal. The rest 72.61 per cent was comprised of marketing cost and profit margin. The total cost incurred in marketing of coffee in channel-III by the producer worked out to Rs. 2,429.64 per quintal. The total profit margin of the curing units on an average found to be Rs. 2,870.36 per quintal.

Out of three channels considered for study, the price spread was relatively more in channel-III (Rs. 5,300.00 per quintal) followed by channel-I (Rs. 2,300.00 per quintal) and channel-II (Rs. 1,300.00 per quintal). The producers share in consumers rupee was more in channel-II (74.74 %) followed by channel-I (61.04 %) and channel-III (27.39 %). So channel-II is the best among identified three channels from the view of coffee planters.

5.8.2 Cost and margins in marketing of pepper

Marketing consists of agencies that perform the various marketing functions in sequence as the produce moves from the producer to the ultimate consumers.

The marketing activities mainly included loading, unloading, transportation, bagging and weighing etc. from the study, it was observed that transportation and grading charges together performed the main component of marketing of pepper, followed by expenditure on storing, storage loss and so on.

In the study area, it was observed that the producer dispatched his produce to the commission agent to retailers through traders or directly to retailers through wholesaler cum commission agent and ultimately to the final consumes.

5.8.2.1 Marketing cost incurred by producer in channel-I and channel-II

Out of the total marketing costs incurred by the pepper growers, the commission charges constituted 54.76 per cent (Rs. 333.33/quintal). Some farmers invariably sold all their produce to the local commission agents, since their production share was merged and with holding capacity was also low and may not be economical for them to sell to the cures located at taluk level.

The labour cost in marketing accounted for 24.64 per cent (Rs. 150.00/quintal). Because the labour wages is more in the study area and also harvesting of pepper requires more labours.

The next item in the marketing cost was packaging material cost accounted for 9.03 per cent (Rs. 118.33/quintal) followed by miscellaneous charges. Planter does not incurred the transportation charges, loading, unloading charges and weighing charges because soon after the harvesting of pepper all those work will be done by commission agents at the farm itself. So the planter was free from these charges.

5.8.2.2 Marketing cost incurred by intermediaries

Intermediaries are the individuals or agencies who specialized in performing various marketing functions involved in the purchase and sale of pepper from producers to consumers. In the present study traders, commission agents and retailers who act as an agent between producer and consumer.

It was observed from the Table 4.14 that, the marketing cost incurred by the traders was Rs. 369.55 per quintal of pepper. The major cost incurred for marketing of pepper was on storage losses (49.72 %). After harvesting the pepper starts continuously to lose their weight so when the trader procure the produce from the planters if he stores for getting good price it may leads the high cost of storage loss. Grading charges (16.65 %) in the study area first graded produce fetches high price so grading is done by each intermediaries. The next item was transportation (10.32%) The trader bears some transportation charges to get the produce from planters when the competition occurs tight. Followed by storing charges (7.94%), loading and unloading charges (4.12%) and so on.

It was also observed from the Table 4.14 that, the marketing cost incurred by the commission agents was Rs. 233.94 per quintal of pepper. The major cost incurred for marketing of pepper was on transportation charges (41.17 %) commission agents incurred transportation cost because when the competition occurs among the commission agents they go to procure the produce from the traders door step followed by grading charge (30.20 %) grading is important process which should be done in the commission agent's level because if they grade the produce, qualitative produce fetches high price. The remaining item of marketing cost such as loading and unloading (15.24 %) packaging material cost (5.75 %) and so on. The commission agents did not incur storing and storage loss charges because soon after they procure the produce from planters they sold it to retailers.

It was also observed from the Table 4.14 that, the marketing cost incurred by the retailers was Rs. 1,540.5 per quintal of pepper. The major cost incurred for marketing of pepper was on storage loss (35.37 %) and storing (24.66 %) the pepper get spoiled easily because of attack of storage pest is more and also exact moisture should be maintained in the produce, if it is not maintained it leads to spoil easily. Transportation cost (17.36 %) retailers purchase the produce from traders, traders are placed far away from retailers shop also the transportation facilities are not good in the study area so the transportation incurred more cost. Packaging cost (10.25 %) consumer prefers qualitative, good packed pepper so the retailer incurred more cost on packaging material. Followed by loading and unloading charges (2.82 %) and so on.

5.8.2.3 Price spread in marketing of coffee in different channel

Pepper was marketed through various intermediaries starting from farmers to ultimate consumers. The intermediaries involved rendered variety of services in the process of marketing of pepper with a view to earn some profit. The margins of the intermediaries can act as an indicator of the efficiency of the marketing system. Marketing cost and margin of the agencies involved in the marketing of pepper are given in the Table: 4.15. The producers' share in consumer's rupee was 93.52 per cent in channel-I and 94.31 per cent in channel-II. Correspondingly net price received by producer per quintal of pepper was highest in channel-II (Rs. 59,891.34 per quintal) followed by channel-I (Rs. 59,391.34 per quintal). The price spread was marginally high in case of channel-I (Rs. 3500.00 per quintal) as compared to channel-II (Rs. 3000.00 per quintal). The total marketing cost incurred by the intermediaries amounted to Rs. 2,143.99 and Rs. 1,774.44 per quintal in channel-I and channel-II respectively. In pepper marketing, the market margin of all the intermediaries was Rs. 1,356.01 (6.49 % consumer price) and Rs. 681.56 (5.69 % consumer price) per quintal in channel-I and channel-II respectively.

