ECONOMICS OF ORGANIC AND CONVENTIONAL PEPPER PRODUCTION IN IDUKKI DISTRICT

by

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(2010 – 11 – 120)

THESIS

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DECLARATION

I hereby declare that this thesis entitled "**Economics of organic and conventional pepper production in Idukki district**" is a bonafide record of research done by me during the course of research and the thesis has not previously formed the basis for the award of any degree, diploma, fellowship, or other similar title, of any other university or Society.

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LIST OF ABBREVIATIONS

GOK	Government of Kerala
ha	Hectare
Rs	Rupees
MT	Metric tones
Kg	Kilogram
IPC	International Pepper Community
FAO	Food and Agriculture Organisation
NPOP	National Programme for Organic Production
USDA	United States Department of Agriculture
FiBL	Research Institute of Organic Agriculture
IFOAM	International Federation of Organic Agriculture Movement
APEDA	Agriculture and Processed Food Products Export Development Authority
USD	United States Dollar
NCOF	National Centre for Organic Farming
EU	European Union
NGO	Non Governmental Organisation
PDS	Peermade Development society
MASS	Manarcadu Social Service Society
KADS	Kerala Agricultural Development Society
CD	Cobb – Douglas
MVP	Marginal Value of Product
MFC	Marginal Factor Cost
KAU	Kerala Agricultural University
B - C	Benefit Cost
FYM	Farm Yard Manure
ICS	Internal Control System
ECGC	Export Credit Guarantee Corporation
CIF	Cost, Insurance and Freight
CWC	Central Warehousing Corporation
NCDEX	National Commodity and Derivative Exchange
MCX	Multicommodity Exchange of India
NMCE	National Multi Commodity Exchange of India Ltd.
IPSTA	International Pepper and Spice Trade Association

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Introduction

1. INTRODUCTION

Pepper is a crop which framed the history of India. This crop made the country a treasure island for the ancient Europe. Expedition in search of this spice by European sailors have led to the discovery of new trade routes, circumnavigation of earth, discovery of hitherto unknown continents and in the due course was to claim the supremacy in spices trade and the formation of colonies and to the creation of several landmarks in human history. When Vasco da Gama landed at Calicut on 20th May 1498, it marked the transition of Indian subcontinent to the modern age and this event changed the course of not only India but rest of World. (Anandaraj, 2010)

Pepper played a large role in the trade and commerce of the past and was nicknamed "black gold". India was the leading producer from the very beginning and continued to be so till a decade ago but has been replaced by Vietnam to the second position now. India's production was stagnant after 2005 and is showing a decreasing trend in the present. Kerala which is the homeland of black pepper produces nearly 90 per cent of black pepper produced in India. Kerala produced 45,267 tonnes from 1,72,182 ha in 2010-11. In Kerala, Idukki district stands first in production with an area of 87, 274 ha contributing 51 per cent to the total area of state under pepper and a production of 30,919 tonnes accounting 68 per cent of the total pepper production of the state (GOK, 2011a).

The area and production of pepper of India and Kerala provided in Table 1 shows that the area and production had been decreasing for the past few years. Production of pepper in the year 2011 -12 is only 43,000 tonnes. The area under pepper and its production has been declining in India during the last few years due to instability in output price, and various other reasons coupled with less relative profitability vis-a vis competing crops (Satheesh *et al*, 2011). India's productivity is as low as 260 kg per hectare in 2011-12 (Archana, 2012). Thailand has the highest

productivity of around 3000 kg per ha followed by China, Malaysia, Vietnam, Brazil whose productivity is about 1000 kg per ha.

Table 1. Area (ha) and Production (tonnes) of Pepper in India and Kerala

Year	India		Kerala	
	Area (ha)	**Production (tonnes)**	**Area (ha)**	**Production (tonnes)**
2002-03	223940	70920	208610	67360
2003-04	235430	74260	216440	69020
2004-05	267112	81930	237670	74980
2005-06	257244	50000	237990	33500
2006-07	236177	50000	216710	33950
2007-08	198956	50000	175679	41952
2008-09	181299	50000	153711	33950
2009-10	198986	50000	171489	48442
2010-11	181299	48000	172182	45267

(Source: www.indianspices.com)

India is a big consumer of spices so the quantity available for export is limited as compared to its competitors (Satheesh *et al*, 2011). From the year 2007 – 08, export of pepper had been decreasing while the import of pepper had been increasing (table 2). It indicates there is a dearth of the commodity. In 2010 – 11, India exported 18,850 tonnes of pepper, and imported 16,100 tonnes.

India is the fourth largest exporter in the world after Vietnam, Brazil, and Indonesia. India produces 18 per cent of the world production and supplies only 10 per cent of the world demand. Until 1980s India was supplying 40 per cent of the world demand, but now Vietnam supplies 40 per cent of the world demand.

Table 2. Export and import statistics of pepper (tonnes) in India

Year	Export (tonnes)	Import (tonnes)
2003-04	15394	14334
2004-05	14148	17725
2005-06	17363	16870
2006-07	28726	15701
2007-08	35000	13500
2008-09	25250	10750
2009-10	19750	18100
2010-11	18,850	16100

(Source: www.indianspices.com)

Table 3. Average domestic price (Rs/kg) of pepper through various years

Year (April - March)	Price (Rs/kg)
2007-08	140.16
2008-09	129.30
2009-10	136.42
2010-11	197.05
2011-12	318.77
2012-13 (April and May)	384.30

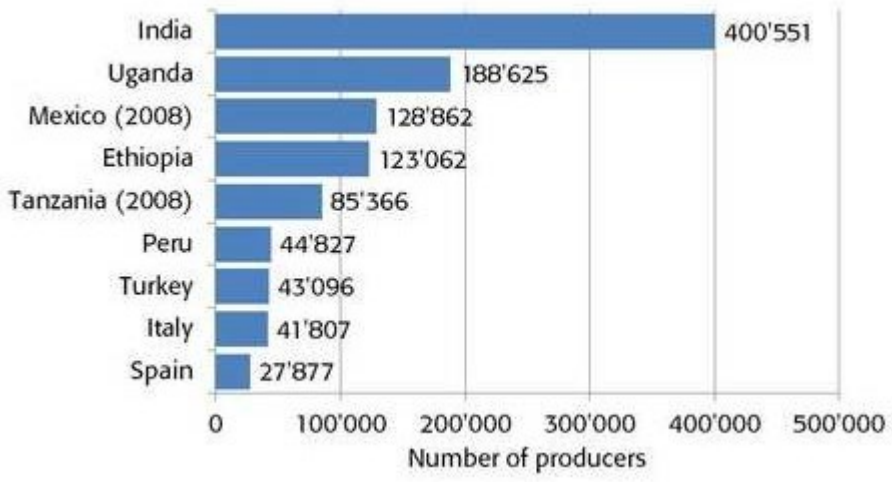
(Source: www.indianspices.com)

Price statistics provided in Table 3 shows that the price had been rising steadily over the past few years. This may be attributed to the heavy demand and scanty supply of the commodity. International Pepper Community (IPC) expects the price to remain high in 2012 since the expected increase in production is not adequate to fill the demand gap.

The demand of pepper is rising steadily and a recent trend is the increasing demand for organic food products including organic spices such as organic pepper. Issues such as genetically modified crops, environmental and health risk associated with the pesticides and insecticides have propelled the exigency for organic products throughout the world. Organic food products are produced through organic farming or organic agriculture. **"**Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using where possible, agronomic, biological and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system", (FAO, 1999).

North America and Europe which are the largest importers of organic food products depend on Asian and African countries. The developing countries in Asia and Africa are mostly organic by default. Also there has been a recent grass root level movement in these countries especially India in certifying the agricultural land as organic. The Government of India has implemented the National Programme for Organic Production (NPOP). The national programme involves the accreditation programme for certification bodies, norms for organic production, promotion of organic farming etc. The NPOP standards for production and accreditation system have been recognized by European Commission and Switzerland as equivalent to their country standards. Similarly, USDA has recognized NPOP conformity assessment procedures of accreditation as equivalent to that of US. With these recognitions, Indian organic products duly certified by the accredited certification bodies of India are accepted by the importing countries.

Figure 1. The ten countries with the most organic producers 2010



(Source: FiBL- IFOAM survey 2012, based on data from government, the private sector and certifiers; Willer and Kilcher, 2012)

India is the country with largest number of organic producers. According to FiBL-IFOAM survey 2012, there are 4, 00,551 organic producers (Fig 1) in the country (Willer and Kilcher, 2012). Currently, India ranks 33rd in terms of total land under organic cultivation and 88th position for agriculture land under organic crops to total farming area. The cultivated land under certification is around 4.43 million ha in 2010-11 (APEDA, 2012a).

India produced around 3.88 million MT of certified organic products which includes all varieties of food products namely basmati rice, pulses, honey, tea, spices, coffee, oil seeds, fruits, processed food, cereals, herbal medicines and their value added products. The production is not limited to the edible sector but also produces organic cotton fiber, garments, cosmetics, functional food products, body care products, etc. India exported 86 items last year (2010-11) with the total volume of 69,837 MT. The export realization was around 157.22 million USD registering a 33 per cent growth over the previous year. Organic products are mainly exported to

EU, US, Australia, Canada, Japan, Switzerland, South Africa and Middle East (APEDA, 2012b).

Kerala had 6,130 hectares of certified organic land and 4,377 ha under conversion in the year 2008-09. Kerala produced 17,419 MT of organic spices in the same year (NCOF, 2012). Pepper and Ginger constitute the major portion of the spices exported from Kerala.

There is a large level of activity going on in organic agriculture and the picture is optimistic. However there is no pertinent research work done and knowledge available on economics of production and marketing of organic produce or organic farming system vis a vis inorganic produce or inorganic farming system in general and for the produce of hills in particular (Takur and Sharma, 2005). Hence this study aimed at comparing the economics of organic and conventional black pepper production in Idukki district was done.

1.1 Objectives of the study

This study was taken up with the following objectives

1. To study the economics of organic and conventional black pepper production.
2. To study the resource use efficiency of organic and conventional black pepper production.
3. To study the extent of adoption of recommended practices of organic and conventional black pepper production.
4. To study the constraints faced by the farmers in black pepper production and marketing.
5. To study the marketing system of both organic and conventional black pepper.

1.2 Limitations of the study

This study has been done as part of the M Sc programme and is limited by time and resource constraint. A clearer picture would have obtained if the study was done after classifying the small, marginal and large farmers. A thorough analysis of marketing system is constrained as pepper is an exportable crop and black marketing exist making the channel complex and hence a separate study is required.

1.3 Scope of the study

The balance of trade of our country is always negative. Pepper is a crop which can bring lot of foreign exchange to our country. Now it is the era of organic production and more export earnings can be obtained through export of organic pepper. Idukki district stands first in area and production. The district can contribute enormously towards the export basket of our nation. Various agencies dealing with organic pepper production are also functioning in the district and hence this study was taken up with an expectation that this study will give an insight into the organic and conventional production system, comparative economics and constraints faced by farmers.

1.4 Organization of study

The thesis is presented in five chapters. The first chapter 'Introduction' highlights the background of the study, its scope, and limitations. The second chapter 'Review of literature' deals with the findings of related studies. The third chapter 'Materials and methods' encompasses the details on the selection of the study area, sampling procedure for data collection, methods used in measurement of variables, statistical tools used, etc. In the fourth chapter, the results of the study in relation to the objectives with interpretations of findings and their discussion are presented. The fifth chapter summarizes the study highlighting the salient findings and implications of the study.

Review of literature

2. REVIEW OF LITERATURE

A critical review of the past work relating to the research problem is essential to find the appropriate methodology and to support the research findings. This study has the objectives of studying the economics, resource use efficiency, marketing and constraints of organic and conventional black pepper production. An extensive literature survey was done to identify similar studies or studies with similar problems. The reviews thus obtained are provided under the following headings.

2.1 Economics of organic crops
2.2 Economics of perennial crops
2.3 Resource use efficiency
2.4 Marketing Channel and price spread
2.5 Constraints

2.1 ECONOMICS OF ORGANIC CROPS

2.1.1 Economics of organic black pepper

The economics of black pepper cultivation under organic and inorganic systems studied by Pratap and Vaidya (2009) found that the total cost of cultivation of organic pepper was Rs 28,020 per hectare and Rs 19,340 per hectare for inorganic pepper in Waynad district of Kerala. They found that the labour cost on inorganic farms was about 28 percent higher than organic farms, the material cost was significantly higher by about 57 per cent on organic farms. As a result, the cost of cultivation on inorganic farms was 31 per cent lower. The net profits in inorganic farms were 17 percent higher as compared to organic farms.

Ramesh *et al.* (2010) found that the productivity of black pepper under organic cultivation was 1.38 tonnes per ha whereas it was 1.40 tonnes per ha in conventional

farming system in Kerala. The cost of cultivation was Rs 36,500 per hectare for pepper in organic system whereas it is Rs 40,200 per hectare in conventional system.

2.1.2 Economics of other organic crops

Flores and Sarandon (2004) compared the organic and inorganic agricultural systems in Argentina and found that organic farm had a higher profitability than the conventional ones but mainly associated to the high price obtained for its goods. These prices were, on average, 352 percent superior (with a minimum of 177 percent and a maximum of 500 percent) to those obtained from conventional markets.

Acording to Kshirsagar (2006) the cost of cultivation of organic sugarcane was lower by 15.39 per cent than inorganic sugarcane. The cost of cultivation of organic sugarcane was Rs 35,632 per ha and for inorganic sugarcane it was Rs 42,115 per ha. The lower cost in organic cultivation was attributed to (i) non- use of chemical fertilizers, (ii) lower on irrigation, (iii) lower cost on seed and planting; and (iv) lower cost on plant protection chemical.

A study on the cost of cultivation of organic and inorganic paddy and wheat showed that yields was lower for organic in both the cases over inorganic. However, farmers could realize relatively higher prices for organic (Rs 1380 per quintal) than nonorganic (Rs 1161 per quintal) paddy. The difference between prices of organic (Rs 875.16 per quintal) and non organic (Rs 780.24 per quintal) wheat has not been wide. Considering the net returns of both organic paddy and wheat, the study concluded that organic paddy was more profitable than organic wheat. (Singh *et al*, 2006)

Dana (2007) worked out the yield and returns per hectare based on cost component analysis by employing ABC cost concepts. Total cost at C_3 level in organic farms was found to be Rs. 49,116 per hectare. The returns from organic farms were worked out

to Rs 1, 26,706 per farm. The gross income was found to be Rs. 77,496 per hectare and net farm income was Rs 28,379 per hectare.

Kshirsagar (2008) found that the average cost of cultivation of organic sugarcane(OS) crop was Rs 37, 017.38 per ha as against Rs 43, 163.81 per ha for inorganic sugarcane (IS) reflecting 14.24 per cent lower cost on organic sugarcane than inorganic sugarcane farms. Besides this the OS cultivation was also found to be more cost efficient than IS cultivation as the per tonne cost of production of OS cane was found to be 8.02 per cent lower on OS farms.

Bolwig *et al* (2009) studied the economics of smallholder organic contract farming in Tropical Africa. The study examined the revenue effects of certified organic contract farming for smallholders and adoption of organic agricultural farming methods in a tropical African context. The comparison in both cases is with farming systems that are "organic by default." The analysis found that, controlling for a range of factors, there are positive revenue effects both from participation in the scheme and, more modestly, from applying organic farming techniques.

Demiryurek and Ceyhan (2009) studied the economics of organic and conventional hazelnut production in the Terme district of Samsun, Turkey. The aim of this research was to compare organic and conventional hazelnut producers, in terms of their socio-economic characteristics, production systems and economic performance. The study revealed that the organic producers had lower costs of production and had higher income.

Cost price calculations made to evaluate the economics of organic production in Sweden found that for large, mechanized, farms, the production costs of organic vegetables were between 45 per cent (carrot) and 85 per cent (cabbage) higher than conventionally produced farms due to higher yield and lower labour requirement in conventional production. For large-scale organic production to be viable, the cost

price must be 50-100 per cent higher than for conventional products. The small producers cannot compete on this market and they usually sell their products directly to consumers in their own farm shops or on the local markets. (Hakansson *et al*, 2009)

In a study on economics and efficiency of sugarcane, it was observed that the mean yield per acre was 12 percent higher under organic farming when compared to conventional farming system. The average cost of cultivation per acre of organic farming came to 97 percent of conventional farming cost and the gross returns per acre of organic farming was 9 per cent higher than conventional farming. However in case of the net returns per acre, this value has gone up to 19 percent (Charyulu and Biswas, 2010)

Ganesh (2010) conducted an economics analysis of organic villages of northern Karnataka and found organic farms were less expensive to the extent of 13.69 per cent and 12.10 per cent annually as compared to conventional farms in the cultivation of field crops under rainfed and irrigated situation respectively. Organic farms were yielding more net returns of 16.49 per cent as compared to conventional farms with respect to perennial crops. The yield per ha in paddy, arecanut, jowar, soybean, chick pea and green gram were higher in organic farms by 5.54 per cent, 15.73 per cent, 11.12 per cent, 9.67 per cent, 15.80 per cent and 4.74 per cent respectively. Costs of production in paddy, arecanut, jowar, soybean and chick pea was lower in organic farms by 11.32 per cent, 2.49 per cent, 7.71 per cent, 10.32 per cent and 17.11 per cent respectively. Partial budgeting analysis of organic paddy, jowar, soybean and chickpea was showing a net gain of Rs 6271.57, Rs1118.30, Rs 5111.10 and Rs 5694.30per ha over conventional paddy, jowar, soybean and chickpea. Cotton and onion were more profitable under conventional farming.

Naik (2010) found that for both organic chilly and tomato, the cost of cultivation and yield were lower compared to their inorganic counterpart. But the price received for organic chilly and tomato were higher enough to provide high net returns compared to inorganic tomato and chilly.

Singh and Grover (2011) assessed the economic viability of organic wheat cultivation in Punjab by collecting primary data from 85 organic and 75 inorganic farmers and found that the total variable cost on per acre basis for the cultivation of organic wheat was less as compared to inorganic wheat. The net returns over variable cost of organic and inorganic wheat has been observed as Rs 21895 per acre and Rs 16700 per acre respectively. The lower crop yield in organic wheat (6.7 q/acre) was well compensated by the higher price it fetched in the market.

2.2 ECONOMICS OF PERENNIAL CROPS

2.2.1 Economics of Black Pepper

According to Mohan (1973) the cost of establishment of pepper garden up to bearing stage (till three years) in Vazhoor block was Rs 1, 325 per acre. The total direct cost of cultivation of pepper was Rs. 292.90 per acre per year of which manures, manuring and harvesting charges accounted for Rs. 230.70 per acre which is 78.76 per cent.

Vinod (1984), in a study on cost of cultivation of pepper in Idukki district in Kerala reported that annual cost of cultivation per hectare was Rs 5, 952, Rs 3, 958, Rs 4, 154, Rs 4, 583, Rs 4, 901, Rs 5, 412, and Rs 5, 506 during the first seven years. The most conspicuous cost was on cultural operations with input human labour. The costs of cultivation viewed on unit area basis are found to be decreased as the size of holding increased.

Santhosh (1985), in a study on cost of cultivation and marketing of pepper in Cannanore district Kerala found the per hectare aggregate cost for seven years to be Rs 29,465. The maximum expenditure on cost of cultivation was during the seventh year and cost was found to be increasing from the third year and reached the maximum in the 7^{th} year.

The economic analysis of Black pepper cultivation under different cropping systems in Kerala done by Padmini (1997) found that the gross profit per hectare was the highest in monocropped farms as compared to the intercropped pepper.

Koizumi (1999) calculated the cost of cultivation of pepper in mixed and monocropping both in living as well wooden stakes and observed that returns from monocropping both in living standard as well as wooden stakes are high. But mixed cropping will avoid risk by providing stabilized income from other crops through different years compared to monocropped pepper. The wooden stakes requires high initial investment but could provide higher net returns.

Alagappan and Manoharan (2001) estimated the cost of cultivation of pepper in Idukki district of Kerala and observed that the cost per acre reached a maximum of Rs 14,903.03 during 7 -12 years of age. The unit cost of production was estimated to be Rs 58.16 per kg.

According to Hema *et al* (2007) the annual maintenance cost of pepper was Rs. 27,364 per ha, of which the labour was the major contributor accounting to 39.82 percent of the annual maintenance cost followed by cost of manures and fertilizers (21.15 percent), cost of plant protection measures (20.99 percent), harvesting charges (11.54 percent) and miscellaneous cost (6.48 percent).

2.2.2 Economics of other perennial crops

An extensive literature survey was done in other perennial crops also.

Jose (1976) estimated the cost of cardamom in certain brackets of Idukki, Wayanad and Nelliyampathi and the cost of production arrived was Rs 59 per kg. The cost of maintenance was Rs 1,200 per acre per year during 1975. The cost of establishment of one acre plantation was estimated as Rs 2,765.

Total cost of cultivation per hectare for establishing rubber i. e., for seven years was estimated as Rs. 11,054. More than a half of this was accounted for labour. Cost of production per quintal of sheet rubber estimated was Rs. 305 during stabilized yield period (Elsamma, 1981).

An economic appraisal of small-scale rubber plantations in Kanyakumari district by Matilda (1984) gave the cost of establishment of one hectare of rubber plantations as Rs 22,641.30. The average annual maintenance cost per hectare of rubber during the taping period (8^{th} year onwards) was Rs 7,678.55 per hectare. The gross income realized was Rs 24,362 .59 from one hectare of rubber plantations and the net income realized was Rs. 16,675.04 when the variable cost alone was considered and it was Rs 2,617.35 when both variable and fixed cost were taken into account.

In an economic appraisal of coconut farming in Kanyakumari district by Rosalind (1984), it was found the cost of establishment of one hectare of coconut garden in dry land was Rs 9, 418.75. The maintenance cost per hectare of coconut during the bearing period was Rs 5,903.00. Production cost per hectare of coconut was Rs 18,349.24 of which the direct cost was Rs 5,903.00 (32.15%) and indirect cost was Rs 12,446.24 (67.85%). The gross income realized from one hectare of coconut garden was Rs 29,205.46 and the net income amounted to Rs 10,856.22 when both direct and indirect costs deducted.

