ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF ORGANIC VEGETABLES IN WAYANAD DISTRICT

by

Gurram Jayanth Reddy
(2012-11-192)

THESIS
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DECLARATION

I, hereby declare that this thesis entitled "**ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF ORGANIC VEGETABLES IN WAYANAD DISTRICT, KERALA**" is a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other university or society.

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Certified that this thesis entitled **"Economic Analysis of Production and Marketing of Organic vegetables in Wayanad district, Kerala**" is a record of research work done independently by **Mr. Gurram Jayanth Reddy (2012-11-192)** under my guidance and supervision and it has not previously formed the basis for the award of any degree, fellowship or associateship to him.

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EXTERNAL EXAMINER

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LIST OF ABBREVIATIONS

GOK	Government of Kerala
APEDA	Agriculture and Processed Food Products Export Development Authority
NGO	Non-governmental organization.
CD	Cobb- Douglas
MVP	Marginal Value Product
MFC	Marginal Factor Cost
B-C	Benefit Cost
FiBL	Research Institute of Organic Agriculture
US	United States of America
Ha	Hectare
Rs	Rupees
M. Ha	Million Hectares
Km	Kilometres
VFPCK	Vegetable and Fruit Promotion Council Keralam
i.e.	That is

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INTRODUCTION

1. INTRODUCTION

India is one among the leading vegetable producing countries in the world. India's diverse climate ensures availability of all varieties of fresh fruits & vegetables. It ranks second in the production of fruits and vegetables in the world, after China. As per the National Horticulture Database published by National Horticulture Board, India produced 81.28 million metric tonnes of fruits and 162.19 million metric tonnes of vegetables in the year 2012. The area under cultivation of fruits stood at 6.98 million hectares, while the cultivation of vegetables at 9.21 million hectares in the year 2012 (APEDA, 2013).

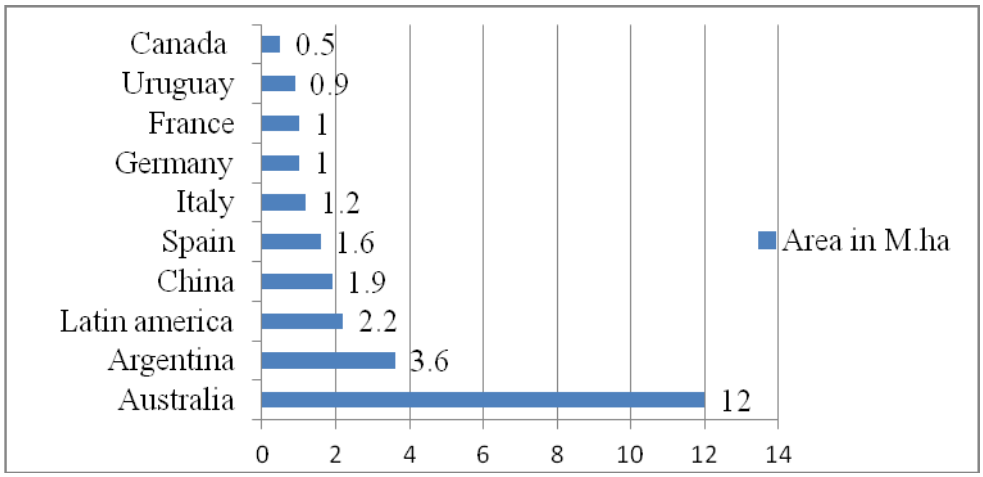
India is the largest producer of ginger and okra among vegetables and ranks second in the production of potato, onion, cauliflower, brinjal and cabbage. Kerala state is blessed with nine agro-climatic regions suitable for growing a variety of fruits and vegetables around the year. The Area under vegetable cultivation in Kerala is 1,49,000 hectares. The net area under cultivation in Kerala during the year 2011-12 was 20, 40,132 ha, which occupies 52.49 per cent of the total area in the State. The total cropped area is 26,61,757 ha during the year 2011-12 (Government of Kerala, 2012).