Out of two channels considered for study, the price spread was relatively more in channel-I (3,500 per quintal) than the channel-II (3,000.00 per quintal). The producers share in consumers rupee was more in channel-II (94.31 %) than the channel-I (93.52 %). So channel-II is the best among identified two channels from the view of pepper growers. Ateeq ahmed (2009) observed the similar result in his study on value chain analysis for coffee, in Kodagu district of Karnataka.

5.8.3 Cost and margins in marketing of cardamom

Marketing consists of agencies that perform the various marketing functions in sequence as the produce moves from the producer to the ultimate consumers.

The marketing activities mainly included loading, unloading, transportation, bagging and weighing etc. from the study, it was observed that transportation and grading charges together performed the main component of marketing of cardamom, followed by expenditure on storing, storage loss and so on.

In the study area, it was observed that the producer dispatched his produce to the commission agent to retailers through traders as well as auction centre to retailers through traders and ultimately to the final consumes.

5.8.3.1 Marketing cost incurred by producer in channel-I and channel-II

Out of the total marketing costs incurred by the cardamom growers, the commission charges constituted around 33.01 per cent (Rs. 225.33/quintal). Some farmers invariably sold all their produce to the local commission agents and traders, since their production share was merged and with holding capacity was also low and may not be economical for them to sell to the retailers located at different places. The transportation cost in marketing accounted for 29.39 per cent (Rs.200.60 /quintal). This was mainly due to the fact that many of the large farmers owned the vehicle for transportation, in the case of small and marginal planters, they need to rely on rented vehicles, as the farmhouses are located at the farthest place from main markets. In addition, roads are poorly maintained and hence transportation cost has major share in marketing cost.

The next item in the marketing cost was labour cost (14.65 %) Because the labour wages is more in the study area and also cardamom cultivation and marketing cost at producer level is a labour intensive work. The next item in the marketing cost was loading and unloading accounted for (8.81 %), packaging material (5.27 %) weighing charges (1.51 %) and miscellaneous charges.

5.8.3.2 Marketing cost incurred by intermediaries

It was observed from the Table 4.17 that, the marketing cost incurred by the traders was Rs. 287.96 per quintal of cardamom. The major cost incurred for marketing of cardamom was on transportation (44.91 %) and it is followed by grading charges (18.28 %). The trader bears some transportation charges to get the produce from commission agents when the competition occurs tight. And grading is important process which should be done in the trader's level because if the grade the produce, qualitative produce fetches high price and marketing also easy. The other items of the marketing cost include storing (12.81 %) followed by loading and unloading (10.99 %) and storage loss (6.12 %). Cardamom was not sold immediately after procurement from planters, to the traders; instead they do some sort of processing and stored the produce in godowns, so the storage cost is high and storage loss may incurred due to attack of stored pests. As indicated earlier loading and unloading cost were incurred to the traders at farm level and even after when it sold to commission level. Followed by packaging charges (4.11 %) and so on.

It was also observed from the Table 4.17 that, the marketing cost incurred by the commission agents was Rs. 158.47 per quintal of cardamom. The major cost incurred for marketing of cardamom was on by transportation charges (44.90 %) commission agents incurred transportation cost because when the competition occurs among the commission agents they go to procure the produce from the planters at farm gate only and also the planters estates are away from commission agent's godown so it incurred high transportation charges followed by grading charge (19.34 %) grading is important process which should be done in the trader's level because if the grade the produce, qualitative produce fetches high price. The remaining item of marketing cost such as loading and unloading (17.45 %) followed by packaging material cost (9.56 %) and so on. The commission agents do not incurred storing and storage loss charges because soon after they procure the produce from planters they sold it to traders.

It was also observed from the Table 4.18 that, the marketing cost incurred by the auction centre was Rs. 100.00 per quintal of cardamom. The auction centre does not take up any activities like processing, loading and unloading, storing etc. It is only create the platform to bidding the cardamom prices among farmer, commission agents and traders. So as registration fee it takes Rs. 100.00 among the members.

It was also observed from the Table 4.17 that, the marketing cost incurred by the retailers was Rs. 759.66 per quintal of cardamom. The major cost incurred for marketing of cardamom was on packaging cost (30.10 %) consumer prefer qualitative, good packed cardamom so the retailer incurred more cost on packaging material. Transportation cost (27.20 %) retailers purchase the produce from traders, traders are placed far away from retailers shop also the transportation facilities are not good in the study area so the transportation incurred more cost. Grading charges (13.25 %) grading is important process which should be done in the retailer's level because if they grade the produce, qualitative produce fetches high price, most of the consumers prefer first grade produce so it will be easy to sell the produce. The remaining item of marketing cost such as storing (12.15 %), loading and unloading (7.19 %) and storage loss (6.49 %).

5.8.3.3 Price spread in marketing of coffee in different channel

Marketing of cardamom like any other commodity involved the participation of a number of intermediaries between the producer and the final consumer. Commission agents purchase the produce directly from the farm at lower price and sold the same to traders at higher prices to gain profit. Traders also purchase produce from commission agents at lower price and sold the same to retailers with higher prices to gain profit. Retailers also purchase produce from commission agents and sold the same to consumers at higher price to gain profit. The size of marketing margin increased with an increased participation of intermediaries. Both the size and composition of the marketing margin varied across different marketing channels. The price spread was relatively more in channel-II than channel-I. Hence producer share in consumer rupee was more in channel-I than channel-II.

The price spread in cardamom market is given in Table 4.18. The price spread in channel-I was worked out to be Rs. 3,000 per quintal. In channel-I, the farmers could realize 88.65 per cent of the consumers price with a net price of Rs. 29,257.57 per quintal. The rest 11.35 per cent was comprised of marketing cost and profit margin of the intermediaries. The total cost incurred in marketing of cardamom in channel-I by the producer worked out to Rs. 1,420.43 per quintal. The total profit margin of the curing units on an average found to be Rs. 1,579.57 per quintal.