Neelakandan (1994) studied the economics of small scale rubber plantations in the Nilgiris district and found that the cost of establishment per hectare of rubber plantation up to commercial taping period was Rs 15,226.12. Of the total cost of establishment 37.21 per cent was spent during the first year and there after about 10 per cent of establishment cost was spent per year up to seventh year. Maintenance cost during the taping period from eight years was Rs 3304.54 per hectare. The total cost of cultivation per hectare of rubber plantation in the age group of 16 – 28 computed to Rs 14,710.63.

From an economic analysis of small scale tea plantations in the Nilgiris District by Vasukidevi (1992), the cost of establishment of one hectare of tea plantations (1.5 years) was worked out to Rs 3,906.69. The average annual maintenance cost per hectare of tea plantations during commercial harvesting stage was Rs 6,885.64. The cost of production of green tea leaf per hectare was Rs 14409.01 of which indirect cost accounted to 52.21 per cent and direct cost accounted to 47.79 per cent. The cost of production per kg of green tea leaf was Rs 3.61 on total cost basis and Rs 1.72 on direct cost basis.

John (1993) calculated the cost of cultivation of cardamom in Idukki district. The cost of establishment was calculated for two years and it was Rs. 16,601 while the cost of maintenance during 3rd to 12th year ranged from Rs.12, 056 to Rs.1, 674 and was Rs.11287 during 13th to 15th year of cultivation. Cost of production of one kilogram of cardamom varied from Rs. 172 per kg during the third year (the first economic yielding year) to Rs.125 during the period fourth to eighth year.

Dineshkumar (1994) studied the economics of arecanut cultivation in Kasargod district. Total cost of cultivation for 11 years was Rs. 107133. The major item of expenditure was human labour constituting about 44.75 per cent of the total cost. Manure and fertilizers accounted for 25.92 per cent and cost on plant protection

accounted for 9.27 per cent of the total cost for 11 years. The cost of production per quintal was Rs.1,539 for the district.

The establishment cost of vineyard up to the age of bearing amounted to Rs 56,609.08 per acre. Pandal erection formed the major item of expenditure, which amounted to Rs 19,939.00 forming 35.22 per cent of the total establishment cost. The annual maintenance cost during the bearing period amounted to Rs 22,533.87 per acre. The total cost of production amounted to Rs 35,560 per acre out of which direct cost and indirect cost accounted for 63.37 per cent and 36.63 per cent respectively. (Radha, 1996)

The performance and economics of replanting of cardamom was analyzed by Korikanthimath (2000) at Chettali in Karanataka. The results revealed that a total investment of Rs. 56,697.82 per ha was incurred towards replanting of cardamom. The results revealed that total annual maintenance cost during the bearing period was Rs. 82,411.09 per hectare. The highest expense (69.45 per cent) was incurred on labour charge.

Sebastian (2001) established that the annual maintenance cost for cashew nut in Kerala was Rs 7,709.71 per hectare. The material cost accounted to 23 percent and labour cost accounted to 77 percent. The gross and net return per hectare was Rs 21,427 and Rs 13,717.24 respectively.

Korikanthimath and Hedge (2002) in their study in Uttar Kannada district of Karanataka and Wynad district of Kerala found that it was highly compatible and profitable to grow Cardamom as mix crop with Arecanut. The total cost of raising a new garden (13 years) was estimated to be Rs 1, 40. 000 per hectare where as gross income per year per hectare was Rs 3, 05, 000 with cardamom and arecanut as components.

Beeraladini (2003) studied the economics of grapes cultivation in Bijapur district of Karnataka. The vineyards were classified into three age groups as below four years, four to ten years and eleven to fifteen years. The cost of cultivation for these groups of vineyards was calculated separately. It was seen that cost of cultivation was higher for the age groups of five to ten years when compared to other age groups and also returns pr investment was also high for this age group.

In a study for finding the cost of cultivation of mature nut orchard and tender nut orchard of coconut, it was found that on an average total cost incurred per ha annum was higher (Rs 25,212) in case of tender nut than for mature orchard (Rs 18,273). (Khunt *et al*, 2003)

In a study on the production marketing and economics of Vanilla cultivation in Karnataka state, Madan *et al* (2003) found that the total cost of production per acre (700 vines) in the first year of bearing was Rs27,542.

Sijesh (2003) did the economic analysis of rubber plantations of Kerala found that the total establishment cost per one hectare was Rs 1,00,981. The total maintenance cost incurred per ha of rubber plantation was Rs.28, 581. The total fixed cost was 50.69 per cent and total variable cost was 49.31 per cent of total cost (Rs.57, 960 per ha). The total cost of production was estimated to be Rs.29.22 per kg of natural rubber.

The establishment cost of a coconut garden (up to seven years) was worked out to be Rs 122129.89 and the annual maintenance cost as Rs 24,690.66. The establishment cost was amortized and was added up to the maintenance cost. The production was estimated to be Rs 4.13 per nut. (Bastine *et al*, 2004)

Dattatray (2004) did the economic analysis of coconut based cropping systems in Konkan region. The per hectare cost of cultivation in sole cropping of coconut worked out to Rs 53,856 of which share of cost A and cost B was 39.36 per cent and 81.86 per cent respectively.

Madan (2004) estimated the cost of cultivation of vanilla and tested the economic viability of recommended management practices. The cost of cultivation of vanilla from the first year to the seventh year was estimated using the farm budgeting approach. The establishment cost per acre (700 vines) for three years was estimated to be Rs. 46,438. The maintenance cost per acre per year was Rs. 21,084. Among the inputs, compost formed the major item of costs (66 per cent) followed by labour charges (21 per cent). The average net return for a seven year crop per acre was Rs. 62,933.

From the cost of production analysis of Arabica coffee in Coorg region of Karnataka it was found that the total cost of cultivation of Arabica coffee was Rs 52.48 per ha which translated into a cost of production of Rs 42 per kg for an average with an yield realization of 1250 kg per ha. Among the total cost, labour wages alone accounted for 54 percent (435 man days per ha) followed by input cost (3.5 percent) and overhead expenditure (11 percent). (Reddy, 2004)

Gangwar *et al* (2005) did the economic evaluation of Kinnow cultivation in Punjab. They found that the establishment cost of orchard was Rs 1, 19,107. The amortization costs over 28 years at the interest rate of 9 and 12 per cent were Rs 11,774 and Rs 14,917 respectively. The maintenance cost from the sixth year onward varied from Rs 26,157 to Rs 43,354 per ha.

The cost of establishment of tea garden without subsidy on slopy marginal grassy un irrigated land was Rs 1, 58,406. The annual operational costs or the total working capital ranged from Rs 34,290 to Rs 66,744 in first to seventh year. Among the different operational costs, labour constituted the major portion and expenditure on labour was maximum in case of plucking operation. (Pathania *et al*, 2005)

When Guledgudda *et al* (2006) did an appraisal of financial feasibility of investment in cashew plantations in Karnataka and found that the cost of cultivation of cashew as a whole amounted to Rs 11,549.24 per hectare in the Dakshina Kannada district. The fixed cost constituted the highest proportion (56.77 per cent). While the variable cost

constituted 43.23 percent of the total cost. Among the variable cost, the cost on labour and material input constituted 24.68 and 18.56 per cent, respectively.

The analysis of production in grape revealed that the establishment cost was accounted to Rs 3,16,174 per hectare with bower erection taking the lion's share of 51.8 per cent (Rs 1,63,760 per ha). Under total production cost (Rs 1,76,503 per ha), manure and fertilizers (Rs 20,768 per ha) among the direct cost and rental value of owned land (Rs 92,956 per ha) among the fixed costs contributed a major share of 11.76 and 52.66 per cent respectively. (Radha *et al*, 2006)

The establishment cost per hectare of vanilla grown as intercrop in arecanut plantation was Rs. 2, 47,642.90 on large farm and Rs. 2, 48,991.50 on small farm. The establishment cost per hectare of vanilla under artificial shade was Rs.11, 83,301.10 and Rs. 11, 56,540 on small and large farmers, respectively. (Rajesh, 2006)

The cost of establishing a Sapota orchard was classified into the investment cost and maintenance cost up to bearing by Ramachandra (2006). The cost of establishment per hectare in Belgaum district was found to be Rs 1,18,666.56 of which investment cost constituted to be 56.669 percent and maintenance cot Rs 57.97 per cent and in Dharwad district the cost of establishment per hectare was Rs 113927.38 of which investment cost constituted to 57.97 per cent and maintenance cost to 4.23 per cent.

Smitha (2006) calculated total cost of production of vanilla among large, small and marginal farmers in Ernakulam and Thrissur district of Kerala. The net returns per hectare were highest for large farmers because the cost of production per hectare was less for large farms when compared with small and marginal farms. The gross returns obtained from the large farm were also high.

When the economic analysis of coconut was done by Thamban *et al* (2006), they found that the average total variable cost ranged from Rs 20,916 per ha in case of small farms to Rs 21766 per ha in large farms. The respective total cost including the

annuity value ranged from Rs 22, 115 to 27,496 per ha. The total variable cost in case of farmers adopting drip system range between Rs 18,382 per ha in the case of marginal farms to Rs 19,786 per ha in the case of large firms and their respective total is Rs 21,682per ha and Rs 25,726 per ha.

Venkattakumar (2006) studied the socio economic impact of Cashew cultivation in Kannur district and found the cost of cultivation of cashew as Rs 18,134 per ha in case of graft origin garden and Rs 9700 in case of seedling origin garden.

The establishment cost for cashew nut per hectare were worked out for I, II and III years are Rs. 417550, 375795 and 354917.5 respectively by Balachandar (2007). Total maintenance cost per hectare was worked out for the age group of 4-7, 8-15 and more than 15 years and was Rs. 93050.1, 88397.6 and 83745.09 respectively.

Economic analysis of small holder Rubber plantation in West Garo hills was done by Goswami and Challa (2007). They found the total establishment cost per ha of rubber plantation up to commercial yielding i.e. up to 6^{th} year amounted to Rs 22,548.00. More than 52 percent of the total cost was spent during the first year itself. Through the subsequent years, it was 15.23percent, 10.45 percent, 9.10 percent. The total maintenance cost of rubber amounted to Rs 6,113.75 from 7^{th} year. Tapping charges was the highest contributor with 51.72 percent and control of competing weed took 8.72 percent. The total cost of production was Rs 19,935.38, the variable and fixed cost was 30.67percent and 69.33 percent.

Apple plantations have a gestation period of about 7 to 8 years to reach the bearing stage. Farmers have to incur costs on maintenance for about 7 years, which ranges from Rs 34,962 during first year to Rs 67,444 per hectare during seventh year. The maintenance cost of the bearing period ranged from Rs 51,325 per ha (8^{th} year) to Rs 58,924 per hectare (21 – 30 years) with increase in the age of plants. (Kumar *et al*, 2007)

Varghese (2007) studied the economics of cardamom cultivation using the cost concepts and found the cost A, B, C, and D as Rs 25,619.30, Rs 25,798.24, Rs 26,426.80, and Rs 33,580 respectively per acre. Cost of seedlings was the highest contributor with 30.44 percent to cost A and 23.22 percent to Cost D. Rental value of land included only in cost D was the second highest contributor. Hired labour, manures and chemical fertilizers and plant protection could only be positioned after the cost of seedling and rental value of owned land.

Indumathy (2008) found that the average total establishment cost incurred from first to fourth year in the mango farms was Rs 52, 226. He classified the establishment cost into variable and fixed cost which accounted to 37.47 percent and 62.52 per cent of the establishment cost. He also calculated the annualized cost of establishment. The cost of maintenance increased from fifth to fifteenth year and was stabilized after 15th year till 30years.

Venkattakumar (2008) studied the socioeconomic impact of cashew cultivation in Sindhudurg district of Maharastra and found the cost of cultivation as Rs 18,800 per ha for graft origin garden and Rs 13,534 for seedling origin Garden.

Ravikumar (2009) studied the production and marketing of Pomegranate in Chitradurga district in Karnataka. The cost of establishment per ha was found to be Rs. 1,90,888.41 and Rs 1,89,644.33 of which material cost constituted 56.87 and 58.15 per cent and maintenance cost 43.13 and 41.85 per cent in Challakere and Hiriyur taluk respectively. The average per ha maintenance cost incurred by respondents in Challakere taluk was Rs. 82,320.70 during the first three years. The labour, material and fixed costs accounted for 53.73, 24.59, and 21.68 per cent, respectively. While in Hiriyur taluk the cost was Rs. 79,368.02 where labour, material and fixed cost accounted for about 56.16, 21.74 and 22.10 per cent respectively. The average per ha maintenance cost incurred in Challakere taluk was Rs. 23,148.67 during the 4th year onwards of which, labour material and fixed cost

accounted for 43.65, 20.32 and 36.02 per cent to the total maintenance cost. While the maintenance cost was Rs. 24,306.31 in Hiriyur taluk where the labour, material and fixed cost accounted for 41.94, 23.34 and 34.71 per cent to the total maintenance cost.

Sud *et al* (2009) estimated the cost of cultivation of coconut in Calicut, Ernakulam and Thiruvananthapuram and it was Rs 14,933, Rs 23,196 and Rs 16,688 respectively for 178 trees and the cost of production estimated was Rs 183, Rs 296 and Rs 223 respectively for 100 nuts.

Guledgudda *et al* (2010) studied the cost of production and financial feasibility in cashew plantations in coastal and North western Karnataka. The cost of cultivation of cashew nut in Dakshina Kannada Was Rs. 11,549.24 per hectare whereas it was Rs. 9699.15 per hectare in Belgaum. The cost of production was Rs 937 per quintal in Dakshina Kannada and it was Rs. 819 per quintal in Belgaum.

Rasmi (2010) found that in small cardamom, the total establishment cost (cost incurred during the first two years) was Rs. 1, 29,521.98 and total maintenance cost was Rs. 1, 10,875.34. The total variable cost was Rs. 1, 10,875.34 accounting 62.73 per cent of the total cost. The cost of production worked out to be Rs. 306.47 per kg.

In case of tea growers, the total fixed cost was Rs. 8,071 per hectare where the total variable cost was Rs. 21,573per hectare. Among the variable cost the contribution of labour cost was the maximum. The net returns per hectare from the farm were found to be Rs 6056 per hectare over total cost, which indicates the profitability of tea growers. (Verma *et al*, 2010)

2.3 RESOURCE USE EFFICIENCY

Matilda (1984) studied the resource use efficiency of rubber in Kanyakumari district and fitted a linear production function with seven variables, namely, age of the trees

in years, number of trees per hectare, fertilizer cost in rupees, labour cost in rupees, miscellaneous cost in rupee, planting material (as dummy) and topography(as dummy). These variables explained 70 percent of the variation in the total return. The functional analysis revealed that the gross income has increased with increase in the age of the tree, further it was observed that increased use of fertilizers, use of budded clones as planting material and slopy topography could contribute for higher returns in rubber.

Randev *et al* (1990) studied the relationship between output of almond and the various input variables. All the explanatory variables (number of trees in age group 9-15, Human labour in man-days, expenditure on manure and fertilizers, expenditure o plant protection measures, expenditure on fixed capital, dummy variable, management index) explained more than 78 per cent of the variation on medium and large farms and in small farms it was found to be more than 84 percent.

Reddy *et al* (1990) found that there is a potential for further use of labour, manures and fertilizers up to its optimal level in the betel vine cultivation Cuddapah district by using Cobb – Douglas production function. The study found that further investment in seed and miscellaneous costs is not desirable as revealed from their insignificant coefficients.

Vasukidevi (1992) found that 74 percent of the variation in green tea leaf yield could be explained by the four variables considered (fertilizer cost in rupees per hectare, plant protection cost per hectare, labour in man days per hectare, number of tea plants per hectare). Functional analysis revealed that the farmers could increase their yield and there by the return by increased use of fertilizers and increasing the density of the crop.

The factors manures, fertilizers and irrigation were found to have significant influence on the gross income obtained from an arecanut garden (Dineshkumar, 1994).

Neelakandan (1994) studied the resource use efficiency of rubber in Kanyakumari district, he considered six variables, fertilizer cost in rupees, labour cost in rupees, miscellaneous cost in rupees, age of the plantation, tree plantation per hectare (dummy)and planting material (dummy) and these variables explained 82.1 per cent of the variations in the total return. The variables such as the age of the tree, application of fertilizers, number of trees, labour cost are found to be highly significant.

The functional analysis by Beeraladini (2003) in grapes showed that increased application of labour, nitrogen, phosphorus and plant protection chemicals would increase the yield of the vineyards further. The age of the orchard was also included in the model to capture the influence of the age on the yield of grapes. It was found that there is considerable difference in the yield in the differing age group of vineyards. About 79 per cent of the variation in yield of grapes was explained by variables included in the function.

Sijesh (2003) studied the resource use efficiency of rubber plantations of Kerala. He found that the variables like number of trees per ha, labour used (man days per ha), amount spent for manure (Rs./ha) and amount spent for fertilizers (Rs./ha) were significantly influencing the rubber yield. The R^2 value (0.632) indicated that 63.2 per cent of the variation in the dependent variable was explained by the selected independent variables. The results indicated that one per cent increase in the number of trees per ha would increase the yield by 0.67 per cent, *ceterius paribus*. In the same way one per cent increase in the labour, amount spent for manures, amount spent on fertilizers would increase the yield by 0.486 per cent, 0.015 per cent and 0.115 per cent respectively, *ceterius paribus*.

The result of functional analysis done by Dattatray (2004) in the coconut cropping systems of Konkan region indicated that the variation in the total returns explained

by various input factors was to the extent of 84 percent to 92 percent in different cropping systems of coconut.

Chinnappa and Hippargi (2005) studied the resource use efficiency of Arecanut in Karnataka and found that the variation in output was not due to chance factor but due to the variables included in the model. The independent variables like age, labour, manure, fresh mud and bullock labour explained the variation in output to an extent of 54 per cent. The variables like age and manure significantly influenced the output level of arecanut. The ratio of marginal value of product to marginal cost was highest increase of mud and manure indicating that these could be used further for enhancing profits. The ratio of MVP to MFC was more than unity in case of bullock labour but negative indicating that additional application would result in uneconomic returns.

The analysis of resource productivity and allocative efficiency showed that human labour, plant protection chemicals and quantity of irrigation water used were the major significant factors influencing the income of the arecanut farmers. It was evident from the study that in water scarce situation (ground water irrigation) quantity of water used in arecanut cultivation emerged as major factor and farmers in these areas were found to use this resource less than optima. The outcome of the study also demonstrated the importance of plant protection chemicals in arecanut production. (Padmavathamma *et al*, 2006)

In a study of resource use efficiency of paddy cultivation in Peechi command area, Suresh and Reddy (2006) found that the elasticity coefficients for chemical fertilizers, farmyard manures and human labour have been observed significant and positive. The allocatively efficiency indicated that marginal return per one rupee increase under these heads would be Rs 2.83, Rs 1.57 and Rs 1.17 respectively.

Douglas (2008) studied the efficiency of agricultural productivity enhancement program (APEP). For APEP farmers, the MVP/MFC for labour, seed, and animal

draught was 0.68, 0.92, and 0.22 and for non APEP farmers were over utilized by non APED farmers.

Estimates of allocative efficiency of inputs used by swamp rice farmers in Nigeria indicated that all the resources were inefficiently utilized as the marginal value products for farm size, labour, seed, fertilizer are greater than their respective factor prices (Oniah *et al*, 2008).

Smitha *et al* (2008) found that a high proportion of variation (98 percent) in gross returns in Anthurium cultivation is explained by the four variables (fertilizers, plant protection chemicals, irrigation, labour cost) included in the production function in the organized sector. In case of unorganized sector, these variables explained 90 per cent of the variation in gross returns. An increased return to scale was evident in case of organized sector and constant returns to scale was seen in the unorganized sector.

The functional analysis done in Pomegranate in Chitradurga district of Karnataka revealed that 76 and 78 per cent of variation in gross returns was explained by the five independent variables included in the Cobb-Douglas frame work in Challakere and Hiriyur taluks respectively. The regression coefficients of labour and manures and fertilizers indicated the significant contribution of these inputs to gross returns. The regression coefficients of plants per hectare and plant protection chemicals were negative and non-significant in both the taluks. (Ravikumar, 2009)

Ganesh (2010) did the economic analysis of organic village in northern Karnataka and found that the regression coefficient of fertilizers and pesticides were negative indicating that increase in the use of these would lead to decrease in gross income. The other variables such as seeds, FYM, vermi compost, organic manures, bio - pesticides and labour contributed positively to the gross income and thus indicated that there is a scope for using additional units of these inputs for profit maximization.

From the resource use efficiency analysis in cowpea, Omonona *et al* (2010) found that the marginal value products of all the resources used are less than their prices (MVP less than MFC), indicating underutilization of resources.

From the Cobb-Douglas regression model fitted on Cassava production in Nigeria, Yakasaki (2010) obtained R^2 as 65.4 percent with exogenous variable farm size and cassava cuttings significant and while labour was not significant. Also MVP/MFC for farm size, cassava cuttings and labour were 0.49, 0.53 and 0.78.

Essilfie *et al* (2011) estimated the farm level efficiency in small scale maize production in Ghana found that the maize farmers for the fertilizers and labour inputs MVP is less than their MFC, i.e. the MVP/MFC is less than one while for seed input, the MVP is greater than its MFC. They concluded that maize farmers could optimize their output and profit by increasing seed use and decrease fertilizer and labour use.

2.4 CONSTRIANTS

Neelakandan (1994) studied the constraints of rubber cultivation in kanyakumari district. The major constraints in rubber production as perceived by the small growers were improper tapping and non availability of budded variety, followed by absence of optimum number of trees per hectare and lack of timely availability of credit and fertilizer. The marketing problem at farm level was analyzed and it was found that 53.33 per cent of the growers are having absence of transport facility as their marketing problem, 50 per cent of the growers are having exploitation by middle men as their marketing problem while 18.33 per cent are having absence of cooperative marketing society as their marketing problem.

The major technical problems identified by Padmini (1997) in pepper cultivation in Kerala were incidence of pests and diseases, lack of suitable varieties, fluctuation in price and the high unit cost of production due to high labour cost. The main socioeconomic constraints faced were the lack of owned funds and credit availability,

non optimal use of the inputs and resources and poor quality of the inputs available. The major problems in the marketing of pepper were higher labour and transportation cost, presence of middle men and intermediaries and the improper functioning and mismanagement of the cooperative societies.