In channel-II, the price spread was estimated to be Rs. 1,300.00 per quintal. This in the farmers could realize 90.17 per cent of the consumer price with a net price of Rs. 29,757.57.00 per quintal. This was due to the presence of auction centre in channel-II. The rest 9.83 per cent was comprised of marketing cost and profit margin of the intermediaries. The total cost incurred in marketing of cardamom in channel-II by the producer worked out to Rs. 1,242.96 per quintal. The total profit margin of the curing units on an average found to be Rs. 1,257.04 per quintal.

Out of two channels considered for study, the price spread was relatively more in channel-I (3,000 per quintal) than the channel-II (2,500.00 per quintal). The producer share in consumer rupee was more in channel-II (90.17 %) than the channel-I (88.65%). So channel-II is the best among identified two channels from the view of cardamom growers.

5.9 Cash flow and financial feasibility of investment in selected coffee based cropping systems

5.9.1 Cropping system-I (Coffee + pepper)

The cost per hectare in cropping system-I during gestation period was Rs. 85,070.48, Rs. 69,384.75 and Rs. 99,520.37 during 1st, 2nd and 3rd years respectively. And Rs. 95, 217.00 for 4th and 5th year respectively. From sixth year onwards cost per hectare was Rs. 1,00,063.16 and it increased over year. The return started flowing from fourth year and went on increasing up to twenty years and started declining. Since, the coffee starts yielding from fourth year onwards, which is when the returns start flowing. The return from coffee went on increasing up to twenty year because coffee yield increased till twenty year and remained constant up to twenty fourth year and starts declined from there on.

5.9.2 Cropping system-II (Coffee + cardamom)

The cost per hectare in cropping system-II coffee plantation during gestation period was Rs 92,396.75 Rs. 75,579.9 and Rs. 82,693.74 during 1st, 2nd and 3rd years respectively. And Rs. 96,460.70 and Rs. 95,217.00 for 4th and 5th year respectively. From sixth to twenty year the cost per hectare was Rs. 1, 00,063.16 and from twenty first year onwards cost per hectare was Rs. 1, 08,063.16 it remained same till thirty year. The return started flowing from fourth year and went on increasing up to twenty years and started declining. Since, the coffee starts yielding from fourth year onwards, which is when the returns start flowing. The return from coffee went on increasing up to twenty year because coffee yield increased till twenty year and remained constant up to twenty fourth year and starts declined from there on.

5.9.3 Financial feasibility of investment in the coffee based cropping systems

To evaluate the feasibility of investment in cropping system-I and cropping system-II, the evaluation criteria such as Net Present Value (NPV), Benefit Cost Ratio (BCR), Internal Rate of Return (IRR) and Payback period were used. The analysis was done on per hectare basis and is presented in the Table 4.21.

Net Present Value (NPV): The net present value of the investment is the difference between the present value of series of returns and cost over the economic life period of the project. The net cash inflows were discounted at the discount rate of 12 per cent to obtain the present value of net benefits in coffee based cropping systems. It may be seen from the Table 4.21 that the net present value was Rs. 87,76,230.56 and Rs. 7,75,936.98 for cropping system-I and cropping system-II, respectively. The cropping system-I ranked higher followed by cropping system-II. Thus, it could be concluded that investment in the coffee plantations was economically feasible and financially sound. Korikanthimath (1996) observed the similar result in his study on economics of mixed cropping of Arabica coffee with cardamom in Kodagu, Karnataka.

Benefit Cost Ratio (BCR): This criterion indicates the returns per rupee invested in cropping system-I and cropping system-II. The benefit cost ratios were 3.51 and 2.46 for cropping system-I and cropping system-II respectively. As indicated by the figures BCR was the highest in cropping system-I followed by cropping system-II. Thus, it could be concluded that investment in the coffee plantations was economically feasible and financially viable. Ninan and Jyothis Sathyapalan (2005).

Internal Rate of Returns (IRR): This criterion measures the rate of returns that can be realized by reinvesting the returns from cropping systems-I and cropping system-II. The Internal Rate of Returns was 27 and 17 per cent in cropping systems-I and cropping system-II respectively. Hence, it can be inferred that the investment in the coffee plantations were found economically feasible, financially sound and highly profitable. Ninan and Jyothis Sathyapalan (2005).

Pay Back Period (PBP): It is the time required to recover the original investment. Payback period was minimum 11.1 and 15.5 years in cropping system-I and cropping system-II.

5.10 Constraints associated with production and marketing of coffee and associated crops in the study area

5.10.1 Production and marketing problems in coffee

5.10.1.1 Production problems

An informal discussion with the sample planters revealed that as such there are problem in production of coffee.

The opinion survey was conducted for the sample planters who produce coffee to ascertain the problems faced. The results of the opinion survey presented in Table: 4.20 are discussed here.

Majority of the planters in the study area (74.08 %) expressed the problem of weather extremity. The reason was delayed/ short fall of rainfall and drought situation during rainy season prevailed in the study area resulting in late flowering which affect the production of coffee. Rodrigues *et al.* (2014) observed the similar result in their study on Influence of climatic factors on the cost of production of arabica coffee.

Non available of skilled labour is another major problem faced in the study area (72.92 %). Since, coffee is labour oriented crop and available of the skilled labour was a problem especially during the peak time of cultural operation which clashes with other agriculture operations. Karunakaran and Vineesh (2015) observed the similar result in their study on problems and prospects of small coffee growers of Wayanad district, Kerala.

Damaged by pest and diseases (63.45 %) the stem borer and coffee rot was the major pest and disease of coffee in Kodagu district due to poor field management, inadequate shade regulator and heavy mist/dew which cause the pest and disease attack. Machado *et al.* (2014) observed the similar result in their study on Climatic changes and main pests of coffee.

The respondent in the study area also facing problem of soil infestation (58.75 %) due to poor field management and improper cultural operations. Problem to getting inputs (48.25 %) during the peak time the coffee growers are not getting inputs such as manures, fertilizers and PPC etc which may leads to attack of pest and diseases and finally low yield.

Non availability of the credit (47.28 %) at proper time due to planters lag in repayment of loan, made the planters to take delayed operation which affect the production of coffee.

Hygroscopic nature of coffee (43.52%) was one more problem faced by coffee planters in the study area. This is because too high and too less moisture content will affect coffee processing. Irrigation problem (39.95 %) was one more problem, irrigation at the proper stage is very important for flower setting in the coffee plantations. If irrigation not given proper at the right stage may leads affects the coffee production. Pulper problem(33.45 %) for larger farmers it is not a major problem, since they have their own machinery and in case of small and marginal farmers cannot afford to purchase the machinery as it is too costly. Non available of pulping machine or delayed in pulping of coffee which affects the quality of coffee.

5.10.1.2 Marketing problems

An informal discussion with the sample farmer revealed that with the marketing of coffee they have lot of problems.

The opinion survey was conducted for the sample growers to know the problem in marketing of coffee. The results of the opinion survey presented in Table: 4.20 are discussed here.

High fluctuation in price (75.80 %) was one of the major problem in case of coffee marketing. The coffee growers expressed that in the recent past there is high fluctuation of prices, past few years the prices were very low but now the price are going up and the planters are getting remunerative prices. The respondents thought that, if such fluctuation keeps on happening in the market, the decision for the investment becomes difficult and they may undergo loss.

Lower price (74.50 %) one of the major problem in case of coffee marketing. The growers are not satisfied about the price of coffee which they were getting now. Because since the coffee production incurred high initial investment. Sanusi et al. (2004) found the similar result on their study on Impact of coffee marketing problems on coffee production in Nigeria.

Inadequate market information (63.45 %) was one of the problem in case of coffee marketing. The coffee planters are located in the interior places. So most of the planters are not aware about the marketing prices and other information regarding marketing of coffee.

Unavailable of labour (55.25 %) in the study area it is noticed that there was a scarcity of skilled labour especially during peak time.

Another problem with regard to coffee marketing that, there were no incentives for quality stock supply in domestic market (50.95 %). The farmers got same price for all quality types. They were not getting higher price for the good quality maintained by them.

Other problems like high transportation cost (49.35 %) followed by loading & unloading cost (42.95 %) and no profit with respect to coffee production business (38.02 %).

5.10.2 Constraints and marketing problems in pepper

5.10.2.1 Production problems

An informal discussion with the sample planters revealed that as such there are problem in production of pepper.

The opinion survey was conducted for the sample planters who produce pepper to ascertain the problems faced. The results of the opinion survey presented in Table 4.21 are discussed here.

Majority of the planters in the study area (68.42 %) expressed the problem of weather extremity. Delayed/ short fall of rainfall and drought situation during rainy season prevailed in the study area resulting in poor yield of pepper

Non available of skilled labour is another major problem faced in the study area (66.00 %) because skilled labours are required for the activities in the orchids to spray pesticide, harvesting etc.

Damaged by pest and diseases (62.84 %) the stem borer and foot rot was the major pest and disease of pepper in Kodagu district due to poor field management, inadequate shade regulator and heavy mist/dew which cause the pest and disease attack. Waard (1980) observed the similar result in his study on problem areas and prospects of production of pepper (*Piper nigrum* L.)-An overview.

The respondent in the study area also facing problem of soil infestation (48.07 %) due to poor field management and improper cultural operations. Sadanandan *et al.* (1997) observed the similar result in their study on Soil nutrients and water management for sustainable spices production.

Problem to getting inputs (47.69 %) majority of the sample planters expressed that availability of input such as manure, fertilizers, PPC and power supply at the peak stage was problem in the study area. Adeoye (2014).

Non availability of the credit (41.80 %) at proper time due to planters lag in repayment of loan, made the planters to take delayed operation which affect the production of coffee. Adeoye (2014). Followed by Irrigation problem (40.00 %) is one of problem during summer and drought season.

5.10.2.2 Marketing problems

An informal discussion with the sample farmer revealed that with the marketing of pepper they have lot of problems. The opinion survey was conducted for the sample growers to know the problem in marketing of pepper. The results of the opinion survey presented in Table 4.21 are discussed here.

Lower price (74.19 %) one of the major problem in case of pepper marketing. The growers are not satisfied about the price of coffee which they were getting now. Because since the coffee production incurred high initial investment.

High fluctuation in price (73.73 %) was one of the major problem in case of pepper marketing. The respondents thought that, if such fluctuation keeps on happening in the market, the decision for the investment becomes difficult and they may undergo loss.

Inadequate market information (64.07 %) was one of the problems in case of pepper marketing. The estates are located in the interior places. So most of the planters are not aware about the marketing prices and other information regarding marketing.