From the study done on grapes by Beeraladini (2003), it was found that the scarcity of the water due to the frequent drought caused much concern to the farmers resulting in the huge loss and this was the major problem faced by grapes growers with mean score of 68.05. High cost of plant protection chemicals was given second rank with mean score of 53.54.

Sijesh (2003) did an economic analysis of resource use efficiency of rubber plantations in Kerala. The respondent farmers opined that the major problems faced by them in the cultivation of rubber were the incidence of total panel dryness and inadequate supply of skilled labour. In case of marketing, market price fluctuation and improper grading by dealers were quoted as the major problems.

The constraint analysis on tea production indicated that, the lack of dependable and skilled labour, high fertilizer cost, poor quality and high pesticide cost, lack of adequate credit support and price fluctuations were the major constraints faced by the tea farmers. (Mahesh *et al*, 2004)

Chinnappa and Hippargi (2006) studied constraints in marketing in Arecanut and found that frequent and violent fluctuations of prices, higher cost of transportation difficulty in transportation of produce to market and problem of inadequacy of credit were the major constraints.

Rajesh (2006) identified the main problems in production of vanilla in Northern Karnataka. They were incidence of pest and diseases as well as non-availability of skilled labour. Lack of assured market facility and drastic price fluctuations are the major marketing constraint observed.

While studying the production and marketing of Sapota in Northern Karnataka Ramachandra (2006) identified the following problems such as non-availability of good seedlings and on-availability of labour during peak season and water scarcity followed by non-availability of technical guidance and higher initial investment.

Smitha (2006) studied the production and marketing of vanilla in Kerala and found that lack of assured markets was the main constraint in vanilla production for small and marginal farmers. But for large farmers hand pollination was the major problem followed by lack of assured markets.

In a study done by Indumathy (2008), the most important constraint identified by the mango growers was higher price fluctuations in the mango market. Other constraints identified were high commission charges, artificial ripening of fruits, transportation problem and delay in payment after the sale.

According to Ravikumar (2009), non-availability of labour during peak season, non-availability of credit, water scarcity, and fluctuation in market price, high commission charges, lack of transportation facilities and lack of availability of market information were the major problem faced by the pomegranate growers in production and marketing of pomegranate.

The constraints identified by Verma *et al* (2010) among the tea growers were high labour charges, availability of labour and lack of knowledge about credit availability, technical knowhow, unavailability of fertilizers, insecticide, pesticide in time.

2.5 MARKETING CHANNEL AND PRICE SPREAD

2.5.1 Marketing channel and price spread of organic crops

The important marketing channels identified for organic producer in Wayanad by Dana (2007) were, Producer- Indian organic producer's company – exporter;

Producer – private company – organic market and Producer – local market and the first channel was found to be widely adopted by the farmers. It was found that no marketing cost is involved in the marketing of organic produce in the study area.

Estonian farmers use many different selling channels for organic products – from farm, delivery to customers, industry, processors, local markets, small shops and supermarkets, schools, kindergartens, hospitals, producers cooperative. The most common marketing channels are direct sale from the farm (88 per cent) and delivery to customers (57 per cent). 35 per cent of farmers sell their products to the conventional food industry and/or processor, because there are only a few organic food processors. The reasons why organic food is sold as conventional are the absence of organic retailers and processors, especially in animal husbandry. The most common way to refer to organic farming is oral information. Only 15 per cent of farmers use the Estonian organic logo on their products. (Peetsmann, 2009)

In the economic analysis of organic farming in northern Karnataka, Ganesh (2010) found that paddy, jaggary, vanilla, cashew and pepper were sold separately under organic market to a considerable extent. Price premium received under organic market for vanilla, jaggary, banana, chickpea, wheat, cashew, vegetables, pepper and paddy and was 40 per cent, 36.36 per cent, 25 per cent, 25 per cent, 20 per cent, 20 per cent, 14-25 per cent, 12.5 per cent and 11.1 per cent respectively. However, most of the organic produces were sold only under conventional markets due to lack of separate organic market in the locality.

2.5.2 Marketing channel and price spread of other crops

Gandhi (1967) observed that the system of marketing in Kerala was old unsystematic and not in the interest of growers. He suggested the formation of cooperatives at the planters level to promote orderly marketing.

In an economic appraisal of cardamom marketing system in Bodinayakanur in TN, Asokarajan(1985) found four channels. Channel I: Grower – commission agent (auctioneer) – exporter – export market; Channel II: Grower – commission agent (auctioneer) – wholesaler dealer – secondary commission agent – upcountry market; Channel III : Grower – pre harvest contractor/ village merchant – commission agent - wholesaler dealer – secondary (auctioneer) – commission agent – upcountry market; Channel IV : Grower – commission agent – wholesaler dealer - secondary wholesaler – retailer – consumer. Marketing cost was highest in channel I and highest price spread was in channel IV.

Rajkumar (1992) studied the marketing, price spread and export of pepper in Kerala and identified two main channels I: Producer – village merchant – wholesaler cum retailer – exporter through commission agent; Channel II: Producer – wholesaler - cum retailer – exporter through commission agent; Channel III: Producer – wholesaler – cum retailer – exporter through commission agent. The FOB (free on board) price was considered as the final price for all channels. The net price realized by the pepper growers was Rs 23.62 per kg in channel I, Rs 24.87 per kg in channel II and their percentage share to the consumer rupee being 72.4 per cent and 76.29 per cent respectively.

Goyal and Satnam (1997) studied the marketing system of tree crops in Haryana. The channels identified were Channel I: Producer – Contractor – Consumer; Channel II: Producer – Contractor – Saw miller/ wholesaler –consumers. Channel III: Producers – contractor – commission agent cum wholesaler – retailer – consumer; Channel IV: Producers – contractor – saw miller – furniture house – consumer; Channel V: Producer – contractor – bark processor/ grinder – consumer; Channel VI: Producer – contractor – plywood factory/ wholesaler – retailer – consumer. Due to the complexity of the system in the present study the price spread has been determined only at the contractor level. The contractor retained as high as Rs 30.28 per quintal as net margin in trading of Sisham and lowest for Eucalyptus i. e. Rs 7.64 per quintal.

In a study done on the marketing and export of cashewnut in Kerala, Sreelakshmi (1998) identified two channels for cashewnut, operating in the study region. Channel I : Producer – village merchant – wholesaler/agent of the exporter - exporter and Channel II : Producer – wholesaler/agent of the exporter – exporter.

Madan (2000) found that the marketing system of pepper was very efficient and it provided increased share of consumer prices (87.7 percent) to farmers with comparatively low marketing cost (6.74 percent). The overall price spread (11.06 percent) was much low compared to that of other export oriented agricultural products.

Chinnappa (2001) studied the price spread in Arecanut. He identified three channels, Channel I: Grower – pre harvest contractor – commission traders – retailers – consumers; Channel II: Grower – Commission agent – traders – retailers – consumers; Channel III: Growers – cooperative marketing society – traders – retailers – consumers. The price spread indicated that marketing channel II involving cooperative society ensured highest share to producer (85.3 percent) in consumer rupee, followed by commission agent (82 percent). The marketing channel I involving the pre harvest contractor proved to be disastrous to producer with 75.44 per cent share in consumer rupee. This study clearly indicated that farmers who marketed their produce in the market instead of resorting to field scale (pre harvest contractor) could maximize their net earnings to 10 per cent.

Madan and Selvan (2001)observed that more than 60 percent of pepper produced moves through the most common channel of producer – village assembler – local trader – wholesaler – exporter. The marketing system for pepper was found to be more efficient by providing increased share of consumers' price (87.7 percent) to the farmers with comparatively low marketing cost (6.74 percent) an low price spread (11.06).

Four different kinds of marketing channels were identified by Ramakumar (2001) for coconut marketing. They were, Channel I: Farmer – copramaker – oil miller – consumer; Channel II: Farmer – oil miller – consumer; Channel III: Farmer – Commission agent – upcountry consumer; Channel IV: Farmer – cooperative society – Kerafed – consumer. Among these four channels, channel III dealt with ball copra, which cannot be compared with other channels that deal with mulling copra. Regarding the consumer share in the final price, the Channel IV was the most efficient. It could provide farmers with 89.94 per cent of final price. Channel I and II offered 69.83 and 87.94 percent of the final price as consumer share. The share of producer in the consumer price was found to be 78.51 per cent in Channel II.

Beeraladini (2003) found that the grapes growers usually resort to sell the grapes either to post-harvest contractors or to the retailers through commission agents. The two major channels identified in the marketing of grapes were as under: Channel I: Grape growers - pre-harvest contractors - commission agent-cum-wholesalers - retailers - consumers; Channel II : Grape growers - commission agents - retailers - consumers. The price spread of channel I was Rs.260.00, which was 52 per cent of consumer's price. The price spread in channel II was Rs. 100 per standard box, which accounted for 25 per cent of consumer's rupee.

A study was undertaken to work out the per quintal cost of marketing of grapes in Nasik district. The study revealed that at the overall level the average per quintal cost of marketing was Rs 557.10. The major items of cost were packaging (35.32 percent) followed by transport (32.23 percent) and commission (19.39 percent). (Dhage and Rahane, 2003)

Narayanan and Bastine (2004) identified four marketing channels for coconut. They were Channel I: Producer — copra maker — oil miller — wholesaler — consumer; Channel II: Producer —oil miller — wholesaler — retailer — consumer; Channel III: Producer — oil miller — consumer; Channel IV: Producer — itinerant traders —

wholesalers — oil miller—retailer—consumer. Results indicate that about 51per cent of the respondents sold coconuts in the non-husked form. Furthermore, most farmers (86per cent) traded it on-farm, and only about 14 per cent of the respondents sold it outside. The most common marketing channel identified was Channel I. The concept of concurrent margin, employed to find out the marketing margin showed that the producer's share in consumer's rupee was only 60.58per cent, implying a high price spread.

Sarker and Das (2005) identified marketing channels for cardamom (Small/large) in Cooch Behar district of West Bengal. Channel I: Producer (Bhutan) – Wholesaler I (Siliguri) – Wholesaler II (Cooch Behar) – Retailer – consumer; Channel II: Producer (Bhutan) – Faria (Bhutan) - Wholesaler I (Siliguri) – Wholesaler II (Cooch Behar) – Retailer – consumer.

The marketing channel identified for Sapota in Konkan region were Channel I: Producers – fruit merchants – commission agents – retailers – consumers; Channel II: Producers – commission agents – retailers – consumers. Channel III: producers – co-operative society – commission agents - retailers – consumers: Channel IV; Producers – fruit merchants – hawkers – consumers. The producers share in consumer's rupee was the highest (34.40 per cent) in channel II and it was the lowest (28.39 per cent) in Channel I. The producer's share in consumer's rupee was 32.23 and 31.61 per cent in Channel II and IV, respectively. The percentage of gross marketing margin in consumer's rupee was the highest (72.60 percent) in Channel I and lowest (65.60 per cent) in Channel II, while in other channel it was 68.39 per cent and 67.76 per cent in channel IV.(Talathi *et al*, 2005)

Chinnappa and Hippargi (2006) identified three channels for marketing Arecanut. Channel I: Arecanut grower – pre harvest contractor – commission agent – trader – retailer – consumer; Channel II: Arecanut grower – commission agent - trader – retailer – consumer; Channel III: Arecanut grower – co-operative marketing society –

trader – retailer – consumer. The total cost of marketing of one quintal of arecanut worked out to Rs 53.64. The transportation cost was the biggest item of total marketing cost constituting 45.5 per cent wit RS 24.42 per quintal. The next biggest item of marketing cost was hamali charges (charges are paid for loading and unloading) sharing 18.82 per cent of the total marketing cost.

Three channels were identified for marketing of grapes in Andhra Pradesh. They were Channel I: Producer – commission agent – retailer – consumer; Channel II: Producer/ grower association – consumer; Channel III: Producer – retailer – consumer. Channel I was found more popular with 50 per cent of producers marketing through this channel. However the marketing efficiency was found high in Channel II (7.45) followed by Channel I (2.85).(Radha *et al*, 2006)

In the Northern Karnataka, Rajesh (2006) identified two marketing channels, they were, Channel I: Producer - local agent (company) – export; Channel II: Producer - vanilla development trust – export. The total marketing cost per kg was Rs. 0.29 in channel I and Rs. 0.33 in channel II. The main items of marketing cost were transportation, packing material and packages in both the channels. The transportation cost in Channel I was lower than that of Channel II. This was due to, the products in Channel I sold their produce to near-by local agents.

Ramachandra (2006) traced out two major marketing channels for marketing of Sapota in the Northern Karnataka. Channel I: Producer - Commission agent - retailer - consumer. Channel II: Producer - pre-harvest contractor - wholesaler - retailer - consumer. The marketing cost incurred by farmers when producer sold at the distant market to commission agents was Rs.1340, of which major items of costs accounted were commission charges (52.24) per cent and transportation (22.39) per cent. And other costs like, packing, loading and unloading, weighing all together accounted for 25.37per cent of total marketing cost. The cost incurred by market intermediaries were Rs.926 per ton by pre harvest contractor and the cost incurred by retailers was

Rs. 841 per ton. The channel-I was the most popular channel among the farmers in study area for disposal of sapota. Producers share in consumer's rupee was high in channel-I (73.68%) and was low in channel-II (57.89%).

Five channels were identified for Mango in Haryana. Channel I: Producer – pre harvest contractor – commission agent – wholesaler – retailer – consumer; Channel II: Producers - pre harvest contractor – commission agent – wholesaler – retailer – consumer; Channel III: Producers – commission agent – wholesaler – retailer – consumer; Channel IV: Producer – commission agent – retailer – consumer; Channel V; Producer – direct consumer. (Sharma and Singh, 2006)

According to Smitha (2006) only one channel existed for vanilla. Producer – company – retailer – consumer. Farmers were marketing their produce through All Kerala Vanilla Growers Association, reducing the influence of market intermediaries. Marketing of the vanilla beans through the association was found to be efficient. The price received by the farmer was Rs. 120 per kg of green beans, which constituted about 40 per cent of the consumer price. The marketing cost incurred by the company constituted 24.08 per cent of final price, and by the retailer was 2.33 per cent of final price. The company received a considerable margin of up to 27.91 per cent of consumer price, while the retailer received 5.68 per cent of the consumer price.

The study done by Balachandar (2007) identified four different channels for marketing of cashew was Channel I: Farmer – village trader – wholesaler – processor – trader); Channel II: Farmer – cooperative marketing society; sharing channel III: Farmer – commission agent – wholesaler – processor; Channel IV: Farmer – processor; respectively. The price spread analysis indicated that the net price realized by the farmer in the channels I, II, III and IV worked out to 85.80; 93.74; 86.82 and 97.74 per cent of price paid by the processor in each channel. The farmer share in processor rupee was high in channel IV and low in channel I.

Six channels were identified for grapes in Nashik, Maharastra. Channel 1: producer – Consumer; Channel II: Producer – retailer- consumer; Channel III: Producer – commission agent – wholesaler- retailer; Channel IV: Producer – pre harvest contractor – retailer – consumer; Channel V: Producer – wholesaler – retailer – consumer; Channel VI: Producer – exporter – commission agent – wholesaler – retailer – consumer. The producer's share in the consumer's rupee was the highest(98.5 percent) in channel I and the lowest(34.10) in channel VI. The fewer shares in Channel VI were due to higher marketing cost and commission on intermediaries (65.90 per cent). The highest total marketing cost and commission of intermediaries was observed in Channel VI, while the lowest in channel I which was because of the involvement of less no of intermediaries.(Ahire and Bhonde, 2008)

Indumathy (2008) identified two marketing channels for mango in Madurai district. Channel I: Producer - Pre harvest contractor – commission agent – wholesaler – retailer - consumer; Channel II: Producer – commission agent – wholesaler – retailer – consumer. It was observed that price spread was less in marketing channel II (39.58 per cent) when compared to the marketing channel I (47.13). In marketing channel II, only 28 per cent of the growers sold their fruits directly to commission agents at Madurai and earned high profit. Even though marketing channel I fetched low profit, majority of the growers sold their fruits to pre harvest contractor to avoid the price fluctuations, delay in payment and transport problems and easy transaction at the village itself.

Ravikumar (2009) found two channels for pomegranate. Channel I: Grower – pre-harvest contractor – commission agent cum wholesaler – retailer – consumer, Channel II : Grower - commission agent cum wholesaler – retailer – consumer. The producer's share in consumer's rupee in channel-I in Challakere and Hiriyur taluk respectively was 33.32 and 52.79 per cent. The total marketing cost incurred by producers accounted for 5.51 and 5.48 per cent of consumer's price.

Analysis of farm gate marketing of natural rubber in Nigeria indicates that the marketing margin per hectare was 44.03%. This implies that farm gate marketers reaped 44.03% of the final price offered per hectare. (Giroh *et al*, 2010)

Rasmi (2010) identified four types of marketing channels for small cardamom in Idukki district of Kerala. Channel I : Producer – Hill produce dealers (Local merchants) – wholesalers – Retailers – consumers, Channel II : Producer – Auction centre – Wholesalers - retailers – consumers, Channel III : Producer – Auction centre – Traders – upcountry wholesalers – Retailers – Consumers, Channel IV: Producer – Auction centre – Traders – exporters – Consumers. The marketing channels I and II were the main channels identified within the state. The channel III was identified within the country, especially for north India and Channel IV was for export purpose. It was also observed that in channel I, the net price received by the farmers was Rs 525 per kg, which was about 74.85 per cent of the consumer price. It was 80.72 per cent, 77.94 per cent, and 80.76 per cent for channel II, III and IV.

Nagaraja and Baravaiah (2011) studied the marketing of coconut in Chitradurga district and identified three channels. Channel I : Farmer (Individual) – Individual(own consumption/ self marketing), Channel II : Farmer (Individuals) – Pooling agent – consumer, Channel III : Farmers (Individuals) – pooling agent – merchant broker – consumer.

Materials and methods

3. MATERIALS AND METHODS

Selection of an apt methodology from a number of methodologies available is essential to bring out a suitable result for a research study. Based on the review of literature given in the previous chapter an appropriate methodology was selected for each aspect of the study. This chapter outlines briefly the characteristics of the study area, the methods adopted in the selection of samples and various statistical tools and techniques employed in analyzing the data.

3.1 DESCRIPTION OF THE STUDY AREA

A general awareness about the characteristics of the study area is vital to understand the background of research. The physical and economic environments of the region are the major determinants of crop production and manufacturing system. It provides the background for analysis, interpretation and discussion of the results and helps in drawing meaningful inferences. Recognizing this, a profile of the region comprising resource inventory such as topography, rainfall, land use pattern, soil type, cropping pattern, sources of irrigation, and infrastructural facilities are presented in this chapter.

3.1.1 Location

Located in the middle part of Kerala, Idukki District is bound on the East by Madurai District of Tamil Nadu State while on the West by Ernakulam and Kottayam Districts of Kerala. In the South it is the Pathanamthitta District, and on the North it is bound by Trissur and Coimbatore Districts of Kerala and Tamil Nadu States respectively. It lies between 9˚ 15' and 10˚ 21' of north latitude and 76˚ 37' and 77˚ 25' of east longitudes. With an area of 4,362 km² it is the second largest district of

Kerala next to Palakkad. It extends by 115km from south to north and 67km from east to west.

3.1.2 Topography

Idukki has many unique topographical and geographical characteristics. About 97 percent of the total area of the district is covered by rugged mountains and forests. There is only a strip of middle land in the western part of the district. Low land area is totally absent in the district. More than 50 percent of the area of the district is covered by forest. As the district lies mostly in the highland, it is covered with dense forest, steep hills and deep valleys. Because of the undulating topography large area of the district is not suitable for scientific cultivation.

Table 4. Topographical status of Idukki district

Altitude (Above mean sea level)	Land Pattern	Percentage of land area
20-100m	Midland	4.5
100m-300m	Mid-upland	7.5
300m -600m	Upland	12.1
600m -1200m	Western Ghat High range	48.3
1200m – above	Top Western Ghat High Range	24.5

(Source: www.idukki.nic.in)

3.1.3 Climate and Rainfall

The district receives plenty of rains from both the South- West monsoon during June-August and the North- East monsoon during October - November. The normal rainfall is 3265 mm. As common to other parts of the state, the Idukki district also experiences both the south-west monsoon (Edavappathy) and North-East

Monsoon (Thulavarsham) during June-July and October -November respectively. The former is more predominant with June experiencing the maximum rainfall. The annual rainfall in the district varies from 250 to 425 cms. The western region of Devikulam taluk gets more rainfall which goes even upto 500cms. The Eastern and North-eastern regions of the district get very low rainfall normally upto 150 cms. Munnar, Devikulam Pallivasal, Vellathooval etc. are places getting high rainfall.

Table 5. Rainfall in mm in the year 2010

Month	**Idukki**	**Average for Kerala**
January	12.5	18.5
February	0	0.9
March	41.3	31.9
April	159.6	139.4
May	182.9	188.9
June	786.5	668.4
July	778.6	631.1
August	543.6	361.3
September	306.1	271.6
October	428.5	441.4
November	305.6	336.8
December	24.5	46.8
Annual	3569.7	3155.5

(Source: GOK, 2012)

The eastern parts of the district located in the highland have a comparatively cold climate with temperature varying between minus 1˚ C to 15˚ C in November/January and 5˚ C to 15˚ C during March/April. The western parts of the district comprising midland area experiences moderate climate, temperature varying between 21˚ C to 27˚ Celsius with minimum seasonal variation.

3.1.4 Soil Type

Laterite soil and alluvial soil are found in the district. Laterite soil is found in Peermade and Thodupuzha taluks and alluvial soil is found in Devikulam and Udumbumchola taluks

3.1.5 Land Utilization Pattern

The table 3 shows the land utilization pattern in Idukki district and Kerala state. Total geographical area in Idukki district is 4, 36,328 ha which constitutes 11.23 percent of the total geographical area of Kerala. The net area sown under Idukki district is 208140 ha which accounts 47.7 percent of the total geographical area of the district. Forest accounts for 45.47 percent of the total geographical area in Idukki district. When Kerala state is considered net sown area occupies 53.49 percent of total geographical area and forest occupies 27.83 percent. Out of the net area sown, 47.34 percent is sown more than once in Idukki and for state as whole only 28.38 percent of the net area sown is sown more than once.

Table 6. Land Utilization of Idukki District and Kerala.

Land use classification	Idukki (area in ha)	Percentage to total geographical area	Kerala (area in ha)	Percentage to total geographical area
Total Geographical	436328	100	3886287	100
Forest	198413	45.47	1081509	27.83
Land put to non	10712	2.46	371906	9.57
Barren & uncultivable	2116	0.48	22046	0.57
Permanent pastures &	171	0.04	228	0.01
Land under misc. tree	216	0.05	4423	0.11
Cultivable waste	2699	0.62	98014	2.52
Fallow other than current	989	0.23	45374	1.17
Current fallow	1041	0.24	76945	1.98
Marshy Land	_	_	211	0.01
Still Water	10480	2.4	101547	2.61
Water Logged Area	1	0	2552	0.07
Social Forestry	1350	0.31	2817	0.07
Net area sown	208140	47.70	2078715	53.49
Area sown more than	98541 (47.34 % of net area sown)		589963 (28.38 % of net area sown)	
Total cropped Area	306681		2668678	

(Source: GOK, 2012)

3.1.6 Agriculture

Agriculture is the most important segment of the economy and is the largest source of employment in the district. This District has the agro-climatic conditions suitable for the cultivation of plantation crops like tea, coffee, rubber, coconut, cardamom, pepper, etc. Cardamom, Pepper, Tea, Rubber and Coffee constituted more than 75 percent of the total cropped area. Paddy cultivation is comparatively less, confined to around 5000 ha. The district is famous for production of spices like pepper and cardamom. Rubber, Coffee and Coconut are the other important crops in the district. More than 80 per cent of the cropped area is under perennial crops. The district is declared as a `Spices District`.

Land holding pattern

Small and marginal farmers are predominant in the district. However, in High land areas there are large holdings of plantations of tea, cardamom, etc. owned by corporate bodies and private agencies.

Also as shown in the table 7, 80 percent of cultivators hold an area of one ha or less. Population having land holding size 1 – 2 ha accounted to 14.34 percent and the rest possess more than 2 ha.

Table 7. Land holding pattern

Area	**Number of Holders**	**Percentage**
Upto 1 ha	1,69,822	80.42
Between 1 and 2 ha	30,283	14.34
Above 2 ha	11, 069	5.24

(Source: www.idukki.nic.in)

3.1.7 Water Sources

The important rivers of the district are Periyar, Thodupuzhayar and Thalayar. Periyar which is 277 km long is the second longest river of Kerala. It originates from Sivagiri in the southeast part of the district and touches all the taluks of the district. There are a few natural lakes in the district. They are Eravikulam and Devikulam lakes in Devikulam taluk, Elavizhapunchira, in Thodupuzha taluk. Mullaperiyar dam, Idukki Hydro-electric project, Idamalayar Hydroelectric project and lower Periyar are constructed across the Periyar. Mullaperiyar dam, Mattupetty dam, Munnar head works, Ponmudi dam, and Kallarkutty dams are constructed across the various tributaries of Periyar.

Table 9. Net area irrigated – source wise (area in ha)

Source	Idukki	Kerala
Government channel	3904 (13.33)	94813 (24.55)
Private channel	409 (1.40)	2656(0.69)
Government tanks	5 (0.02)	1720 (0.45)
Private tanks	9391 (32.06)	39131(10.13)
Government wells	0	410 (0.11)
Private wells	3949 (13.48)	125482 (32.49)
Minor irrigation	18 (0.06)	6794 (1.76)
Tube wells	10609 (36.22)	96794 (25.06)
Other sources	1006 (3.43)	18462 (4.78)
Total	29292 (100)	386262 (100)

(Source: GOK, 2012); Figure in parenthesis represents the percentage to total

Source of irrigation is as given in table 8. The irrigated area in the district is 29,292 ha which accounts to only 14.07 per cent of the net sown area. In Kerala, 18.5 per cent of the net sown area can be irrigated.

3.1.8 Demography

The district had population of 1,107,453 which constituted 3.32 percent of the Kerala population according to 2011 census. The male and female population was 5, 51,944 and 5, 55,509 respectively. The density of the population is 254 sq. km. The sex ratio is 1006 females for 1000 males. The literacy rate was 92.2 percent which was found to be lower than the state average (93.91 percent).

3.1.9 Occupation

Hilly terrain, lack of proper irrigation facilities and accessibility, forest cover and topography in general, make a major portion of the available land unsuitable for cultivation. Even then agriculture is the main occupation of the people. Dairy is the main supplementary source of income of the farmers in the district. Recently, floriculture, mushroom cultivation, medicinal plants, vanilla cultivation etc., are being taken up by some progressive farmers / women in the district.

Table 9. Classification of the population according to the occupation

Occupation	Number	Percentage
Cultivators	103015	21.14
Agricultural labourers	131935	27.07
In household industries	8080	1.66
Other workers	244322	50.13

(Source: GOK, 2009)

Animal husbandry activities are the major subsidiary occupations of the farming community. Extensive pasture, grazing lands and the favorable climate make the district suitable for rearing. Livestock wealth has great significance in the agricultural economy of the district.

3.1.10 Administration

For the purpose of administration the district is divided into four taluks. They are Devikulam, Udumbanchola, Peerumade and Thodupuzha. The taluks contain 65 villages. There are eight community development Blocks: Devikulam, Adimali, Nedumkandom, Azhutha, Kattappana, Idukki, Elamdesom and Thodupuzha and there are 51 Panchayaths in the district.

3.2 SELECTION OF THE AREA OF STUDY

In Kerala Idukki district stands first in production of pepper with an area of 87, 274 ha contributing 51 percent to the state total and producing 30,919 tonnes accounting to 68 per cent of the state total. (GOK, 2011a). There are a number of nongovernmental organizations (NGO) and private agencies actively involved in the organic certification of land, procurement and export of organic spices from the district. Hence Idukki district was purposively selected for the study. Out of the eight blocks of Idukki district, Azhutha and Kattapana blocks were selected randomly. Incidentally, Azhutha and Kattapana could be ranked second and fourth in area under pepper cultivation and first and fourth in production of pepper in the district respectively. With an area of 15330.09 ha, Azhutha produced 7353.506 tonnes of pepper and under 14454.24 ha Kattapana produced 5911.048 tonnes in the year 2010-2011.

3.2 SELECTION OF THE RESPONDENTS

The list of certified organic farmers from the above blocks were taken from NGOs like Peermade Development Society Organic Spices, Manarcadu Social service Society (MASS), Kerala Agricultural development Society (KADS) and compiled. The lists of conventional farmers were obtained from the spices board offices of Kattapana and Peermade (Azhutha). 25 farmers were selected randomly from each block. The distribution of the farmers among the panchayaths of the block is shown as below.

Table 10. Distribution of respondents in different Panchayaths.

AZHUTHA			KATTAPANA		
Panchayaths	Organic	Conventional	Panchayaths	Organic	Conventional
Kumily	8	8	Kanchiyar	7	5
Vandiperiyar	7	10	Ayyapankovil	-	3
Peruvanthanam	10	2	Erattayar	10	10
Elappara	-	5	Chakkupallam	8	7

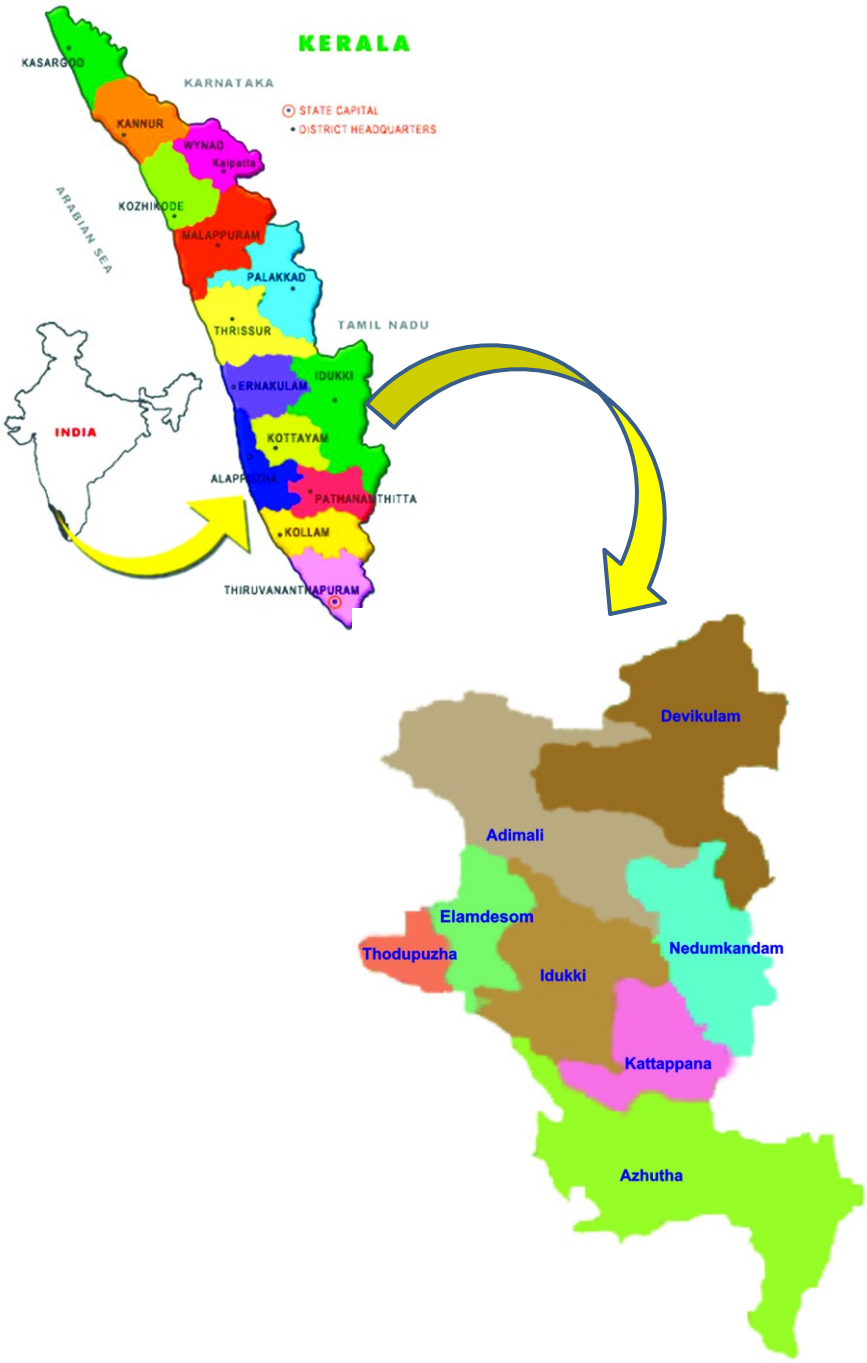


Figure 2: Location of the Study – Kattapana and Azhutha Blocks of Idukki District.

3.3 METHOD OF DATA COLLECTION

The data was collected from the respondents by personal interview using a well structured and pretested interview schedule specifically designed for the study. The detailed field survey was conducted during the period of October – November 2011. Same schedule was used for both organic and conventional farmers.

3.4 VARIABLES AND THEIR MEASUREMENT

3.4.1 Cost of Planting Materials –Vines and Standards

In production process, both farm produced and purchased inputs are used. If the material are purchased from outside then it is evaluated at purchase rate. If it is farm produced, a price prevailing in the locality is considered.

3.4.2 Cost of Human Labour

i) Cost of hired labour

Hired and permanent labour charges are evaluated on basis of wages paid for respective work.

ii) Cost of family labour

The value of family labour was imputed on the basis of wages of attached farm labour and number of men hours used. Women labour (both hired and family) is evaluated on the basis of wages paid to women which is actually lesser than the amount paid to the men labour.

3.4.3 Cost of Machinery Labour

The human labour in using the machine is accounted under various headings of hired and family labour. Cost of maintenance of farm machinery, which may include i) Fuel, ii) Power, iii) Lubricants, iv) Repair and, v) Other expenses, if any

are included under annual maintenance and repairs. Depreciation of the machinery is worked out using straight line method and is accounted under depreciation.

3.4.4 Cost of Materials used for Tying and Shading.

The material such as coir used for tying was evaluated at purchasing rate. For initial two years farmers use banana fibers to tie the vines as it would break off when the girth of the standard increase and would not harm the vines. Coir is used from the third year. For farm produced materials used for shading such as banana and arecanut leaves, a price prevailing in the locality is considered. If it is purchased it is evaluated at the purchasing price. Practice of using newspapers for shading was also observed among some farmers. In such cases resale value of newspapers was considered in computing this cost of cultivation.

3.4.6 Cost of Manure, Fertilizers, Biofertilizers

Farm produced manure is evaluated as per the prevailing locality rates and purchased ones are evaluated on the basis of purchase price.

3.4.7 Cost of Plant Protection Chemicals

It is evaluated at the purchased price.

3.4.8 Cost of Irrigation

This cost involves labour cost for irrigating the field, electricity charges, diesel cost, and other irrigation structures used particularly for the use of irrigating pepper.

3.4.9 Interest on Working Capital

The paid out cost constitutes the working capital. Interest on working capital was worked out at the rate of 7 per cent per annum for half the period of the crop, since that is the rate at which farmers got crop loans from financial institutions.

3.4.10 Interest on Fixed Capital

The present value of assets, equipments form the fixed capital. Interest on this can be calculated in the same way as in case of interest on working capital. Interest on fixed investments (excluding land) was estimated at rate of 11 per cent per annum being the lending rate of commercial bank for long term loans.

3.4.11 Rental Value of Owned Land

It is evaluated at an interest of 11 percent per annum on the value of land for the period of crop since it is the lending rate of commercial banks. Cost of production of pepper was calculated using market rent for leased in land also since the rental value of owned land is too huge.

3.4.12 Land Revenue

Land revenue paid was reckoned at the actual payments made in the study area. It is at rate of Re 1 per are for holding size more than 1 acre and 50 paise per are for holding size less than 1 acre (40 ares).

3.4.13 Depreciation

This was worked out to meet the wear and tear of the implements and machinery used in pepper cultivation. The annual rate of depreciation was worked out on each item using straight line method and then cumulated to get the total annual depreciation allowance.

3.4.14 Miscellaneous Cost

This is the cost involved in replacing damaged or disease infected vines and standards. It is includes other sundry charges.

3.5 TOOLS FOR ANALYSIS

Appropriate tools are employed to analyze the data collected. The tools are

3.5.1 Percentages and Averages

Percentages and averages are used to examine the distribution of socio economic characteristics of farmers such as age, educational status, land holding, annual income and farming experience. And it is also used in cost of cultivation and cost of production analysis.

3.5.2 Cropping Pattern and Cropping Intensity

Cropping pattern is the proportion of area under different crops at a point of time (Dhondyal, 1997). The intensity of cropping refers to the number of crops grown on a farm during the year with land as a fixed resource. It is calculated as:

$$\text{Cropping intensity} = \frac{\text{Gross Cropped area}}{\text{Net sown Area}} \text{ X } 100$$

Gross cropped area is the sum of the cropped area, which in turn was calculated by converting the number of each crop in a plot into area by using its standard spacing.

3.5.3 Cost of Cultivation and Cost of Production

Cost of cultivation of a commodity is the sum total of cost incurred on various inputs that are used in the production of commodity. Correct identification of these inputs and there measurement is crucial for the realistic assessment incurred in the production. A B C cost concept was used to calculate cost of cultivation of pepper for the year 2010-11. Cost of production of pepper was worked out by adding the amortized value of establishment cost and adding it to the maintenance cost.

3.5.3.1 A B C cost concepts

Cost A includes

a) Cost of hired human labour

b) Cost of manures, fertilizers and soil ameliorants

c) Cost of plant protection chemical

d) Cost of tying material

e) Land Revenue

f) Depreciation

g) Annual repairs

h) Interest on working capital

i) Miscellaneous

Cost B 1

This includes the items of under cost A and the interest on fixed capital.

Cost B2

This includes Cost B1 and the rental value of owned land.

Cost C1

This comprises of the cost B1 and imputed value of family labour.

Cost C2

This comprises of the cost B2 and imputed value of family labour.

Cost C3

This is the sum of Cost C2 and 10 percent of cost C2 to account for managerial input of the farmer

(CSO, 2008)

3.5.3.2 Cost of establishment and cost of maintenance approach

Cost of establishment

This is all the cost involved in pepper production till the bearing stage of two years.

Cost of maintenance

It includes the operational cost and cost of maintaining plantation in the bearing stage.

In order to estimate the annual share of the total establishment cost, the total establishment expenditure incurred up to the bearing stage were apportioned among the average productive years (15 years) using the following formula.

Amortized cost = Establishment Cost x Annuity

Annuity = $\frac{i\,(1+i)^n}{(1+i)^n - 1}$

(Nelson et al, 1973; Das,1984; Bastine et al, 2004; Rashmi, 2010)

i = Existing bank rate of interest (7 percent)

n = Life period of the plantation i.e 15 years

The annualized cost thus obtained was added to the annual maintenance cost to arrive at the total annual cost per unit area. This annual cost per unit area divided to the yield per ha to obtain the cost of production.

3.6 Resource Use Efficiency

The study of resource use efficiency in agricultural sector is done to examine how efficiently the farmers are using their resources.

An efficient farmer allocates his land, labour, water, and other resources in an optimal manner, so as to maximize his income, at least cost, on sustainable basis. While some farmers may attain high physical yield per unit of land at a high cost, some others may achieve maximum profit per units used.(Haque, 2006)

The important problem of increasing agricultural production in any region is how to increase output per unit of input. Therefore it is necessary that the available resources should be used economically and efficiently. The concept of economic efficiency is significant to determine the cost per unit of output. Farrel (1957) as mentioned by Takale (2006) divided the economic efficiency into two components namely 1) technical efficiency and 2) allocative or price efficiency. Technical efficiency refers to the proper choice of production function among all those actively in use by farms in the agriculture. This efficiency refers to the marginal ability, soil fertility, climactic conditions, incentives etc. The price or allocative efficiency refers to the proper choice of input combination. It refers to the achievement of optimum output so as to maximize net income. Economic efficiency combines both technical and allocative efficiency (Takale, 2006). In this study we find the allocative efficiency of pepper production in both organic and conventional system using the Cobb Douglas (CD) production function.

The algebraic form of function is written as

$$Y=a\Pi X_i^{bi}$$

The functional form is written as follows

$$Y = a.X_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{B5}e$$

This is modified into a log linear model by the application of logarithms to either side resulting in,

$$\log Y = \log a + b_1 \log X_1 + b2\log X2 + b3\log X3 + b4\log X4 + b5\log X5 + e$$

Where,

Y = Yield of pepper (kg/ha)

X1 = Area under pepper (ha)

X2 = Planting density

X3 = Expenditure on manures and fertilizers (Rs/ha)

X4 = Cost of family and hired labour (Rs/ha)

X5 = Miscellaneous cost + Cost for Plant protection (Rs/ha)

bi's are regression coefficients of explanatory variables.

The CD function was estimated by using OLS method assuming the error term (e) to be randomly and normally distributed. The results of analysis were subjected to test by the coefficient of multiple determination and relevant 't' test was carried out for each variable. The regression coefficients (bi) were tested for their significance using 't' test at chosen level of significance.

$$t = \frac{bi}{\text{Standard error of bi}}$$

Estimation of marginal products and marginal value products

The resource use efficiency was studied by comparing the marginal value product (MVP) of each resource with marginal factor cost (MFC). The marginal value product was obtained by multiplying the marginal product with the price of the product. The marginal products were calculated at the geometric mean levels of variables by using following formula.

$$\text{Marginal product of input} = b_i \times \frac{\overline{Y}}{\overline{X}}$$

Where,

$\overline{Y}$= Geometric mean of output

$\overline{X}$ = Geometric mean of i^{th} independent variable.

bi = the regression coefficient of i^{th} independent variable.

The marginal value product of each resource was calculated by multiplying the marginal product of the resource by the price of the product.

The formula used for the purpose was as under

$$\text{Marginal value productivity of } X_i = b_i \times P_y \times \frac{\bar{Y}}{\bar{X}}$$

Where,

Py = Price of pepper.

The comparison of ratios (MVP/MFC =k) for judging efficiencies are

k > 1 indicating under use of resources

k = 1 Optimum use of resources (allocative efficiency)

k < 1 indicating excess use of resources.

Farm specific input level is calculated by equating MVP of an input with its price. In this study since the cost of inputs are considered for the production function price of input i.e. MFC is taken as unity.

3.7 Extent of Adoption of Farmers

There has been a wide acceptance of organic farming among the farmers of Idukki district. Yet the extent of adoption of organic practices is not known. The practice of organic farming among these farmers is mostly limited to applying organic manures. Adoption level of this was measured using recommendation in Package of Practice Recommendations (Adhoc) for organic farming published by Kerala Agricultural University (2009). Extent of adoption of conventional farmers was also measured using the Package of practice recommendation by KAU (2007).

$$\text{Extent of adoption} = \frac{\text{Adopted level}}{\text{Recommended level}} \times 100 \quad \text{(Ganapathy, 1998)}$$

$$\text{Total extent of adoption of farmers} = \frac{1}{4}\left[\frac{X1}{F1} \times 100 + \frac{X2}{F2} \times 100 + \frac{X3}{F3} \times 100 + \frac{X4}{F4} \times 100\right] \text{ (Dhondyal, 1997)}$$

Where x1, x2, x3, x4 are adopted level of various manures and fertilizers

And F1, F2, F3, F4 are recommended level of the corresponding manures and fertilizers.

3.8 Garett's Ranking Technique

Different constraints were identified in consultation with agriculture officers and scientist. The respondents were asked to rank these constraints. These ranks were converted into percent position by using the formula.

Percent position = $100 \text{ X } (R_{ij} - 0.5) / N_j$

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

N_j = No. of factors ranked by the j^{th} individual (Garret, 1969)

By referring to the Garrett's table, the percentage position estimated is converted into scores. Thus for each constraint, the scores of various respondents were added and the mean value was calculated. The mean scores thus obtained for each of the constraint were arranged in descending order. The attribute with the highest mean value was considered as most important constraint.

3.9 Marketing Channel

Marketing channels are routes through which agricultural products move from producers to consumers. This was identified by interviewing the market intermediaries in pepper. A separate questionnaire was there for market intermediaries. Village trader, Upcountry wholesale merchant, exporter, and retailers, were covered by the survey. The distribution of number of samples from each category is furnished in table 11.