Unavailable of labour (54.61 %) in the study area it is noticed that there was a scarcity of skilled labour especially during marketing time

Other problems like high transportation cost (47.00 %) followed by no incentives for qualitative produce supply (44.80%), high loading & unloading cost (39.26%) and no profit with respect to pepper production business (33.03 %)

5.10.3 Constraints and marketing problems in cardamom

5.10.3.1 Production problems

An informal discussion with the sample planters revealed that as such there are problem in production and marketing of cardamom.

The opinion survey was conducted for the sample planters who produce cardamom to ascertain the problems faced. The results of the opinion survey presented in Table 4.22 are discussed here.

Majority of the planters in study area (78.28 %) expressed the problem of weather extremity. Delayed/ short fall of rainfall and drought situation during rainy season prevailed in the study area resulting in poor yield of cardamom.

Damaged by pest and diseases (66.28 %) the thrips and rot was the major pest and disease of cardamom in Kodagu district due to poor field management, inadequate shade regulator and heavy mist/dew which cause the pest and disease attack.

Non availability of skilled labour is another major problem faced in the study area (61.28 %) because skilled labours are required for the activities in the orchards to spray pesticide, harvesting etc.

The respondent in the study area also facing problem of soil infestation (54.28 %) due to poor field management and improper cultural operations. Sadanandan *et al.* (1997) observed the similar result in their study on Soil nutrients and water management for sustainable spices production. Irrigation problem (44.85 %) is one of problem during summer and drought season.

Problem to get inputs (44.71 %) majority of the sample planters expressed that availability of input such as manure, fertilizers, PPC and power supply at the peak stage was problem in the study area. Non availability of the credit (31.85 %) at proper time due to planters lag in repayment of loan, made the planters to take delayed operation which affect the production of cardamom.

5.10.3.2 Marketing problems

An informal discussion with the sample farmer revealed that with the marketing of cardamom they have lot of problems. The opinion survey was conducted for the sample growers to know the problem in marketing of pepper. The results of the opinion survey presented in Table 4.22 are discussed here.

Lower price (74.00 %) one of the major problem in case of cardamom marketing. The growers are not satisfied about the price of cardamom which they were getting now.

High fluctuation in price (71.28 %) was one of the major problem in case of cardamom marketing. The planters expressed that in the recent past there is high fluctuation of prices, past few years the prices were very low but now the price are going up and the planters are getting remunerative prices. The respondents thought that, if such fluctuation keeps on happening in the market, the decision for the investment becomes difficult and they may undergo loss.

Inadequate market information (66.71 %) was one of the problem in case of cardamom marketing. The estates are located in the interior places. So most of the planters are not aware about the marketing prices and other information regarding marketing. Unavailable of labour (55.50 %) in the study area it is noticed that there was a scarcity of skilled labour especially during marketing time.

Other problems like high no incentives for qualitative produce supply (47.85 %), high loading & unloading cost (43.14 %), transportation cost (41.42 %) followed by and no profit with respect to cardamom production business (31.00 %).

6. SUMMARY AND CONCLUSIONS

Coffee plantations are vital for the survival of the vibrant ecosystem in the ecologically sensitive Western Ghats which has been recognized as one of the biodiversity hotspots of the world. The shade grown conditions prevailing in coffee plantations offer rich opportunities for intercrop diversification with many intercrops. Shade grown Indian coffee forests are recognized world over as one of the most diverse forests on planet earth. These biodiversity rich parks are a symbol of wilderness, harboring a wide variety of herbs, shrubs, & multiple crops. Coffee, pepper, oranges, and cardamom grow in wild abundantly. Other studies have shown that the diversity of flora and fauna has a bearing on coffee quality. Thus coffee agro biodiversity in Coorg makes a case for giving Geographic Indication protection to Kodagu coffee.

Coffee is one of the important commercial plantation crops of South India. It is also a social institutional and cultural fabric of South states of India. Coffee has wide range of uses both as beverage and preparation of food. Pepper, cardamom and other spice crops are also important perennial crops which are taken as inter/mixed crops in coffee estates. Keeping in view the importance of coffee in economy made the researcher to study the production and marketing management of coffee based cropping systems in Kodagu district.

The specific objectives are:

1. To estimate the growth in area, production and productivity of coffee in Karnataka.
2. To study production management of selected coffee based cropping systems in Kodagu district.
3. To study marketing management of selected coffee based cropping systems in Kodagu district.
4. To analyse financial feasibility of coffee based cropping systems.
5. To identify the constraints faced in production and marketing of coffee and associated crops and suggest appropriate policy measures.

The present study is based on the data collected from planters in each cropping system viz., cropping system-I (coffee + pepper) and cropping system-II (coffee + cardamom)

6.2 Sampling procedure

The study was conducted in Kodagu district of Karnataka state. For present study multistage sampling technique was followed. In Karnataka Kodagu district accounts for 54.06 per cent of total production of coffee. Hence, Kodagu district was selected purposively.

The second stage comprised of selection of Taluk. From the Kodagu district all the taluks were selected.

In the third stage from the three taluks, thirteen coffee planters from Madikeri taluk, fourteen coffee planters from Somwarpet taluk and thirteen coffee planters from Virajpet taluk were randomly selected for the study. Totally 40 planters were selected for the study.

To study the marketing aspects of coffee based cropping system, 20 commission agents, 20 preharvest contractors and in the study the final product is consider as coffee bean so the final consumer is consider as curing agency hence, instead of 20 consumers, 40 curing agency were randomly selected from the study area.

In the study different coffee based cropping system were identified. Of these cropping systems, more than 80 per cent of the planters are following two major cropping systems, i.e. cropping system-I (coffee + pepper) and cropping system-II (coffee + cardamom). So two major coffee based cropping systems were selected for detailed analysis of the system. From the two cropping systems, 26 respondent were comes under the group of cropping system-I and 14 respondents were under the group of cropping system-II.