Table 11. Distribution of number of samples from each intermediary in conventional black pepper.

Intermediaries	No of sample
Village trader	10
Upcountry wholesale merchant	5
Exporter	2
Retailer	3

3.10 Price Spread Analysis

In the marketing of agricultural commodities the difference between the price paid by the consumer and price received by the producer for an equivalent quantity of farm produce is often known price spread. Sometimes, this is termed as marketing margin. The total marketing margin includes:

i) The cost involved in moving the product from the point of production to the point of consumption, *i.e.,* the cost of performing the various marketing functions and of operating various agencies which can be termed as the marketing cost

ii) Profits of the various market functionaries involved in moving the produce from the initial point of production till it reaches the ultimate consumer and this can be termed as profit margin.

Marketing margin = marketing cost + profit margin

In the study price spread is analyzed by comparing the prices prevailing at the successive levels of marketing at the producer's, wholesaler's and retailer's level are compared. The sum of marketing margin at each level is taken as price spread. The margin of the intermediary is worked by deducting the ascertainable costs from the gross margin earned by that intermediary.

4. RESULTS AND DISCUSSION

This study entitled economics of organic and conventional pepper production in Idukki district was aimed to bring out the economics, resource use efficiency, constraints and marketing of pepper under organic and conventional cultivation system. The data collected was analyzed and the results are presented in this chapter under the following heads.

4.1 General characteristics of sample farmers
4.2 Cropping pattern and cropping intensity
4.3 Cultivation practices
4.4 Economics
4.5 Resource use efficiency
4.6 Extent of adoption
4.7 Constraints
4.8 Marketing

4.1 GENERAL CHARACTERISTICS OF SAMPLE FARMERS

4.1.1 Age of the Farmers

The sample farmers were classified into 3 age groups, less than 36 years, 36-50 years, and above 50 years and the details are presented in the table 12. Average age of organic pepper growers was 51 years and maximum concentration of farmers was observed in the age group of 36- 50 years (54 per cent) followed by the age group of more than 50 years (40 per cent). But in the case of conventional farmers the average age was 52 years. The maximum number of farmers was observed in the age group of more than 50 years which accounted to 60 per cent of the total, followed by the age group of 36 – 50 years (36 per cent).

The high concentration of conventional farmers in the age group of more than 50 years may be because of the fact that they are traditional pepper growers cultivating pepper for many years and reluctant to move to organic farming, a comparatively new system of cultivation. It is evident from the above table that about 54 per cent of the organic farmers are concentrated in the age group of 36 – 50 years as they may be receptive to the new technology.

Table 12. Distribution of farmers according to age

Age group (years)	**Number (Organic)**	**Percentage**	**Number (Conventional)**	**Percentage**
<36	3	6	2	4
36-50	27	54	18	36
>50	20	40	30	60
Total	50	100	50	100
Average age (years)	**51**		**52**	

4.1.2 Educational Status of Farmers

The sample farmers were classified under different educational status as shown in table 13. None of the farmers were illiterate and almost all of them had more than primary level of education. Maximum number of organic and conventional pepper cultivators had secondary level of education which was respectively 42 per cent and 44 per cent followed by higher secondary level (32 per cent and 24 per cent respectively).

Table 13. Distribution of farmers according to educational status

Educational Status	Number (Organic)	Percentage	Number (Conventional)	Percentage
Primary	1	2	0	
Upper Primary	2	4	3	6
Secondary school	21	42	22	44
Higher secondary	16	32	12	24
Graduate	8	16	12	24
Post graduation	2	4	1	2
Total	**50**		**50**	

4.1.3 Farming Experience of Farmers

Table 14 gives the distribution of farmers in six groups according to the farming experience. The average experience of organic farmers was 28 years and it was 31 years for the conventional farmers. In both the cases the distribution was similar in the groups of 11 – 20 years, 21 – 30 years and 31 – 40 years.

But in the case of farming experience of up to 10 years organic farmers were more (14 per cent) when compared to conventional farmers (6 percent). But reverse is the case in the age group of 41 – 50 years and more than 50 years, where conventional farmers were more in number than organic farmers. So we can say that farmers with lesser experience or younger age group were more oriented towards organic farming. Distribution according to age group also supported this result.

Table 14. Distribution of farmers according to farming experience

Experience (in years)	Number (Organic)	Percentage	Number (Conventional)	Percentage
Up to 10	7	14	3	6
11 – 20	9	18	9	18
21 – 30	15	30	15	30
31 – 40	12	24	12	24
41 – 50	4	8	7	14
Above 50	3	6	4	8
Total	**50**	**100**	**50**	**100**
Average (years)	**28**		**31**	

4.1.4 Family Size of Farmers

Distribution of farmers according to family size (table 15) showed that 50 per cent of organic and 58 per cent of the conventional farmers had small family size with less than 5 members. Average size of family of organic and conventional farmers did not show much difference.

Table 15. Distribution of Farmers According to Size of the Family

Family size	Number	Percentage	Number	Percentage
Small(< 5)	29	58	25	50
Medium(5)	13	26	15	30
Large (>5)	8	16	10	20
Total	**50**	**100**	**50**	**100**
Average size	**4.40**			**4.54**

4.1.5 Land Holding Size of Farmers

A perusal of table 16 reveals the average holding size for organic and conventional farmers were respectively 1.38 ha and 1.44 ha. Maximum number of organic farmers had land holding size ranging from 0.5 – 1ha (38 per cent) followed by 1 – 2 ha (36 per cent). None of the organic farmers had holding size above 4 ha. But maximum number (44 percent) of conventional farmers had land holding size ranging from 1 – 2 ha followed by 0.5 – 1 ha (32 per cent). This may be because of the difficulty in obtaining large quantities of organic inputs for large area and the reluctance of the traditional farmers having large holding sizes to move towards organic cultivation.

Table 16. Distribution of farmers according to land holding size

Size of the holding (ha)	**Number (Organic)**	**Percentage**	**Number (Conventional)**	**Percentage**
Less than 0.5 ha	4	8	5	10
0.5 – 1	19	38	16	32
1 – 2	18	36	22	44
2 – 3	5	10	5	10
3 – 4	4	8	0	0
Above 4 ha	0	0	2	4
Total	**50**	**100**	**50**	**100**
Average size	**1.38**		**1.44**	

4.1.6 Annual Income of Farm Households

The distribution of farmers according to annual income of the households in table 17 shows that the maximum number of organic and conventional farmers falls under the category of 2 – 4 lakhs followed by 1 – 2 lakhs. Average income of both the group were respectively Rs 4,02, 995 and Rs 3,95,463.

Table 17. Distribution of sample farmers according to the annual income of household

Income	Number (Organic)	Percentage	Number (Conventional)	Percentage
Less than 1 lakh	3	6	4	8
1 - 2 lakhs	12	24	10	20
2 - 4 lakhs	15	30	17	34
4 - 6 lakhs	11	22	9	18
6 -8 lakhs	4	8	4	8
Above 8 lakhs	5	10	6	12
	50	**100**	**50**	**100**
Average	**4,02,995**		**3,95,463**	

4.2 CROPPING PATTERN AND CROPPING INTENSITY

Almost all the farmers were growing pepper as mixed crop or in home gardens. Only 2 each of organic and conventional farmers were cultivating pepper as mono crop out of the total 100 samples.

Data presented in table 18 and figure 3 shows that cropping pattern of both organic and conventional farmers was almost similar. The total cropped area estimated was 56.73 ha for organic farmers and 52.06 ha for conventional farmers. Both organic and conventional farmers had a cropped area of about 28 ha under pepper which was 50 and 53 percent respectively of the total cropped area. Next major crop under organic farming was cocoa occupying 12.83 per cent of the cropped area, followed by coffee, clove, nutmeg, coconut, and arecanut. For conventional farmers coffee occupied the second position (11.10 per cent), followed by cocoa, coconut, clove, cardamom and nutmeg. Other crops including banana, ginger,

tapioca, vanilla, rubber, and trees such as jack, mango, bread fruit, cinnamon, teak, wild jack, etc occupied 9.06 per cent of the area for organic and 10.26 per cent of the area for conventional farmers.

The cropping intensity of organic farmers was more which worked out to 143 percent and for conventional farmers it was 125 percent. This shows slightly denser planting among the organic farmers as some of them are raising pepper vines in their home garden, along with assortment of crops required for family consumption.

Table 18. Cropping pattern and cropping intensity of sample farmers

Crop	Organic		Conventional	
	Cropped Area (ha)	Percentage	Cropped area (ha)	Percentage
Pepper	28.22	49.74	27.76	53.32
Cocoa	7.28	12.83	5.20	9.99
Coffee	5.99	10.56	5.78	11.10
Clove	2.62	4.63	1.68	3.21
Nutmeg	3.39	5.98	0.94	1.81
Coconut	2.48	4.37	3.38	6.50
Arecanut	1.50	2.64	0.78	1.50
Cardamom	0.11	0.19	1.20	2.31
Other crops (banana, ginger, tapioca, vanilla, rubber, jack, mango, etc)	5.14	9.06	5.34	10.26
Total cropped area	**56.73**	**100**	**52.06**	**100**
Net sown area	**39.75**		**41.42**	
Cropping Intensity	**143**		**125**	

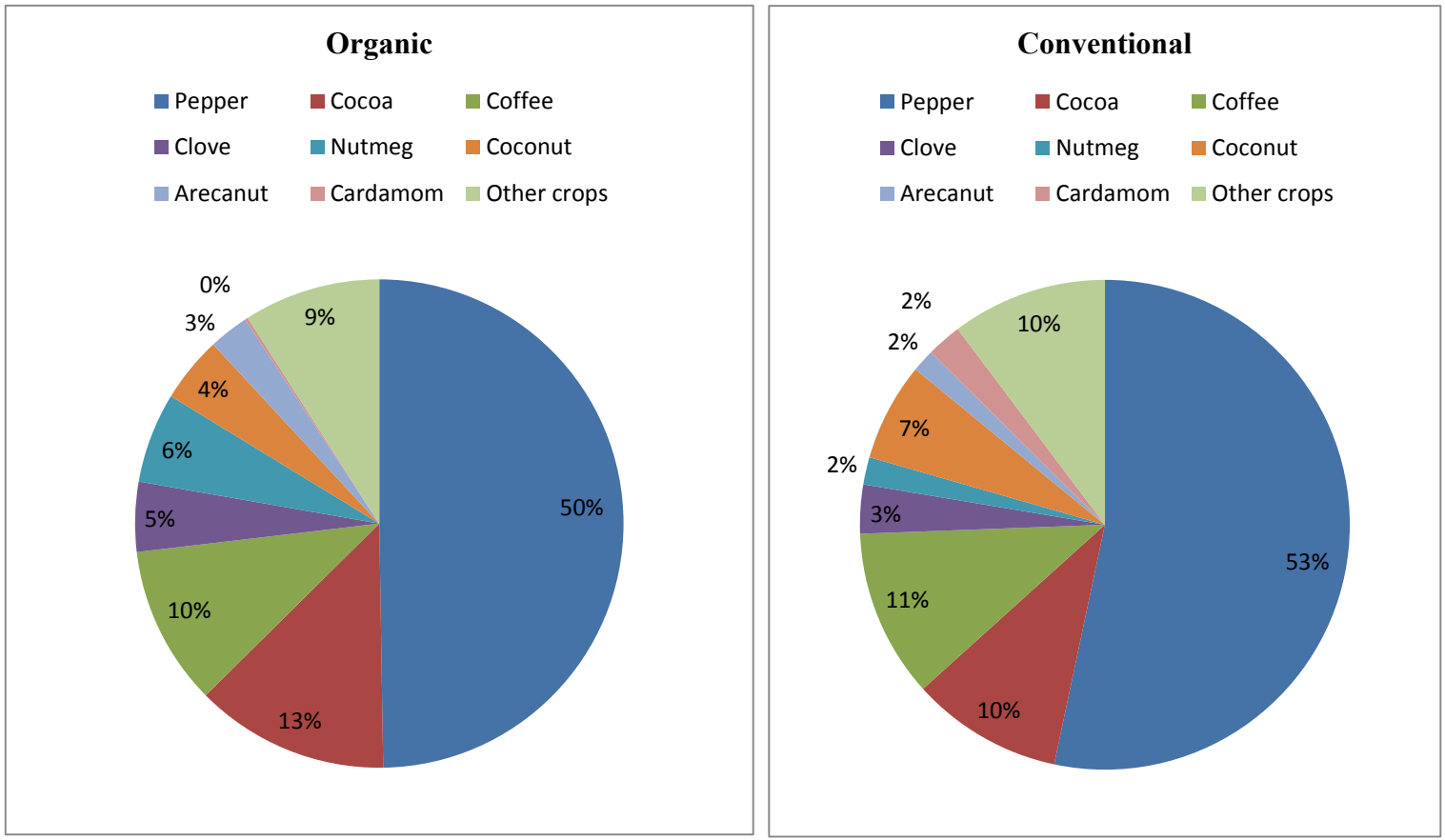


Figure 3: Cropping pattern

4.3 CULTIVATION PRACTICES

To get an idea about the operations done for organic and conventional black pepper production the various practices adopted by the farmers are explained here.

Vines and Standards

Farmers doing both organic and conventional black pepper production were found to be obtaining vine cuttings from their own farms. The varieties and age of the vines was not uniform in any farm for both organic and conventional black pepper production system. Local varieties such as Karimunda, Vellamundi, Neelamundi, Deivamundi, Jeerakamundi were the most prominent. Panniyur 1 was also found rarely in few farms. Kumbukkal selection, a farmers' variety was observed among the organic farmers in Peruvanthanam panchayath of Azutha block.

Erythrina sp. was the most common standard observed albeit its problems of pest and disease attack. Pepper vine is also trailed on other perennial crops such as jack. Trees such as silver oak and Payyani is gaining popularity among farmers as standards for commercial cultivation of pepper vines.

Establishing Standard

Standards are planted in the month of May in pits ranging from 1 foot to 2.5 feet, filled with dried cow dung powder. The amount applied varied from farmer to farmer irrespective of organic and conventional farmers.

Establishing Vines

Vines are planted at the onset of monsoon. Three to five cuttings are planted on the western side of the standard along with 2 – 3 kg of dried cow dung powder/compost.

Weeding and Mulching

Initial weeding is done during July. Then it is done after the north east monsoon in October along with digging around. Digging around pits is done for the first two years. But organic farmers do not follow this as it may damage the roots and make the plant susceptible to foot rot. They just slightly loosen the soil around the standard along with weeding. During the bearing stages most of the organic farmers stick to slashing of the weeds 4 – 5 times a year and they leave the weeds as a mulch in the field to increase the organic content. The conventional farmers do 2 – 3 weedings (slashing) per year and during December – January, before the harvest they clean up the field by removing every weed including the roots and the practice is commonly called by the name 'kalachethu'. Mulching is done in summer (April - May) and it covers the soil and prevents desiccation.

Shading and Irrigation

Shading and irrigation are done in the summer mostly in pre bearing vines. Banana and arecanut leaves and even newspapers are used for shading the young plants from being wilted by the sun. Irrigation was not common and only few farmers along the bank of river Periyar who had access to water from the river only irrigated their crops. Those farmers who are irrigating did not shade the pre bearing vines. Those who did not have arecanut and banana leaves used newspaper to cover the young plants. As the rain starts, the shading material is removed and the basin is cleared up of any remaining mulching material.

Manures and Fertilizers

Pepper farmers irrespective of whether they are organic or not, used dried cow dung powder as the main manure for pepper vines. Out of the 100 sample, 8 organic farmers had vermicomposting facility at their households and hence used vermicompost. Neem cake and bone meal were another major inputs used by farmers.

Use of inorganic fertilizers was limited to very few farmers, as they believed that the use of inorganic fertilizers will make the plants susceptible to disease and pest attack.

Tying of Vines

Vines had to be frequently tied to the standards for initial two years as the vines grow. For the pre bearing period of two years farmers use banana fibers to tie the vines as it would break off when the girth of the standard increase and would not harm the vines. If alternates such as coir is used it may constrict the vines and thus damage it. Coir is used from the third year. The following year this will be untied and used again. Hence coir will be bought afresh every alternate year only.

Plant Protection

Foot rot was the major disease of pepper mentioned by majority of the farmers in the study area. A few farmers complained about fungal pollu also. The major pest of pepper mentioned by the farmers was mussel scale. In Standard *erythrina* farmers whined about thrips, stem borer, case worm, and phytophagus caterpillar. Nematode infestation was also mentioned

Organic famers used Bordeux mixture and copper oxy chloride to control foot rot and many followed phytosanitation measure such as burning the infected vines along with the root system. Application of Bordeux mixture and copper oxy chloride is allowed in organic farming in restricted quantities. Some of the organic farmers used bio control agents such as *Trichoderma* and *Pseudomonas* along with application of dried cow dung powder or compost. Organic farmers apply rice stalk and cow dung on vines and leaves to control scale. The major plant protection measure followed by conventional farmers was also the application of Bordeaux mixture and copper oxy chloride. Conventional farmers used chemicals such as Triphos and Ecalyx.

Pruning of Standards

This is done twice in a year, in March – April and during July – August to prevent overgrowth and to provide proper shade. During the bearing stages, the tying of vines is done along with the pruning in March – April.

Harvest and Post Harvest Operations

Harvesting is done in the month of December – February. The spikes are left in the sun for one day so that it gets wilted and berries can be separated easily from the spikes. A few farmers follow the practice of dipping the harvested spikes in hot water for one minute before drying. It provides uniform black colour for dried pepper. But since it is a laborious process, it is not practiced by many of the farmers. The berries after separating from the spikes are dried for 3 days.

4.4 ECONOMICS OF ORGANIC AND CONVENTIONAL PEPPER PRODUCTION

ABC cost concept is used to represent the cost of cultivation of one hectare of bearing pepper plantation. Cost of production was worked out by computing the amortized establishment cost and annual maintenance cost since pepper is a perennial crop. Net returns and B- C ratio with respect to cost A, cost B_1, B_2 and cost C_1, C_2, C_3 was worked out.

4.4.1 Cost of Cultivation

The cost of cultivation per hectare of organic and conventional pepper was worked out using ABC cost concepts and is presented in table 19 and 20 respectively.

For organic pepper cost A was worked out to Rs 82,192 of which hired labour accounted to about 54 per cent, followed by cost of manures which worked out to 28 per cent of cost A (figure 4).

Cost B_1, B_2, C_1 and C_2 were respectively Rs 83,062, Rs 4,84,420, Rs 1,29,879 and Rs 5,31,237 respectively. Cost C_3 was worked out by adding 10 per cent of cost C_2 to C_2, and it was worked out as Rs 5,84,361.

Table 19. Cost of cultivation of organic pepper, 2010-11

Sl. No.	Item	Cost (Rs/ha)	Percentage to cost A
1	Cost of hired labour	44,737.15	54.43
2	Cost of Plant protection Chemicals and soil ameliorants	1,113.10	1.35
3	Cost of manures	22,630.20	27.53
4	Cost of tying materials	4,050.11	4.93
5	Land revenue	49.82	0.06
6	Depreciation	1,116.29	1.36
7	Annual repairs	869.93	1.06
8	Interest on working capital	2,779.42	3.38
9	Miscellaneous	4,845.52	5.90
	Cost A	82,191.54	100
10	Interest on fixed capital	870.06	
	Cost B1	83,061.60	
11	Rental value of owned land	4,01,358.10	
	Cost B2	4,84,419.70	
12	Family Labour	46,817.72	
	Cost C 1	1,29,879.32	
	Cost C2	5,31,237.42	
	Cost C3	5,84,361.16	

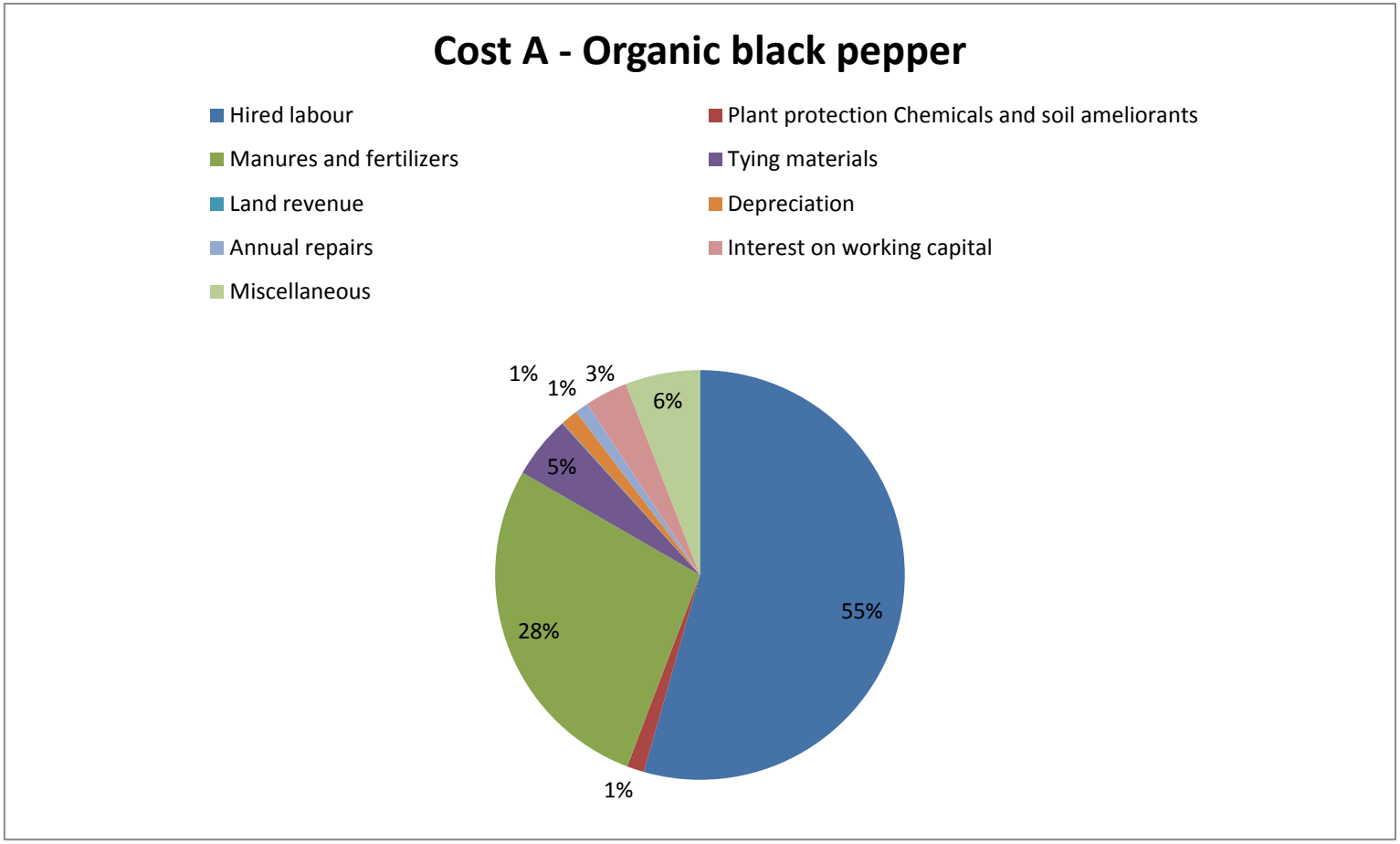


Figure 4: Cost A of organic black pepper

For conventional farmers out of Rs 77,230 estimated as cost A, hired labour was again the highest contributor accounting to 62 per cent and cost of manure and fertilizers occupied the second position accounting to 19 per cent of cost A (figure 5).