So the total sampling size was 40 farmers and 80 middlemen. Thus, the total sampling size was 120.

6.3 Analytical technique

For analysis the data collected during the study, tabular presentation, compound growth rate, financial feasibility and Garret's ranking were employed.

The tabular presentation was employed to workout cost and returns in coffee plantation and cost of marketing of coffee.

Compound growth rate analysis was employed to estimate the growth in the area, production and productivity of coffee plantation.

In order to know the financial feasibility of investment in coffee plantations the measure of project evaluation techniques namely, Net Present Value (NPV), Benefit Cost Ratio (BCR), Pay Back Period (PBP) and Internal Rate of Return (IRR) were employed.

In order to know the constraints faced in production and marketing of coffee and its associated crops the Garret's ranking technique has employed.

6.4 Major findings of the study

6.4.1 Growth rate analysis

The growth rate in India, in case of area and production was found to be significant at 1 per cent and in productivity was found to be non significant. The growth rate in Karnataka in case of area, production and productivity was found to be significant at 1 per cent respectively.

6.4.2 General characteristics

The analysis of general characteristic of the sample farmers in the study area revealed that the average area under coffee plantation was 6-10 hectares in both of the cropping systems. The plant population maintained by the planters was 1573 and 1050 plants per ha in cropping system-I and cropping system-II. Average age of plantation was 15-20 years in cropping system-I and cropping system-II.

6.4.3 Establishment cost

The per hectare total establishment cost of cropping system-I was Rs. 9,23,116.55 of which, investment and maintenances cost accounted for 72.48 and 25.97 per cent respectively. Among various components of establishment cost, farm vehicle + vehicle shed contributed 34.66 per cent followed by labour quarters + godowns + drying yard (13.67 %), sprinklers + drippers (10.60 %), fencing (4.54 %), pump set + pump house (2.95 %), wells + tanks (1.79 %), farm implements (1.43 %), digging of pits (0.88 %) seedlings (0.71 %), Planting(0.42 %), land preparation (0.41 %), line marking + staking (0.19 %), and opening drains (0.17 %). Among maintenance cost Rs. 85,070.48 (9.21 %) constituted for 1st year, Rs. 69,384.75 (7.51 %) for 2nd year and Rs. 99,520.37 (10.79 %) for 3rd year respectively.

The per ha total establishment cost of cropping system-II was Rs. 9,76,801.5 of which, investment and maintenances cost accounted for 74.33 and 25.67 per cent respectively. Among various components of establishment cost, farm vehicle + vehicle shed contributed 38.50 per cent followed by labour quarters + godowns + drying yard (10.80 %), sprinklers + drippers (8.43 %), fencing (6.58 %), pump set + pump house (3.43 %), wells + tanks (1.52 %), farm implements (1.45 %), digging of pits (0.74 %) seedlings (1.26 %), Planting (0.78 %), land preparation (0.35 %), line marking + staking (0.17 %), and opening drains (0.28 %). Among maintenance cost Rs. 92,396.75 (9.45 %) constituted for 1st year, Rs. 75,579.9 (7.73 %) for 2nd year and Rs. 82,693.74 (8.46 %) for 3rd year respectively.

6.4.4 Maintenance cost

The annual per hectare maintenance cost for cropping system-I was 10,7,217.1, the variable cost (Rs. 65,801.17) constituted the highest proportion (61.37 %). While the fixed cost (Rs. 41,415.9) constituted 38.62 per cent. Among the variable cost, the expenditure on labour and material input cost (Rs. 39,343.26) was 36.69 per cent and (Rs. 22,153.84) 20.66 per cent, respectively. A major portion of the labour cost was incurred on the harvesting and processing (Rs. 18,000.00) which accounted for 16.78 per cent of total maintenance cost followed by pruning, weeding, application of manure and fertilizer, irrigation, watch and ward and application of plant protection chemicals which accounted to 5.59, 4.53, 2.79, 2.32, and 1.85 per cent, respectively.

A major portion of the material cost was incurred on the fertilizers (9,000.00) which accounted for 8.39 per cent of total maintenance cost followed by manure, plant protection chemical and weedicide which accounted to 5.73, 1.86, and 1.86 per cent respectively.

The annual per hectare maintenance cost for cropping system-II was 1,08,461, the variable cost (Rs. 69,022.62) constituted the highest proportion (63.63 %). While the fixed cost (Rs. 36,498.29) constituted 33.65 per cent. Among the variable cost, the expenditure on labour and material input cost (Rs. 41,435.71) constituted 38.20 per cent and (Rs. 23,071.42) constituted 21.27 per cent. A major portion of the labour cost was incurred on the harvesting and processing (Rs. 21,000.00) which accounted for 19.36 per cent of total maintenance cost followed by pruning, weeding, application of manure and fertilizer, irrigation, watch and ward and application of plant protection chemicals which accounted 4.42, 4.36, 3.31, 2.35, and 1.61 per cent respectively.

A major portion of the material cost was incurred on the fertilizers (Rs. 9,285.00) which accounted for 8.56 per cent of total maintenance cost followed by manure, plant protection chemical and weedicide which accounted 5.79, 2.30 and 1.84 per cent respectively.

6.4.5 Yield and returns

The per hectare average quantity of coffee obtained by the sample planters was 3,003.85 kg with an average gross returns of Rs. 1,50,385. And the per hectare average quantity of pepper obtained by the sample farmers was 3,415.38 kg with an average gross return of Rs. 2,10,254. The total average net returns per hectare were worked out for both the crops to Rs. 2,57,972.00 in cropping system-I.

The per hectare average quantity of coffee obtained by the sample farmers was 2,914.29 kg which resulted to average gross return of Rs. 1,45,714. And the per ha average quantity of cardamom obtained by the sample farmers was 364.20 Kg which amounted to average gross return of Rs. 1,27,488.21. The total average net returns per ha worked out for both the crops to Rs. 1,50,579.96 in cropping system-II.

6.4.6 Marketing of coffee and its associate crops

6.4.7.1 Marketing of coffee

The following coffee marketing channels were identified in the study area.

Channel-I

Producer → Commission agent → Curing agency → Exporter/ Domestic wholesaler

Channel-II

Producer → Curing agency → Exporter/ Domestic wholesaler

Channel-III

Producer → Preharvest contractor → Wholesaler cum commission agent → Curing agency → Exporter/ Domestic wholesaler

Marketing margin of the coffee who sold produce through channel-III was more followed by channel-II and channel-I. The producer incurred a marketing cost of Rs. 543.66/quintal when he marketed his produce. The marketing cost incurred by commission agent was Rs. 608.33/ quintal. Among marketing cost of commission agents, cost on transportation and commission charges were the highest. The marketing cost incurred by curing agency was Rs 962.35/quintal. Among marketing cost of curing agency, cost on processing and transportation were the highest. The results revealed that, in the study area, the price spread was higher in channel-III followed by channel-II and channel-I, it was Rs. 5,300.00/quintal in channel-III, Rs. 2,300.00/quintal in channel-II and Rs. 1,300.00/quintal in channel-I.

6.4.7.2 Marketing of pepper

The following pepper marketing channels were identified in the study area.

Channel-I Producer → Traders → Wholesaler cum commission agent → Retailers → Consumers

Channel-II Producer → Wholesaler cum commission agent → Retailers → Consumers

Marketing margin of the pepper who sold produce through channel-II was higher than channel-I. The producer incurred a marketing cost of Rs. 608.66/quintal when he marketed his produce. The marketing cost incurred by trader was Rs. 369.55/ quintal. The marketing cost incurred by wholesaler cum commission agents was Rs 233.94/quintal. Among marketing cost of wholesaler cum commission agents, cost on grading charges and transportation were the highest. Marketing cost incurred by retailer was Rs 1,540.5/quintal. Among marketing cost of retailer, cost on storage loss and transportation were the highest. The results revealed that, in the study area, the price spread was higher in channel-I than channel-II, it was Rs. 3,500.00/quintal in channel-I, Rs. 3,000.00/quintal in channel-II.

6.4.7.3 Marketing of cardamom

The following cardamom marketing channels were identified in the study area.

Channel-I Producer → Traders → Wholesaler cum commission agent → Retailers → Consumers

Channel-II Producer → Wholesaler cum commission agent → Retailers → Consumers

Marketing cost of the cardamom who sold produce through channel-II was the higher than channel-I. The producer incurred a marketing cost of Rs. 682.43/quintal when he marketed his produce. The marketing cost incurred by trader was Rs. 337.96/quintal. Among marketing cost of trader, costs on grading and transportation charges were the highest. The marketing cost incurred by wholesaler cum commission agents was Rs 158.47/quintal. Among marketing cost of wholesaler cum commission agents, cost on grading charges and transportation were the highest. The marketing cost incurred by retailer was Rs 759.66/quintal. Among marketing cost of retailer, cost on packaging charges and transportation were the highest. The result revealed that, in the study area, the price spread was higher in channel-I than channel-II, it was Rs. 3,000.00/quintal in channel-I, Rs. 2,500.00/quintal in channel-II.

6.4.7 Financial feasibility of investment

6.4.7.1 Net Present Value (NPV)

The results of financial feasibility analysis in Kodagu district revealed that per hectare NPV for the entire life period of coffee plantation (30 years) was found to be Rs. 7,76,230.56 and Rs. 7,75,936.98 in case of cropping system-I and cropping system-II respectively. Hence, the investment in cropping system-I and cropping system-II were found to be economically feasible and viable. But the investment in cropping system-I is more profitable than that of cropping system-II

6.4.7.2 Internal Rate of Return (IRR)

In the study area IRR was 27 and 17 per cent in cropping system-I and cropping system-II, respectively. The IRR observed was above the current bank rate and hence investment in both cropping system-I and cropping system-II. Plantation was financially feasible and viable.

6.4.7.3 Benefit Cost Ratio (BCR)

The discounted B: C ratio was found to be 3.51 in cropping system-I and 2.46 in cropping system-II plantation. B: C ratios are greater than unity in both the cropping systems, indicated that investment was found to be profitable. However B: C ratio was higher in cropping system-I compared to cropping system-II.

6.4.7.4 Pay Back Period

Time required to recover the original investment. Payback period was minimum 11.1 and 15.5 years in cropping system-I and cropping system-II.

6.4.8 Problems in production and marketing of coffee and its associate crops

6.4.8.1 Production and marketing problems of coffee

With regard to constraints in production of coffee, most of the sample growers expressed the problem of weather extremity (74.08 %), followed by non-availability of skilled labour (72.92 %), damaged by pest and diseases (63.45 %), soil infestation (58.75 %), non availability of input timely (48.25 %), non-availability of credit during appropriate time (47.28 %), hygroscopic nature of coffee (43.52 %), irrigation problem (39.95 %) and problem of coffee bean pulping (33.45 %)

Regarding marketing of coffee, majority of planters expressed that, there was problem of high fluctuation of price (75.80 %), followed by lower price (74.50 %), inadequate market information (63.45 %), non-availability of skilled labour during peak season (55.25 %), no incentives for the supply of qualitative coffee bean (50.95 %), high transportation cost (49.35 %), high loading and unloading cost (42.95 %) and no profit with respect to production of coffee (38.02 %).