Table 20. Cost of cultivation of conventional Pepper in the year 2010-11

Sl. No.	Item	Cost (Rs/ha)	Percentage to cost A
1	Cost of hired labour	47,574.10	61.60
2	Cost of Plant protection Chemicals and soil ameliorants	1,124.53	1.46
3	Cost of manure and fertilizers	14,443.82	18.70
4	Cost of tying materials	4,249.31	5.50
5	Land revenue	38.48	0.05
6	Depreciation	872.65	1.13
7	Annual repairs	749.59	0.97
8	Interest on working capital	2,611.64	3.38
9	Miscellaneous	5,565.79	7.21
	Cost A	77,229.91	100
10	Interest on fixed capital	670.19	
	Cost B1	77,900.10	
11	Rental value of owned land	3,92,191.30	
	Cost B2	4,70,091.40	
12	Family Labour	41,010.14	
	Cost C1	1,18,910.24	
	Cost C2	5,11,101.54	
	Cost C3	5,62,211.69	

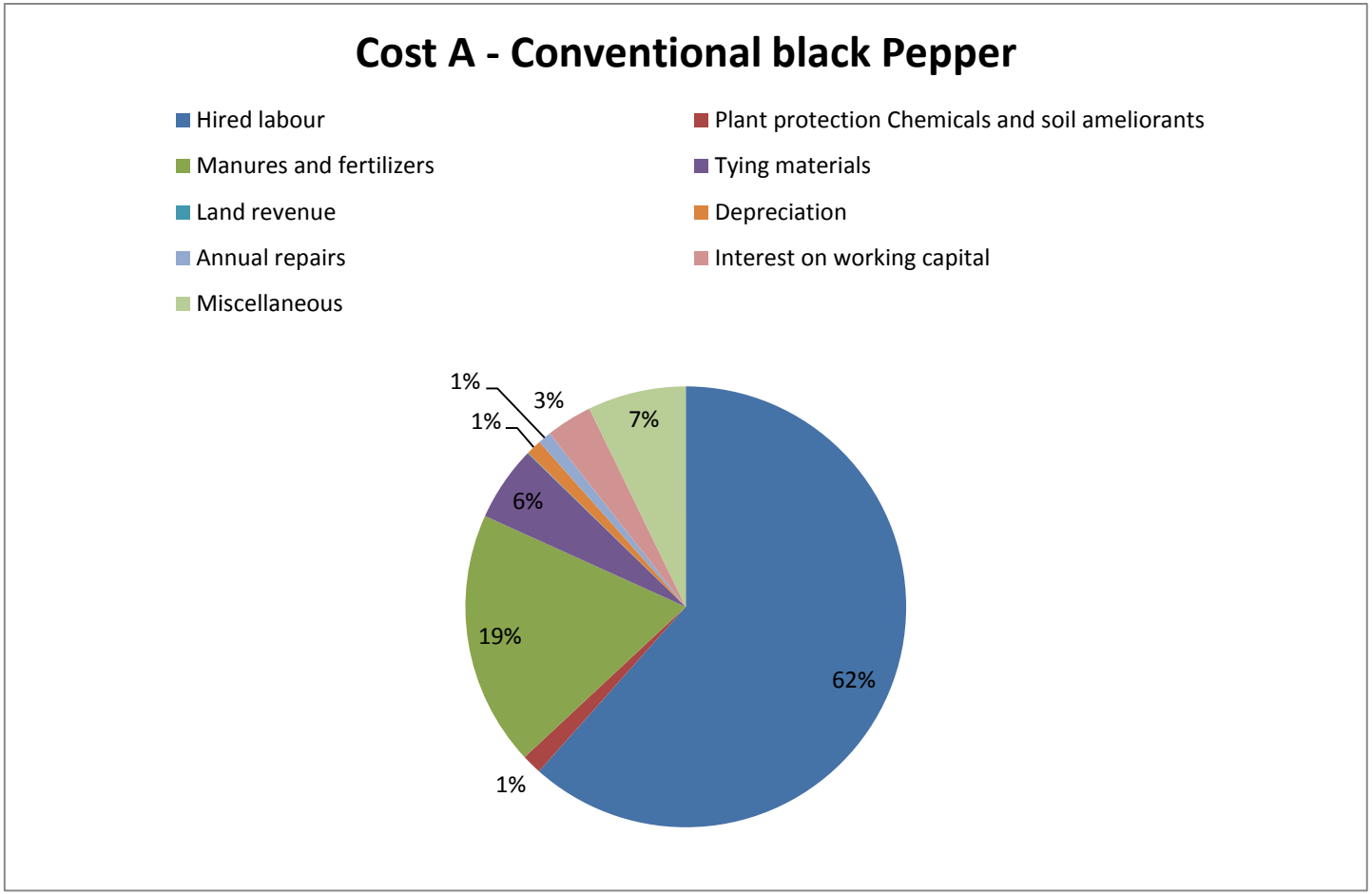


Figure 5: Cost A of Conventional black pepper

Cost B_1, B_2, C_1, C_2 and C_3 were respectively Rs 77,900, Rs 4,70,091, Rs 1,18,910, Rs 5,11,102 and Rs 5,62,212.

From the analysis it can be seen that cost A for organic pepper production was 6.42 percent higher than the cost A of conventional pepper production. The main contributing factor for this difference seems to be the contribution of organic manures (cost of which is 56.68 percent higher in organic pepper production compared to conventional pepper production). But when we look into different cost components of cost A, hired labour cost was more for conventional pepper than organic pepper. So it is clear that the cost involved in organic manures for organic farmers abated the effect of higher cost for hired labour in conventional farmers and made the cost A higher for organic pepper cultivation.

Pratap and Vaidya (2009) also obtained similar results in Wayanad district of Kerala. In contrast to their observation of organic manure as the major contributor to the cost A of organic pepper production, in this study labour cost was found to be the major contributor. This could be attributed to the high wage rate existing in the study area.

There is a huge hike in cost B_2 of both organic and conventional black pepper cultivation which is due to the rental value of owned land. It is estimated at 11 per cent interest of the land value, which is the lending rate of commercial banks for long term loans. The cost of cultivation of pepper estimated by the department of Economics and Satistics of Government of Kerala was Rs 4,03,606 out of which the rental value of owned land was as huge as 3,53,616 (GOK, 2011b).

Cost C was observed to be higher for organic farmers. Here the main contributor is family labour which is slightly higher for organic farming. Since majority of organic farmer had smaller holding compared to conventional, they are using more family labour for various cultivation practices especially for the application of organic manure which is laborious.

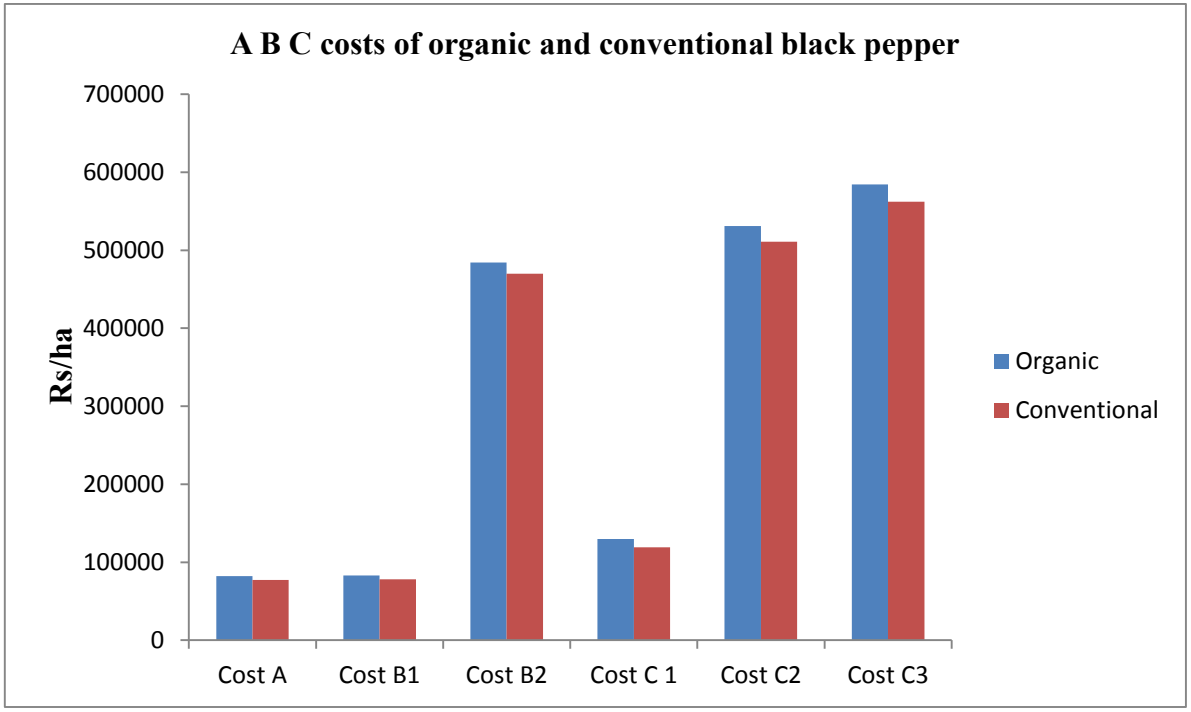


Figure 6. ABC costs of organic and conventional black pepper production

The yield obtained for pepper was slightly lower for organic farms (854 kg per ha) when compared to conventional farms (934 kg per ha). Similar observation was made by Ramesh et al (2010). The organic farmers got a price premium of Rs 400 per kg (3.9 per cent higher) over the conventional farmers, but the margin was insufficient to replace the returns from the higher yield of conventional system. The gross returns (as shown in table 21) obtained by organic farmers was Rs 3, 41,576 per ha which was 5.26 per cent lower than the conventional system (Rs 3, 59,544 per ha). This shows that the higher price of organic pepper does not compensate for higher cost of production and lower yield of pepper.

Table 21. Returns per hectare

Parameters	Organic	Conventional
Yield (kg/ha)	853.94	933.88
Price	400	385
Gross Returns (Rs/ ha)	3,41,576	3,59,544

B – C ratio with respect to cost A was as high as 4.16 and 4.66 for organic and conventional farmer. During the past few years price of pepper is showing an increasing trend including the study period which results in a high B – C ratio. Net ratio and B – C ratio with respect to cost A, B_1 and C_1 provides a comforting picture for both organic and conventional pepper production. They were respectively positive and more than one for both production systems. Net returns was negative and B – C ratio was less than 1, with respect to cost B_2 and C_2 since it includes the cost of land (rental value of owned land) which is a fixed factor of production.

Table 22. Net returns and B – C Ratio

Cost	Net returns (Rs/ha)		B – C ratio	
	Organic	Conventional	Organic	Conventional
Cost A	2,59,384.46	2,82,314.09	4.16	4.66
Cost B1	2,58,514.4	2,81,643.9	4.11	4.62
Cost B2	-1,42,843.7	-1,10,547.4	0.71	0.76
Cost C1	2,11,696.68	2,40,633.76	2.63	3.02
Cost C2	-1,89,661.42	-1,51,557.54	0.64	0.70
Cost C3	-2,42,785.16	-2,02,667.694	0.58	0.64

So it can be concluded that the pepper cultivation through both organic and conventional system was profitable after considering all the paid out cost and imputed value of family labour but not when the value of land is taken into account. And when the both systems are considered, cultivating pepper through conventional system provided more returns compared to organic pepper cultivation.

4.5 Cost of Production

Cost of production was worked out considering the establishment cost and the maintenance cost, since pepper is a crop with long life span and having an initial pre bearing period of two years.

The establishment costs consist of variable cost for the pre bearing period and are given in table 23. The establishment cost of organic pepper cultivation was estimated as Rs 2,10,241 and conventional pepper production as Rs 2,07,297 per hectare. The major contributor to establishment cost was labour contributing 74.65 per cent and 75.84 per cent respectively for organic and conventional pepper production. The total labour cost of establishing pepper vines was lesser in organic cultivation of pepper than conventional cultivation. This is due to reduction in labour for digging pits, establishing standards and vines. Organic farmers do less of digging

around pits as it may damage the roots and make the plant susceptible to foot rot. Some of the organic farmers are trailing pepper in the trees existing in their home garden. This is reflected in the total establishment cost for organic.

Table 23. Establishment cost of organic and Conventional pepper, 2010- 11

Items		**Organic Cost (Rs)**	**Conventional Cost (Rs)**
Labour (hired +family)	Clearing land	777.78	825.00
	Digging pits	15,343.11	18,021.43
	Establishing Standards	10,707.09	13,395.76
	Establishing vines	5,039.66	5,677.68
	Application –manures	13,163.84	7,844.37
	Shading	10,078.05	9,929.92
	Digging around	10,297.68	15,617.07
	Weeding	58,676.61	56,013.20
	Tying of vines	32,851.33	29,885.35
Total Labour (hired +family)		1,56,935.20 (74.65)	1,57,209.80 (75.84)
Cost of planting material		15,506.25 (7.37)	15,024.17 (7.25)
Cost of manures and fertilizers		27,615.06 (13.13)	23,872.62 (11.52)
Cost of shading material		5,523.18 (2.63)	5,255.54 (2.54)
Miscellaneous		466.52 (0.22)	654.75(0.32)
Irrigation		0	745(0.36)
Interest on working capital		4,194.43 (2.00)	4,534.96 (2.17)
Establishment cost		**2,10,240.60 (100)**	**2,07,296.80 (100)**

(Figure in parenthesis represents the percentage to the total)

The next major establishment cost was cost of manures and fertilizers which was 13.13 per cent of the establishment cost for organic pepper production and 11.52 per cent for conventional pepper production. This is due to the high cost and bulkiness of organic manure which is used by the organic pepper growers.

Table 24. Maintenance cost of organic and conventional Pepper, 2010-11

Items		**Organic (Rs/ha)**	**Conventional (Rs/ha)**
Labour (hired +family)	Application – manures	11,378.70	7,829.68
	Plant protection	834.11	839.07
	Weeding	27,791.76	26,587.85
	Cutting Standard	15,900.79	16,006.21
	Harvesting and post harvest charges	35,649.50	37,321.43
Total Labour (hired +family)		91,554.86 (70.49)	88,584.24 (74.50)
Cost of manures and fertilizers		22,630.20 (17.42)	14,443.82 (12.15)
Cost of Plant protection chemicals and soil ameliorants		1,113.10 (0.86)	1,124.53 (0.95)
Cost of tying materials		4,050.11 (3.12)	4,249.31 (3.57)
Land revenue		49.82 (0.04)	38.48 (0.03)
Depreciation		1,116.29 (0.86)	872.65 (0.73)
Annual repairs		869.93 (0.67)	749.59(0.63)
Interest on working capital		2,779.42 (2.14)	2,611.64 (2.20)
Miscellaneous		4,845.52 (3.73)	5,565.78 (4.68)
Interest on fixed capital		870.06 (0.67)	670.19 (0.56)
Maintenance Cost		**1,29,879.30**	**1,18,910.24**

(Figure in parenthesis represents the percentage to the total)

Cost of maintenance shown in table 24 is same as cost C_1 of organic (table 19) and conventional (table 20) pepper cultivation. This cost C1 include cost A, interest on fixed capital and cost of family labour. The maintenance cost for organic pepper for a year is Rs 1,29,879 per ha and for conventional pepper is Rs 1,18,910 per hectare. In the case of maintenance cost labour was the main contributor which accounted to more than 71 per cent for organic pepper growers and 75 per cent for conventional pepper growers followed by organic manures and fertilizers which accounted to 17 per cent and 12 per cent respectively to the total maintenance cost.

The high maintenance cost for organic manures was due to high cost of organic manures and its high application cost due to its bulkiness.

Annualized establishment cost is included along with the maintenance cost to estimate the cost of production. The annuity value estimated was 0.11 with an interest of 7 per cent (interest for agricultural loan) and life period of pepper vines as 15 years as suggested by farmers. The annualized establishment cost worked to Rs 23,126 for organic pepper and Rs 22,803 for conventional pepper production.

Cost of production was worked out considering rental value of owned land and market rent for leased in land. Considering rental value of owned land the cost of production was Rs 649 per kg for organic pepper and Rs 572 per kg for conventional pepper respectively (table 25). When cost of production was worked out considering market rent for leased in land, cost of production (table 26) was Rs 238 and Rs 205 per kg for organic and conventional pepper production respectively.

Table 25. Cost of production black pepper considering the rental value of owned land

Sl. No.	Items	Organic	Conventional
a.	Establishment cost (Rs/ha)	2,10,240.59	2,07,296.82
b.	Annuity	0.11	0.11
c.	Annualized establishment cost (Rs/ha) a X b	23,126.46	22,802.65
d.	Maintenance Cost (Rs/ha)	1,29,879.3	1,18,910.24
e.	Rental value of owned land (Rs/ha)	4,01,358.1	3,92,191.3
f.	Total Cost (Rs/ha) (c+ d+ e)	5,54,363.87	5,33,904.19
g.	Yield per ha (kg)	853.94	933.88
	Cost of production (Rs/kg)	649.18	571.71

Table 26. Cost of production of black pepper considering market rent for leased in land

Items	Organic	Conventional
Establishment cost (Rs/ha)	2,10,240.59	2,07,296.82
Annuity	0.11	0.11
Annualized establishment cost (Rs/ha)	23,126.46	22,802.65
Maintenance Cost (Rs/ha)	1,29,879.3	1,18,910.24
Market rent for leased in land (Rs/ha)	50,000	50,000
Total Cost (Rs/ha)	2,03,005.77	1,91,712.89
Yield per ha (kg)	853.94	933.88
Cost of production (Rs/kg)	237.73	205.29

4.5 RESOURCE USE EFFICIENCY

Cobb Douglas production function was used to work out the resource use efficiency. Five variables namely area under pepper (ha), planting density per ha, cost of manures and fertilizers per hectare, cost of labour per hectare and miscellaneous cost plus cost for plant protection per hectare were taken as independent variables and yield per hectare was taken as dependent variable.

For organic pepper production, the coefficient of determination (adjusted R^2) obtained was 0.60 (table 27) which shows that 60 percent of variation in the dependent variable was explained by the explanatory variables selected. Studies on the relationship between climatic parameters and productivity in black pepper showed that December and January rainfall had negative correlation while April and May rainfall had positive correlation. Minimum temperature had positive correlation in higher elevations while both maximum and minimum temperature had negative correlation with productivity in plains. Results on the extent of relationship between climatic parameters and productivity revealed that maximum and minimum temperature influenced yield more than rainfall or rainy days (Krishnamurthy, 2011). Climatic factors, land fertility, age of the vines and varieties have a strong influence in pepper production and were not accounted in this study and this could be the reason for the low R^2.

Out of the five variables considered the elasticity coefficients of cost of manure and labour was observed to be statistically significant and positive. It indicated that one per cent increase in cost of manure and labour would increase the yield by 0.23 per cent and 0.52 per cent respectively. The returns to scale which is the sum of elasticity coefficients of explanatory variables was 0.8 for organic pepper indicating decreasing returns to scale.

Table 27. Production function for organic and conventional black pepper production

Sl. No	Explanatory variable	Elasticity of production	
		Organic	Conventional
1	Constant	-1.9284	-3.37036
2	Area (ha)	-0.0042	0.0835
3	Planting density	0.3615	0.0015
4	Cost of Manures and fertilizers (Rs/ha)	0.2328*	0.1931
5	Cost of labour (Rs/ha)	0.5218**	0.72*
6	Miscellaneous cost plus plant protection cost (Rs/ha)	-0.2877	0.0035
	Adjusted R square	0.60	0.43
	Returns to Scale	0.80	1.00
	F - value $_{(5,44)}$	15.09**	8.14**

(* significance at 5% level; ** Significance at 1% level)

For conventional pepper production, the coefficient of determination (adjusted R^2) was 0.43 (table 28). This shows that the explanatory variables considered explained only 43 per cent variation in yield in conventional pepper production.

Climatic factors, land fertility status age of vines and varieties as mentioned before were not included in this study and might have significant influence on yield. Elasticity of production of labour was 0.72 and was significant at one per cent level for labour indicating that one percent increase in labour would bring 0.72 percent increase in yield. Other variables were positive but statistically non significant. The return to scale was 1.0 for conventional pepper indicating constant returns to scale.

From both organic and conventional pepper production function elasticity coefficient reveals that further increase in labour would increase the output, but it does not sound logical. This may be because the explanatory variables considered could not explain the variation in yield effectively.

Allocative efficiency is a measure of how an enterprise uses production inputs optimally in the right combination to have maximum profits (Inoni, 2007 as mentioned by Douglas, 2008). The ratio of marginal value of product (MVP) and marginal factor cost (MFC) is used to find the allocative efficiency (table 28). To calculate the marginal value of product, geometric mean of yield per hectare, geometric mean of independent variables, elasticity coefficient and price per unit of pepper were used. The price taken was Rs 400 and Rs 385 respectively for organic and conventional pepper.