6.4.8.2 Production and marketing problem of pepper

With regard to constraints in production of pepper, most of the sample growers expressed the problem of weather extremity (68.42 %), followed by non-availability of skilled labour (66.00 %), damage by pest and diseases (62.84 %), soil infestation (48.07 %), non-availability of input timely (47.69 %), non-available credit during appropriate time (41.80 %), irrigation problem (40.00 %).

Regarding marketing of pepper, majority of planters had the opinion that, there was problem of lower price (74.19 %) followed by high fluctuation of price (73.73 %), inadequate market information (64.07 %), non-availability of skilled labour during peak season (54.61 %), high transportation cost (47.00 %) high loading and unloading cost (42.95 %), no incentives for the supply of qualitative produce (44.80 %) and no profit with respect to production of pepper (38.02 %).

6.4.8.3 Production and marketing problem of cardamom

With regard to constraints in production of cardamom, most of the sample growers expressed the problem of weather extremity (78.28%), followed by damaged by pest and diseases (66.28%), unavailable of skilled labour (66.00%), soil infestation (54.28%), irrigation problem (44.85%), problem of timely getting input (44.71%), non-available credit during appropriate time (31.85%),

Regarding marketing of cardamom, majority of planters had the opinion that, there was problem of lower price (74.00%) followed by high fluctuation of price (71.28%), inadequate market information (66.71%), non-availability of skilled labour during peak season (55.50%), no incentives for the supply of qualitative produce (47.85), high loading and unloading cost (43.14%), high transportation cost (41.42%) and no profit with respect to production of cardamom (31.00 %).

6.5 Policy implications

1. The growth rate analysis indicated that the increase in production was due to increase in area, rather than productivity, which called for intensive efforts to increase productivity of coffee in the study area as well as major coffee growing areas of the State.
2. As it revealed by the results that, there is higher initial investment (Rs.6,69,140.95/ha and Rs.7,26,131.14/ha for cropping system-I and II respectively) in establishment of coffee plantations. Hence, financial assistance may be provided to the farmers by the financial institutions at subsidized rate of interest against the present rate per cent similar to the crop loans which is at form per cent.
3. Coffee Board also situated in the study area, it can also be involved more effectively in marketing so that role of middlemen could be minimized.
4. The exploitation by commission agents, traders, wholesalers and retailers in marketing of coffee was more as evident by the smaller portion of producer's share in consumer rupee (It ranges from 27.39 % in channel III and 74.74 % in channel II). So, efforts has to be made to maximize the producers share in consumers rupee by planters as well as institutional agencies.
5. The BC ratio revealed that the cropping system-I (3.51) is more profitable than the cropping system-II (2.46). Therefore, planters can be advised to take up cropping system-I in order to increase the farm income.
6. Weather extremity and damage by pest were the major production constraints expressed by the respondents in case of coffee (I , II and III ranks respectively). Hence, there is need to evolve an integrated pest and disease management practices besides strengthening the extension system in imparting knowledge about prevention and control of pest and diseases.

7. High fluctuation in prices and lower price were the major marketing constraints expressed by the respondents in case of coffee (I and II ranks respectively). Hence, there is a need to take up necessary steps for stabilization of prices by the government and concerned authorities. The similar findings observed in case of pepper and cardamom also which require the similar attention.

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PRODUCTION AND MARKETING MANAGEMENT OF COFFEE BASED CROPPING SYSTEMS IN KODAGU DISTRICT

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2016

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ABSTRACT

The objective of the study was to analyse the production and marketing management of coffee based cropping systems in Kodagu district of Karnataka. A multi-stage random sampling procedure was adopted in selection of the sample coffee planters. The data was collected from 40 farmers and 80 middlemen involved in marketing of coffee and its associate crops. The collected data was analysed by Tabular analysis and Garrett ranking techniques.

The study revealed that Karnataka state was found to be significant and has positive growth rate in area (0.99 %), production (1.74 %) and productivity (0.93 %). The establishment and maintenance cost of coffee per hectare was found to be Rs. 9,23,116.55 and Rs.1,07,217.10 in the cropping system-I (coffee + pepper) and Rs. 9,76,801.50 and Rs.1,08,461.00 for cropping system-II (coffee + cardamom) respectively. The total and net returns were Rs. 3,60,639.00 and Rs.2,57,972 for cropping system-I and Rs.2,53,177.00 and Rs.1,50,579.00 for cropping system-II respectively. Producers share in consumer's rupee was high in channel-II (74.74%) in coffee, channel-II (94.31 %) in pepper and channel-II (90.17 %) in cardamom. Financial analysis of the study depicted that at the discount rate of 12 per cent, the coffee enterprises has NPV (Rs.7,76,230.56 and Rs. 7,75,936.98), BCR (3.51 % and 2.46 %), PBP (11.1 and 15.5 years) and IRR (27 % and 17 %) for cropping systems-I and II, respectively.

Weather extremity, non-availability of skilled labour, high fluctuation of prices and lower price were the core problems faced by the coffee and its associative crop growers. Adoption of recommended cultivation practices, provision of adequate credit facilities and practice of cropping system-I over the cropping system-II helps to amplify the farm income and productivity of coffee growers.