The ratio 'k' (MVP/MFC) for manures and fertilizers in organic and conventional pepper production was more than one indicating underutilization and should be increased to enhance the allocative efficiency. The 'k' value for labour was also above one indicating under utilization of labour for organic and conventional pepper cultivation. And 'k' value for miscellaneous cost plus plant protection was negative for organic pepper and less than one for conventional pepper indicating over utilization. When vines of organic farmers are affected by diseases like foot rot, they remove the vines and roots from their field and burn them which involves high cost and this may be the reason for negative 'k' value.

Thus it is clearly understood that the inputs used in both organic and conventional pepper production is not optimal and could be increased further. Organic pepper cultivators should resort to a more cost efficient practice such as using disease resistant varieties of pepper to improve efficiency.

Table 28: Allocative efficiency of organic and conventional black pepper production

Explanatory Variables/ Resources	Geometric mean		MVP		MFC	k	
	Organic ($\bar{Y}$ = 393.73)	**Conventional ($\bar{Y}$ = 451.11)**	**Organic**	**Conventional**		**Organic**	**Conventional**
Area	0.65	0.62	-1015.94	23572.94	-	-	-
Planting Density	801.34	825.41	71.05	0.32	-	-	-
Cost of manures and fertilizers	9067.96	7290.07	4.04	4.60	1	4.04	4.60
Cost of Labour	51653.62	48351.68	1.59	2.59	1	1.59	2.59
Miscellaneous Cost plus Plant Protect-ion Cost	2957.14	3479.43	-15.32	0.17	1	-15.32	0.17

4.6 EXTENT OF ADOPTION OF RECOMMENDED PRACTICES

Extent of adoption of farmers of both organic and conventional was analyzed and is presented in table 29 and 30.

Adoption by organic pepper growers was studied by considering the recommendation of package of practice recommendation (ad hoc) for organic farming published by Kerala Agricultural University (2009). For organic black pepper, the major practices recommended are use of resistant or tolerant variety, solarisation of the potting mixture, treatment of cuttings with biocontrol agents, application of farm yard manure/ vermicompost/ compost or other organic manures and biofertilizers, collection and destruction of pest (egg, larvae, pupae, and disease affected plants), use of biopesticides and natural enemies. But the only practice followed by organic

farmers was the use of organic manures like dried cow dung powder / farm yard manure/ vermicompost. The recommended organic manures are 10kg of cattle manure/ compost/ green leaves, 0.5 kg ash and one kg neem cake/ plant just at the onset of southwest monsoon and 5 kg farm yard manure (FYM), 0.5 kg ash and one kg neem cake/plant at the onset of north east monsoon. Farm yard manure could be substituted with vermicompost, and in that case the quantity needed would be half. Thus it makes a total of 15 kg cattle manure/ compost/ green leaves or 7.5 kg vermicompost, 2 kg neem cake and 1 kg of ash. Biofertilizers such as Azospirillum (25g/plant) and Phosphobacter (25g/plant) are also recommended.

A perusal of table 29 shows that out of the 50 farmers studied under organic pepper production system, 86 per cent farmers used cattle manure/ farm yard manure (FYM). They applied 4.81 kg per vine making their adoption rate 32 per cent of the recommendation. But when the adoption was worked out for whole sample, adoption was 27.5 per cent of the recommendation. Sixteen per cent of the farmer adopters used vermicompost and they adopted nearly 50 per cent of the recommended level. Thirty per cent of the farmers used neem cake and 4 per cent of them used ash. The average extents of adoption by farmer adopters were respectively 20.14 per cent, and 79 per cent respectively. When the whole sample was considered the average extent of adoption was 27.5 per cent, 3.98 per cent, 6.04 per cent, and 3.16 per cent respectively for FYM, vermicompost, neem cake, ash. This shows that the extent of adoption of recommended practice by organic farmers is very low in the study area. Thus among the farmer adopters the average adoption application of recommended manures worked out to 45 percent but when sample of organic farmers as a whole is considered, the extent of adoption is only 10 percent.

Also there are 3 farmers among the organic farmers who used bio control agents such as *Trichoderma* and *Pseudomonas* and one farmer who used fish meal trap. But it was observed that 16 per cent of the famers used manures such as bone

meal which is not recommended and is certainly contributing to the production of pepper.

Table 29. Extent of adoption of the manures by organic pepper growers

Items	FYM	Vermi-compost	Neem Cake	Ash	Total
No. of farmers	43 (86)	8 (16)	15 (30)	2 (4)	
Recommended level (kg/vine)	15	7.5	2	1	
Average adopted rate by farmer adopters (kg)	4.81	3.73	0.4	0.79	
Average extent of adoption of farmer adopters (%)	32.09	49.75	20.14	79	45.15
Average adopted rate by sample farmers (kg)	4.13	0.6	0.12	0.03	
Average extent of adoption sample farmers (%)	27.50	3.98	6.04	3.16	10.19

*(Figures in parenthesis represent the percentage to the total no. of sample organic farmers)

For conventional pepper production also organic manures constitute a major portion as per recommendation by KAU. Recommendation composed of Cattle manure/ compost/ green leaves at rate of 10 kg per plant per annum and the nutrient dosage is 50:50:100 g/vine/year of $N:P_2O_5:K_20$.

From table 30 it can be seen that all farmers were applying farmyard manure indicating that they prefer organic manure to chemical fertilizers. Average adoption rate of farmer adopters were less than recommended rate for all nutrients except N where we could see excess adoption (116.96 per cent). The overall adoption rate of manures and fertilizers by farmer adopters were 72.17 per cent. When the whole sample of farmers was considered overall adoption rate of nutrients was only 21.72 per cent and even in the case of N it comes to only 25. 72 per cent

Among conventional farmers also the practice of application of bone meal was observed.

Table 30. Extent of adoption of manures and fertilizers by conventional pepper growers

Items	N	P	K	FYM	Total
No. of farmers	11 (22)	11(22)	6 (12)	50(100)	
Recommended level (kg/vine)	0.05	0.05	0.10	10.00	
Average adopted rate by farmer adopters (kg)	0.058	0.034	0.058	4.48	
Average extent of adoption farmer adopters (%)	116.90	68.65	58.3	44.84	72.17
Average adopted rate by sample farmers (kg)	0.012	0.0076	0.007	4.48	
Average extent of adoption sample farmers (%)	25.72	15.10	1.20	44.84	21.72

(Figures in parenthesis represent the percentage to the total no. of sample conventional farmers)

4.7 CONSTRAINTS

Understanding the constraints of famers is very important for various reasons. It helps the scientific community in directing changes in cultivation practices, formulating research and for the economists in suggesting suitable policy measures. Out of the plausible constraints provided farmers ranked the ones they felt most serious. Using Garrets ranking technique those ranks were converted into Garrets score and are provided in Table 31. The corresponding rank according to the score is also provided in the table.

Variation in climate was the most serious constraint faced by organic pepper producers followed by diseases and pest of pepper and labour problems. The other important constraint identified are price of produce, disease and pest attack of standards, obtaining high yielding and resistant planting materials, availability of organic manures, availability of organic pesticides and insecticides, etc.

Table 31. Constraints faced by organic and conventional pepper growers

S. No.	Constraints	Organic		Conventional	
		Garrett's Score	Rank	Garrett's Score	Rank
1	Availability of high yielding and resistant planting materials	17.86	VI	18.9	VI
2	Standards used - diseases and pest attack	26.92	V	20.28	V
3	Standards other problems	5.9	XI	12.96	VIII
4	Pepper - diseases and pest	42.84	II	34.76	IV
5	Pepper - other problems	8.74	IX	15.06	VII
6	Availability of organic manure	13.4	VII	8.98	IX
7	Availability of organic pesticides and insecticides	11.94	VIII	0	
8	Availability of biofertilizers and bio control agents	5.12	X	0.4	XII
9	Labour problems	37.92	III	40.7	II
10	Variation in climate	50.6	I	45.76	I
11	Availability of market	4.28	XII	1.12	XI
12	Price of produce	27.76	IV	34.94	III
13	Other marketing problems	2.92	XIII	3.04	X

For conventional pepper growers also variation in climate was the most serious constraint. Unlike the organic pepper cultivators the next major constraint faced by them was labour problems such as lack of availability and high wage rate, followed by price of the produce. According to them disease and pests of pepper, diseases and pest of standards, availability of high yielding and resistant planting materials are also major constraints.

From the study it is clear that climate is an important factor in pepper production irrespective of whether it is under organic or conventional production system. Disease and pest of pepper is ranked second by the organic pepper growers and fourth by the conventional pepper cultivators. This could be because organic farmers could not use the chemicals which the conventional farmers used. Suitable alternatives like bio control agents are not much popular among organic farmers. Problems associated with labour such as high wage rate and dearth of labour even at this high wage rate was considered a serious problem by conventional farmers and was ranked second. Majority of organic pepper were having smaller holdings of land and dependent more on family labour than hired labour compared to conventional farmers and this may be the reason why labour problems was ranked third by them after the diseases and pest of pepper. Diseases and pest attack of standards and availability of high yielding resistant planting materials were ranked fifth and sixth by both organic and conventional farmers.

Price fluctuations of the pepper are also a serious concern for the both organic and conventional farmers albeit a high price during the study period. The high variation of price in the past along with apprehension over future price made them rank this constraint high. Farmers demanded a stable price fixed for few years, since bumper harvest is always followed by low price and scanty harvest will be followed by high price. So farmers cannot take advantage of both situations. Farmers were concerned about the international aspects of marketing, the practice of import of pepper from other countries to be again exported mixed with good quality pepper produced in the state. This will diminish the quality of Indian pepper and may indirectly affect the high price offered for Indian pepper at international market.

4.8 MARKETING

The marketing of farm commodities is as important as production. Hence an attempt was made to study the marketing of organic and conventional pepper in the district.

4.8.1 Marketing and Price Spread Analysis of Organic Black Pepper

Marketing of organic pepper is not well developed. Marketing of organic pepper in the district is mostly NGO centered. KADS, PDS organic spices, and MASS are the major NGO involved with organic farming in the district. One among the NGOs, Kerala Agricultural Development Society (KADS) was not actively involved with pepper marketing. They were not successful in exporting the commodity and could not sustain the premium price they provided and hence farmers under them in the area of study depended on conventional marketing channel. Other two NGOs were actively involved in pepper marketing and had been exporting pepper for the past few years. The marketing channel is shown in figure 7.

Figure 7. Marketing Channel of organic black pepper

The price spread analysis of organic pepper is provided in the table 32. From the table, it can be seen that the margin or price premium for organic pepper was Rs 15 over domestic market price of conventional pepper. Also from the table it is clear that the transportation cost is borne by the NGO. They collect the produce from the

village level collection centre and bring it to the factory. Although the produce is collected frequently from the farmer, it would have to be stored till the demand comes. But price of the commodity is given to farmers on the spot. The storage cost incurred by the NGO is Rs 8 per kg. Loss of 15 per cent is incurred while cleaning, grading and processing at NGO level. The cost of certification is borne by the NGO and the fair-trade cost and other cost such as the wages of the employees in the internal control system (ICS) accounts to Rs 15. The processing and packaging cost amounts to Rs 25. Other overhead expenses such as salaries, electricity, vehicle transport cost, promotional activities, etc. comes to average of Rs 35 per kg. Along with other cost such as freight, custom clearance, analytical charges, Export Credit Guarantee Corporation (ECGC) cover, Cost Insurance Freight (CIF) commission, the total marketing cost was Rs 192 and along with a profit of 10 per cent the marketing margin or the price spread was calculated as Rs 232. Since the commodity is exported to USA, Europe, etc., channel and price spread beyond this level could not be worked out.

Table 32. Price spread of organic black pepper

Sl. No.	Particulars	Amount (Rs/kg)
1.	**Producer**	
A	Price received by producer	400
2	**NGO**	
a.	Purchase price	400
b.	Transportation Cost	3
c.	Storage cost	8
d.	Processing loss	60
e.	Cost for Organic certification and ICS including salary, wages, DA, fair-trade cost	15
f.	Processing and packaging expense (electricity, firewood, water, salaries, wages	25
g.	Overhead expense (salaries, electricity, vehicle transport cost, staff DA, promotional activities)	35
h.	Transport	16
i.	Transfer, freight, export charges, custom clearance, analytical charges	9
j.	ECGC cover	1
k.	CIF Commission	20
l.	Total marketing cost (b+c+d+e+f+g+h+i+j+k)	192
m.	Profit	40
n.	Marketing margin (l+m)	232
o.	Sales price	632
	Price spread	232

4.8.2 Marketing Channel and Price Spread Analysis of Conventional Black Pepper.

Marketing channels of conventional pepper is shown in fig 5 and fig 6. Out of the 50 conventional farmers covered in the study, 23 farmers sold their produce to village level traders, 19 sold to wholesale merchant directly and 8 have not sold their produce for the past few years. In India, pepper has a large domestic market along with an international market. The domestic marketing channels are provided in fig 8. Farmers or producers sell commodity to both village traders and wholesale merchants. From the village traders the produce moves to wholesale merchants. In most of the cases, wholesale merchants collect the produce from village trader bearing the transportation cost rather than the village trader going to wholesale merchants. This is because there was a dearth of the commodity since the overall production was low and at the same time the price was moving high. Black marketing is common in black pepper. There are a group of people who could be called as brokers who collect the produce from the village trader and sell it to merchants in North India. Since they are not working visibly further information could not be collected. Also they are traders from Tamil Nadu who collect the produce mostly from wholesale merchants at a high price than the domestic price. They black market it through the border and sell it again to merchants of North India making huge profits and the pepper farmers are not benefitted. There are other internal wholesalers who provide the commodity to industries, domestic market in Kerala and again to merchants in North India, as there is a huge demand for pepper in the North India.

Along with that, the influence of commodity market/futures trading is strong in pepper marketing and price determination in this crop is mainly done through the commodity market/futures trading. There are regional exchanges and national exchanges dealing with the futures trading of pepper. The regional exchange is Indian Pepper and Spice Trade Association (IPSTA) located in Mattanchery, Cochin and the national exchanges are National Multi Commodity Exchange of India Ltd. (NMCE),

Ahmedabad, Multicommodity Exchange of India (MCX), Mumbai, National Commodity and Derivative Exchange (NCDEX), Mumbai. With the rise of futures trading a new class of intermediaries emerged known as the processor traders. They collect the produce from village traders and wholesale merchants to process (garbling) it and sell it through the commodity exchange or others traders/ hedgers involved in futures trading. One can trade in commodity exchange only as a member of securities or brokers like JMG securities, Bonanza, etc. Buying and selling takes place in the commodity exchange through these securities. When it comes to delivery and purchase of the produce, it has to be done in the warehouse associated with the commodity exchange. Warehouses of Central Warehousing Corporation (CWC) in Kochi, Calicut, Thrissur, Malappuram and Kottayam are approved by national exchanges for pepper delivery and procurement. Because of the recent hike in price a large no of people are involved in this and pepper has now become the 'black gold' of futures trading.

The price spread along the marketing channels described above could not be studied because of resource and time constraint. The channels are complex and a separate study on the marketing of pepper should be done to obtain a clearer picture of the marketing system.

But Idukki district being a tourist hot spot in the state, a number of retailers catering to the tourist could be observed in the study area. Hence the channel involving them was studied and is given in figure 8.

The channels catering to the international market is described in fig 9. It involves the village trader, the upcountry wholesale merchant, brokers and the exporters. Exporters also depend on the commodity exchange to meet the demand.

The price spread analysis of conventional pepper warrants another detailed study. In this study, price spread analysis of only one channel existing in the district was done. This is mainly tourist oriented channel and retailers do the cleaning and

processing and obtain huge profit ranging from 30 to 60 percent profit depending on the origin and nationality of the customer. The marketing cost for the retailers accounted to nearly Rs 50 per kg and average profit worked out to Rs 155 per kg. Thus marketing margin on retailers was Rs 204 per kg. Although village trader is also playing a part in the marketing of pepper, their role contribution to price spread is not significant. The price spread of this channel was worked out to Rs. 208 per kg and the producer's share in consumer rupee was 64.70 per cent.

Fig 8. Marketing channel of conventional black pepper – domestic

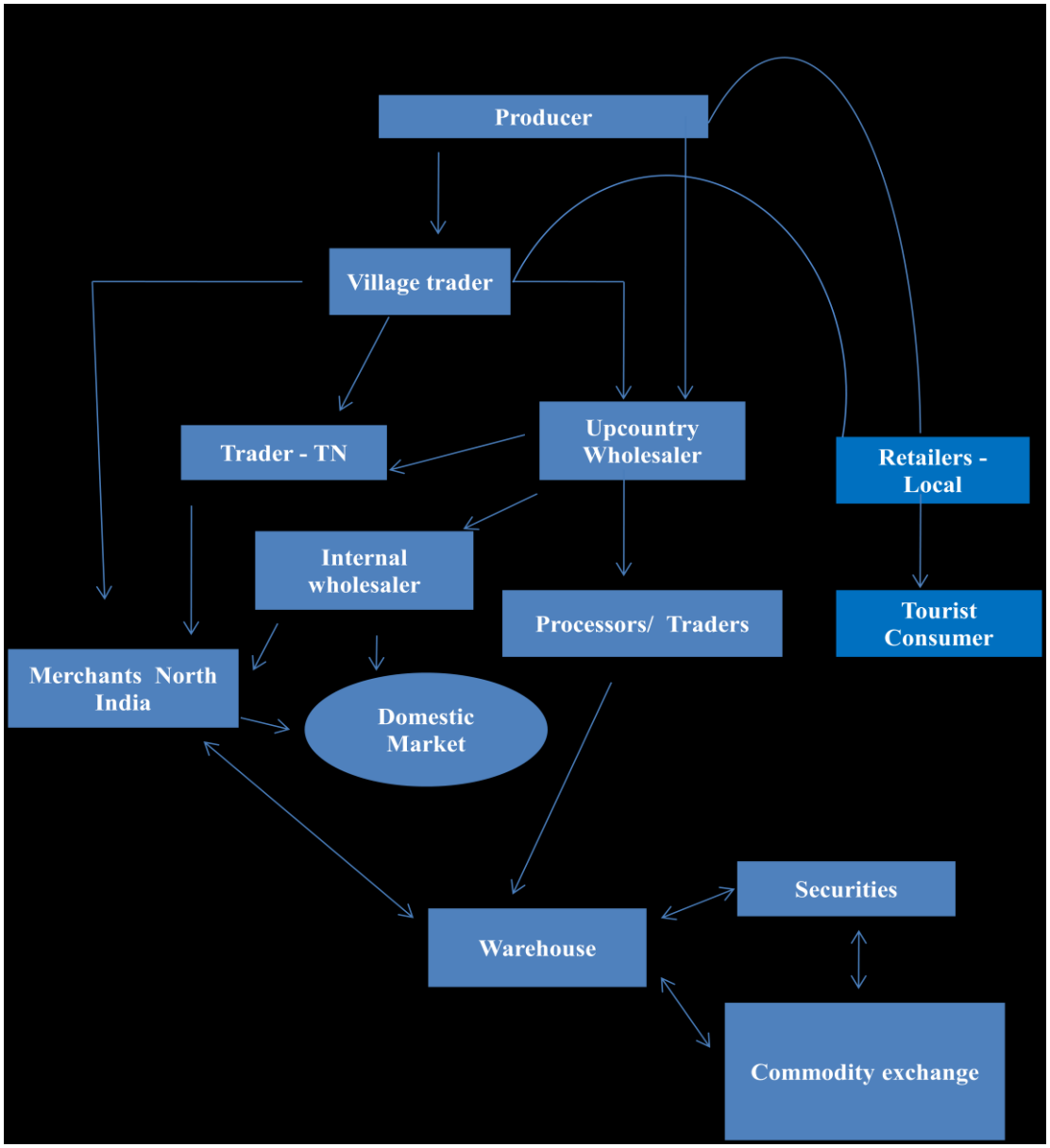


Fig 9. Marketing channel of conventional black pepper - International

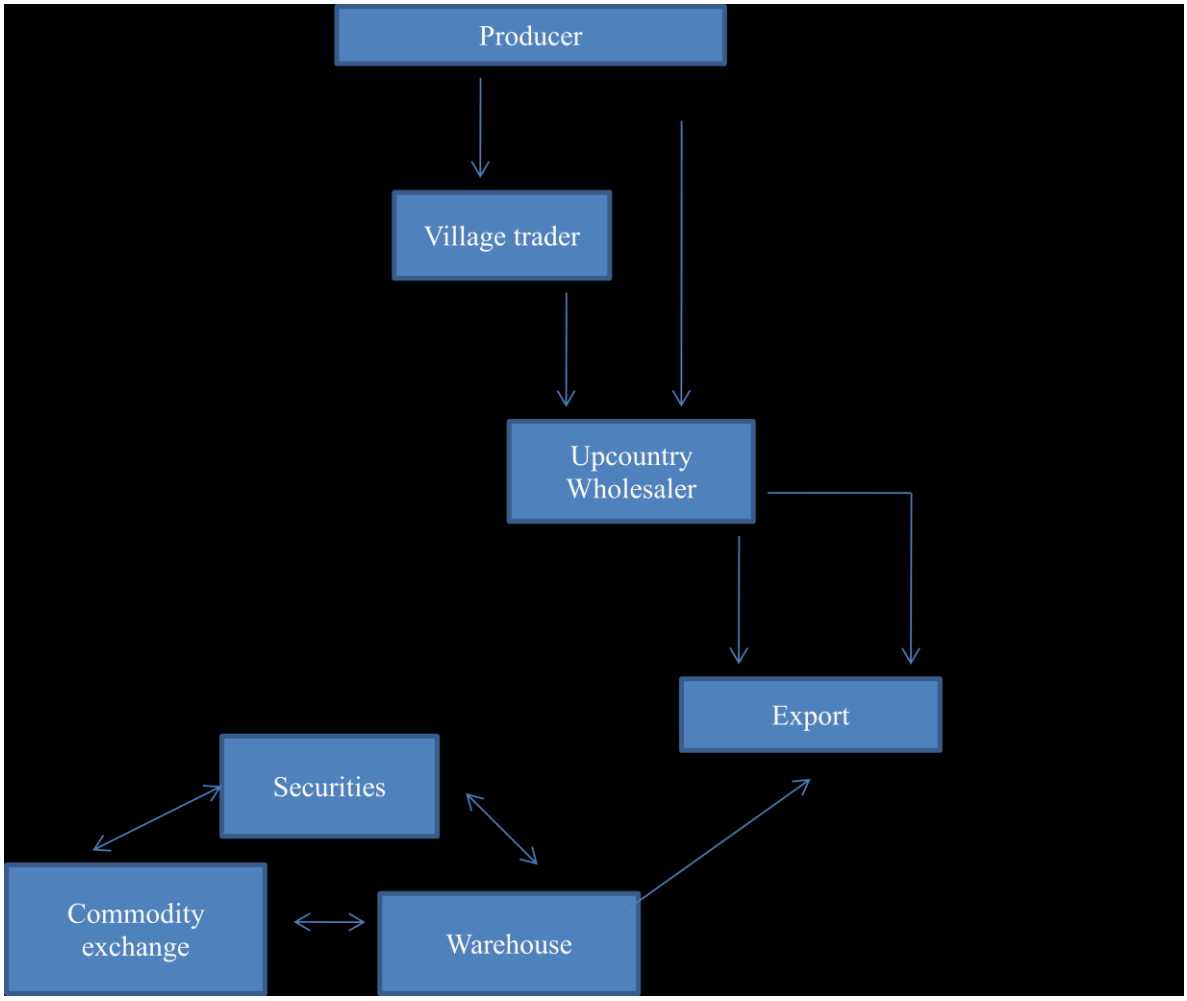


Table 33. Price spread of local marketing channel of conventional black pepper

Sl. No.	Particulars	Amount (Rs/kg)
1.	**Producer**	
a.	Price received	385
b.	Transport cost	2
c.	Net price received	383
2.	**Village trader**	
a.	Purchase price	385
b.	Storage and cleaning cost	1.00
c.	Profit	1.00
d.	Marketing margin	2
e.	Sale price	387
3.	**Retailer**	
	Purchase price	387
	Transport cost	0.50
a.	Cleaning and processing charges	30
b.	Packaging charges	10
c.	Transport cost	1.00
d.	Rent	3.00
e.	Miscellaneous	5.00
f.	Marketing cost	49.50
	Average Profit	154.80
	Marketing margin	204.3
	Sales price	591.3
	Price spread	208.3

Summary and conclusion

5. SUMMARY AND CONCLUSION

Idukki district is a major producer of black pepper in the state contributing 68 per cent to the total production of the state. The district also has a large number of organic famers producing black pepper. The present study was an attempt to understand the organic and conventional pepper production system in the district. The objectives of the study were

1. To study the economics of organic and conventional black pepper production.
2. To study the resource use efficiency of organic and conventional black pepper production.
3. To study the extent of adoption of recommended practices by organic and conventional black pepper cultivators.
4. To study the constraints faced by the farmers in black pepper production and marketing.
5. To study the marketing system of both organic and conventional black pepper.

The study was done in Azutha and Kattapana block of Idukki district. Data on general characteristics of the farmers and cropping pattern were collected. Percentages and averages were used to study the above features. Cropping intensity was also worked out. Cost of cultivation was worked out using the A B C cost concepts. Since pepper is a perennial crop, cost of production was studied by considering establishment cost (cost during pre bearing period). The establishment cost was amortized by multiplying it with annuity and an annualized establishment cost was obtained. This cost was added to the maintenance cost to obtain the total cost. Cost of production was worked out in two ways using rental value of owned

land and market rent for leased in land. Allocative efficiency of the resource was estimated using Cobb – Douglas production function. Extent of adoption of recommended practices by organic and conventional pepper growers were analysed. Constraints faced by organic and conventional pepper growers were also studied. Marketing channel of both organic and conventional pepper was identified and price spread was calculated for organic and conventional marketing channel.

5.1 The salient findings of the study are presented below

1. Average age of organic pepper growers was 51 years and that of conventional farmers was 52 years. For organic farmers maximum concentration of farmers was observed in the age group of 36- 50 years (54 per cent) and the maximum number of conventional farmers was observed in the age group of more than 50 years which accounted to 60 per cent of the total.

2. None of the farmers were illiterate and almost all of them had more than primary level of education. Maximum number of organic and conventional pepper cultivators had secondary level of education which was respectively 42 per cent and 44 per cent followed by higher secondary level (32 per cent and 24 per cent respectively).

3. The average experience of organic farmers was 28 years and it was 31 years for the conventional farmers. Respondents with a farming experience of up to 10 years were found to be more (14 per cent) among organic farmers, while it was only 6 percent among conventional farmers. But reverse is the case in the age group of 41 – 50 years and more than 50 years, where conventional farmers were more in number than organic farmers.

4. Distribution of farmers according to family size showed that 50 per cent of organic and 58 per cent of the conventional farmers had small family size with less than 5 members. Average size of family of organic and conventional farmers did not show much difference.

5. The average holding size for organic and conventional farmers were respectively 1.38 ha and 1.44 ha. Maximum number of organic farmers had land holding size of less than one ha (38 per cent) followed by 1 – 2 ha (36 per cent). None of the organic farmers had holding size above 4 ha. But maximum number (44 percent) of conventional farmers had land holding size ranging from 1 – 2 ha. While only 32 per cent had less than one ha and 8 per cent had more than 4 ha.

6. The distribution of farmers according to annual income of households showed that the maximum number of organic and conventional farmers falls under the category of 2 – 4 lakhs rupees followed by 1 – 2 lakhs rupees. Average annual income of both the group were respectively Rs 4,02,995 and Rs 3,95,463.

7. About 50 per cent of the area of organic farmers and more than 53 per cent of the area under conventional farmers were under pepper cultivation. Next major crop under organic farming was cocoa occupying 12.83 per cent of the cropped area, followed by coffee, clove, nutmeg, coconut, and arecanut. For conventional farmers coffee occupied the second position (11.10 per cent), followed by cocoa, coconut, clove, cardamom and nutmeg.

8. The cropping intensity of organic farms worked out to 143 per cent and for conventional farms it was 125 per cent.

9. For organic pepper cost A was worked out to Rs 82,192 of which hired labour accounted to about 54 per cent, followed by cost of manures which worked out to 28 per cent of cost A. Cost B_1, B_2, C_1 and C_2 were respectively Rs 83,062, Rs 4,84,420, Rs 1,29,879 and Rs 5,31,237 respectively. Cost C_3 was worked out by adding 10 per cent of cost C_2 to C_2, and it was worked out as Rs 5,84,361.

10. For conventional pepper out of Rs 77,230 estimated as cost A, hired labour was again the highest contributor accounting to 62 per cent and cost of manure and fertilizers occupied the second position accounting to 19 per cent of cost A. Cost B_1,

B_2, C_1, C_2 and C_3 were respectively Rs 77,900, Rs 4,70,091, Rs 1,18,910, Rs 5,11,102 and Rs 5,62,212.

11. The gross returns obtained by organic farmers was Rs 3, 41,576 per ha which was 5.26 per cent lower than the conventional system (Rs 3,59,544 per ha). B – C ratio with respect to cost A was as high as 4.16 and 4.66 respectively for organic and conventional farmer.

12. The establishment cost of organic black pepper production was estimated as Rs 2,10,241 and conventional pepper as Rs 2,07,297 per hectare. The maintenance cost for organic black pepper production for a year was estimated as Rs 1,29,879 per ha and for conventional pepper cultivation it was Rs 1,18,910 per hectare.

13. The cost of production worked out to Rs 649 and Rs 572 per kg for organic and conventional pepper respectively when rental value of land was considered. Since the practice of leasing the land was observed among few farmers in the study area cost of production was analyzed considering the market rent for leased in land also and it worked out to Rs 238 and Rs 205 for organic and conventional pepper production respectively.

14. Five variables namely area under pepper (ha), planting density per ha, cost of manures and fertilizers per hectare, cost of labour per hectare and miscellaneous cost plus cost for plant protection chemicals were considered for the analysis of resource use efficiency. The coefficient of determination (Adjusted R^2) obtained for organic and conventional pepper production was 0.60 and 0.43 respectively.

15. Two variables, cost of manures and cost of labour were found to be contributing significantly to organic pepper production while only one variable cost of labour was found to be significant for conventional pepper production.

16. The returns to scale for organic pepper production was 0.80 which indicated decreasing returns to scale and for conventional pepper production it was 1.00 indicating constant returns to scale.

17. From the allocative efficiency analysis it is understood that the inputs used in both organic and conventional pepper production is not optimal and could be increased further.

18. Ten per cent and 22 per cent of the recommended practices were only adopted respectively by conventional and organic pepper growers.

19. Climate, diseases and pests attack and labour were identified as the major constraints by both organic and conventional farmers. High variability in price was identified as the major marketing constraint by both types of farmers.

20. Single export oriented marketing channel was observed for organic pepper and price spread worked to Rs 232 per kg.

22. Marketing channels for conventional pepper was complex and price spread could be worked only for the local channel. The channel was Producer – village trader – local retailer – consumer (tourist) and the price spread was Rs 208 per kg. The producer's share in consumers' rupee was 64.70 per cent.

5.2 Conclusion

From the present study it was observed that the cost of cultivation per hectare of organic pepper was Rs 82,192 and that of conventional pepper was Rs 77230. It was also observed that organic farmers are getting 8.5 per cent lower yield than that of conventional producers. The cost of production in organic pepper is higher which was mainly due to higher cost of organic manure and more labour requirement for its application. NGOs popularizing organic cultivation in the area used to purchase organic pepper with a nominal margin of Rs 15 over the market

price of conventional pepper. Even with this higher price of organic pepper the net returns and benefit cost ratio of organic pepper production were lower than conventional pepper production.

From allocative efficiency analysis it was understood that labour and manure is underutilized in both organic and conventional pepper production system. The extent of adoption of manure by organic pepper growers was lower than the extent of adoption of conventional pepper producer. So if adoption rate is increased by organic farmers, yield can be enhanced considerably.

Many of the farmers are unaware of the various organic formulations to control pests and diseases. So extension measures should be strengthened to improve organic pepper production. Marketing channel of conventional pepper was complex and needs a separate elaborate study but in the case of organic pepper, NGO functioning in the area are purchasing from organic pepper producers. To get higher price for organic pepper, marketing system should be strengthened.

Policy options

India once a leader in pepper production and export has become a laggard now. India has lost its leadership in export and trade to other countries. Our country has the disgrace of largest area and lowest productivity. It is high time for India to regain its lost glory.

First and the foremost step which can be done is to enhance productivity. This can be achieved through the development of location specific high yielding varieties. India's production is too low to meet both the domestic and international demand. Hence production should be increased. It is reported that two fifths to one half of the pepper vines in the pepper gardens of the state is in declining phase and needs urgent replanting, and rejuvenation. So mass multiplication and supply of quality planting materials is an urgent need of the hour. Government support, especially in the form of

institutional credit and incentives, be given to women and unemployed youth after giving proper training to establish a net work of nurseries including tissue culture propagated ones, from where reliable quality planting materials could be accessed by the farmers to meet, rejuvenation and replanting needs of pepper gardens. These varieties should be resistant to diseases and pests attack and tolerant to changes in climate. A farmers variety 'Kumbukkal selection' available in Azutha block which is said to be resistant to foot rot by farmers in the area should be supplied for cultivation on large scale.

The institutions under the Kerala Agricultural University and Indian Institute of Spices should be able to provide the necessary back up especially in supplying high quality parent materials for propagation.

Assured availability of organic manures was observed as a constraint and should be rectified by encouraging farmers to start vermicompost unit or raising livestock by government support.

Climatic factors have a huge role in pepper production and have affected the production of not only India but also countries like Indonesia. Variation in climatic factors cannot be avoided. But farmers can be facilitated with provisions to overcome this variation. Consequence of prolonged drought could be avoided by improving irrigation facilities. Subsidies for constructing water harvesting structures should be provided to farmers.

Also location specific research should be conducted to develop high yielding varieties with tolerance to climate changes. It is vital to link the scientific community to farmers. Researchers should be in constant touch with the farmers and should orient the research towards the problems of the farmers.

The Kerala Agricultural University should develop a package of practices suited to different agro ecological zones for rehabilitating pepper vines and pepper gardens taking a holistic view of the resource system that sustains pepper in such systems.

Future of export in pepper is organic oriented. As revealed from the study majority of the conventional farmers are also organic by default. So government should increase the extension measures to promote the recommended organic cultivation practices so as to get organic certification by the farmers and thus increase productivity of organic pepper vines. Organic marketing in the district is under the monopoly of few NGOs. Since the cost of cultivation of pepper using organic cultivation practices is higher than using inorganic fertilizers, price margin is not sufficient to maintain them in the field. Takur and Sharma (2005) had reported that organic produce fetches 3 to 4 times higher prices than those paid for inorganic produce in crops like maize, wheat, rice and vegetables. So government should take immediate action to strengthen the marketing machinery so that the organic pepper farmers get premium price for their produce.

Pepper experienced the largest fall in prices, both in proportion and magnitude, during the second half of the nineties along with other agricultural commodities grown in Kerala. During 1991 and 1993 pepper prices hovered around Rs. 50 per kg. Since then it moved upwards to reach Rs. 251 in 1999. And then price fell to Rs. 70 in 2000. And it has nearly reached the peak of Rs 400 by the mid of 2012. Farmers demanded a stable price fixed for few years, since bumper harvest is always followed by low price and scanty harvest will be followed by high price. So farmers cannot take advantage of both situations. The price fluctuation is high in this crop and hence requires the intervention of government for stabilizing the price. For this warehouses must be started in major pepper producing areas, so that they can sell at times of high price. Futures trading in pepper should also be strengthened to avoid price risk and the benefits should be transferred. Farmers should be made aware of the futures trading and they must be encouraged to participate in the trading process by forming farmers cooperative.

Pepper based agro business units for value addition should be promoted. This will benefit the farmers to harness the high price in international

market. Small holders can operate on cooperative basis and do value addition, this can enhance the net income they receive.

Indian pepper has a reputation of superior pungency, aroma and flavour. Branding the pepper with geographical indication along with promotion of organic farming will fetch a high price in the international market. This high price should reach the farmers and black pepper should turn out to black gold for the real producer too.

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Appendices

APPENDIX – I (a)

KERALA AGRICULTURAL UNIVERSITY

DEPARTMENT OF AGRICULTURAL ECONOMICS

COLLEGE OF AGRICULTURE, VELLAYANI

SCHEDULE

ECONOMICS OF ORGANIC AND CONVENTIONAL PEPPER PRODUCTION IN IDUKKI DISTRICT

Block - _____ Village - _____ Taluk - _____

I. GENERAL INFORMATION

Name: _____ Age: ____ Education: _____ _____

Occupation: a) Main _____b) Subsidiary _____

Annual Income: a) Main _____ b) Subsidiary _____

No of family members: _____ Farming experience: _____

Address

Phone no.

II. INVENTORY OF RESOURCES: LAND

S.NO	PARTICULARS	
1.	Area owned	
2.	Net cropped area	
3.	Area under pepper	
4.	Value of owned land	
5.	Land revenue	

III. PEPPER

Area under pepper	Year of planting	Variety grown	Standard used	No of pre bearing vines	No of bearing vines	Production	Price

IV. BUILDINGS AND OTHER STRUCTURES

S. No	Particulars	No.	Value (Rs)	Expected life	Maintenance cost

V. FIXED CAPITAL

S. No.	Particulars	No.	Year of purchase	Value	Expected life	Annual operation & maintenance cost	Depreciation	Remarks
1.	Mammatties							
2.	Pikckaxe							
3.	Spades							
4.	Sprayers							
5.	Vaakathi							
6.	Ladder							
7	Others							

VI. LIVESTOCK

S. No.	Type of animal	Total no.	Yield	Returns

VII. LAND USE PATTERN AND CROPPING PATTERN

S. No	Area /No.	Irrigation	Cost of planting	Cost of maintenance	Other cost (harvest and post harvest)	Yield	Income
Cardamom Coconut Arecanut Banana Clove Ginger Others 1. 2. 3.							

VIII Cost of cultivation

a) Material cost

			1st year		2nd year		3rd year		4th year		5th year		6th year		7th year	
Sl no.	Item	Rate	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
1	Standards															
2	Pepper cuttings															
3	Organic manures a) b) c) d)															
4	Fertilizers a) b) c)															
5	Tying materials															

6	Shading material															
7	Liming material															
9	Plant protection chemicals															
10	Irrigation															
11	Weedicides															
12.	Miscellaneous															

b) Labour cost

Wage rate: Men - _____; women - _____ (FL - Family labour; HL – Hired labour; ML – Machine labour)

	1st year			2nd year			3rd year			4th year			5th year			6th year			7th year		
Items	FL	HL	ML	FL	HL	ML	FL	HL	ML	FL	HL	ML	FL	HL	ML	FL	HL	ML	FL	HL	ML
Clearing the land																					
Digging pits for standards																					
Planting standards																					
Establishing pepper vines																					

Application of organic manures																				
Fertilizers application																				
Digging around standard																				
Shading																				
Weeding and mulching																				
Tying of vines																				
Cutting and training standards																				
Application of plant protection chemicals																				
Application of lime																				
Irrigation																				
Harvesting and post harvesting																				
Miscellaneous																				

APPENDIX – I (a)

KERALA AGRICULTURAL UNIVERSITY

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SCHEDULE FOR MARKETING INTERMEDIARIES

I Type of intermediaries:

II Basic details a) Name & address :

S No	Particulars	Cost
1.	Labour unloading	
2.	Cleaning	
3.	Grading	
4.	Packaging	
5.	Packaging & Grading	
6.	Storage	
7.	Rent	
8.	Transport cost	
9.	Sales tax	
10.	Miscellaneous	
11.	Labour unloading	
12.	Profit margin	

Appendix II

GARRETT RANKING CONVERSION TABLE

The conversion of orders of merits into units of amount of "socres"

Percent	Score	Percent	Score	Percent	Score
0.09	99	22.32	65	83.31	31
0.20	98	23.88	64	84.56	30
0.32	97	25.48	63	85.75	29
0.45	96	27.15	62	86.89	28
0.61	95	28.86	61	87.96	27
0.78	94	30.61	60	88.97	26
0.97	93	32.42	59	89.94	25
1.18	92	34.25	58	90.83	24
1.42	91	36.15	57	91.67	23
1.68	90	38.06	56	92.45	22
1.96	89	40.01	55	93.19	21
2.28	88	41.97	54	93.86	20
2.69	87	43.97	53	94.49	19
3.01	86	45.97	52	95.08	18
3.43	85	47.98	51	95.62	17
3.89	84	50.00	50	96.11	16
4.38	83	52.02	49	96.57	15
4.92	82	54.03	48	96.99	14
5.51	81	56.03	47	97.37	13
6.14	80	58.03	46	97.72	12
6.81	79	59.99	45	98.04	11
7.55	78	61.94	44	98.32	10
8.33	77	63.85	43	98.58	9
9.17	76	65.75	42	98.82	8
10.06	75	67.48	41	99.03	7
11.03	74	69.39	40	99.22	6
12.04	73	71.14	39	99.39	5
13.11	72	72.85	38	99.55	4
14.25	71	74.52	37	99.68	3
15.44	70	76.12	36	99.80	2
16.69	69	77.68	35	99.91	1
18.01	68	79.17	34	100.00	0
19.39	67	80.61	33		
20.93	66	81.99	32		

ECONOMICS OF ORGANIC AND CONVENTIONAL PEPPER PRODUCTION IN IDUKKI DISTRICT

by

SNEHA ELIZABETH VARGHESE

(2010 – 11 – 120)

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Faculty of Agriculture

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2012

Abstract

The research entitled "economics of organic and conventional pepper production in Idukki district" was done in Azutha and Kattapana blocks of Idukki district. The study was undertaken with the objective to study the economics of organic and conventional pepper production, resource use efficiency, adoption of practices, marketing system and constraints in production and marketing of pepper.

In this study the cost of cultivation was worked out using the A B C cost concepts. Since pepper is perennial crop, cost of production was studied by considering establishment cost (cost during pre bearing period). The establishment cost was amortized by multiplying it with annuity and an annualized establishment cost was obtained. This cost was added to the maintenance cost to obtain the total cost. Cost of production was worked out considering both rental value of owned land and market rent for leased in land. Allocative efficiency of the resource was estimated using Cobb – Douglas production function. Extent of adoption of recommended practices by organic and conventional pepper growers were analysed. Marketing channel of both organic and conventional pepper was identified and price spread was calculated for organic and conventional marketing channel.

For organic pepper cost A was worked out to Rs 82,192 of which hired labour accounted to about 54 per cent, followed by cost of manures (28 per cent). Cost B1, B2, C1, C2 and C3were respectively Rs 83,062, Rs 4,84,420, Rs 1,29,879, Rs 5,31,237 and Rs 5,84,361. For conventional pepper out of Rs 77,230 estimated as cost A, hired labour was again the highest contributor accounting to 62 per cent and cost of manure and fertilizers occupied the second position accounting to 19 per cent of cost A. Cost B_1, B_2, C_1, C_2 and C_3 were respectively Rs 77,900, Rs 4,70,091, Rs 1,18,910, Rs 5,11,102 and Rs 5,62,212. The gross returns obtained by organic farmers was Rs 3, 41,576 per ha which was 5.26 per cent lower than the conventional system (Rs 3,59,544 per ha). B – C ratio with respect to cost A was as high as 4.16

and 4.66 for organic and conventional farmer. The cost of production worked out to Rs 649 and Rs 572 per kg for organic and conventional pepper respectively when rental value of land was considered. The cost of production was analyzed considering the market rent for leased in land was found to be Rs 238 and Rs 205 respectively for organic and conventional pepper production. Cobb – Douglas production function was used to study the resource use efficiency of both production systems. From the allocative efficiency analysis it is understood that the inputs used in both organic and conventional pepper production is not optimal and could be increased further. Ten per cent and 22 per cent of the recommended practices were only adopted respectively by conventional and organic pepper growers. Climate, disease and pest attack, labour were identified as the major constraints by both organic and conventional farmers. High variability in price was identified as the major marketing constraint. Single export oriented marketing channel was observed for organic pepper and price spread worked to Rs 232 per kg. Various marketing channels of conventional pepper were observed, but the price spread of the local channel alone was calculated due to the complexity of other channels. The local channel observed for conventional pepper was producer – village trader – local retailer – consumer (tourist) and the price spread estimated was Rs 208 per kg with producer's share of 64.70 per cent.