In Wayanad district, there are about 79,386 cultivators and 2,90,044 agricultural labourers and a total area of 47,831 ha under vegetables. Total cropped area is 1,75,300 ha and a net sown area of 1,14,966 ha. Certified Organic cultivation of vegetables was practiced largely in the district. Hence Wayanad district was purposively selected for the study. (Office of the Principal Agricultural Officer – Wayanad district.)

There are 1.9 million organic producers in the world of which most number of producers is from India (6,00,000) Followed by Uganda (1,89,610) and Mexico (1,69,707). With an area of 5,00,000 hectares organic farming accounts to 0.3 per cent share of total agricultural land in India. India has a total retail sale of

130 million euros and an export of 291.2 million euros. (World of Organic Agriculture, Statistics and Emerging Trends 2014).

Figure 1: The ten countries with the largest area (in M ha) under organic agriculture during 2012



Organic farming is getting popular day by day. The pollution in general and poisoning of food, that we eat with harmful chemicals and their effect on human health and environment is making people to look for organic food. NGOs along with successful organic farmers had a big role to play in bringing organic farming to this level today. There are several states in India, which have declared their organic agricultural policy with an intent to make the entire state organic in the near future.

Indian government is promoting organic farming in a big way as a result of which India exported agri-organic products of total volume of 1,60,276.95 MT and realization was around Rs.1,155.81 crore in year 2012-13.

Kerala state government is striving to make farming sustainable, rewarding, and competitive, and ensure poison-free water, soil and food to every citizen. The farmers in Kerala are convinced that the only way is to return to the traditional sustainable ways of cultivation without harming the ecosystem. Thus

the organic farming, a system with the broad principle of 'live and let live', came up which was recognized nationally and internationally.

Organic agriculture is not limited to crop production alone, but encompasses animal husbandry, dairy, fisheries, poultry, piggery, forestry, bee keeping, and also uncultivated biodiversity around. By and large, there is an increasing awareness among the consumers also on the deleterious effects of pesticides and hence, they are demanding organically cultivated food produces. Therefore it has become a solemn responsibility of the Government to encourage organic farming to ensure availability of safe food at affordable price to every citizen.

Many farmers, researchers and policy makers believe that turning to organic farming would mean lower yields and lower profits. Therefore, there is an argument for premium price for organic produce. But consumers on the other hand, would not want to pay higher price for organic produce. Hence, the challenge is to develop systems, which will facilitate acceptance of organic cultivation by the farmers and the consumers at reasonable prices.

It is believed by many that organic farming is healthier. Though the health benefits of organic food are yet to be proved, consumers in the developed countries are willing to pay higher premium for the same. Many farmers in India are shifting to organic farming due to the domestic and international demand for organic food. Further stringent standards for non-organic food in European and US markets have led to rejection of many Indian food consignments in the past. Organic farming therefore provides a better alternative to chemical farming.

Today there is an increasing awareness about organic farming in view of energy shortages, food safety and soil and environment pollution arising out of inorganic farming. Thus organic farming will definitely help to create a healthy society and healthy people. At present there is no adequate and proper documentation of organic practices being adopted by vegetable growers and also

empirical studies have been hardly conducted on various aspects of organic vegetable production practices in Kerala. This study is an attempt to compare the input use pattern, costs involved, yields, marketing, prices and the returns in organic and inorganic cultivation of vegetables. The study also looks into the problems faced by the farmers of organic vegetables.

1.1 Objectives of the Study

This study was taken up with the following objectives

To study the economics of organic vegetable production, consumer preference and marketing of organic vegetables in Wayanad district.

The hypotheses outlined for the study are

1. The costs involved in production of organic vegetables are more compared to that of inorganic vegetables.

2. Net returns from organic vegetables are higher than that of inorganic vegetables

1.2 Limitations of the Study

This study has been done as a part of the M. Sc programme and is limited by time and resource constraint. A clear picture would have been obtained if the study was done after classifying the small, marginal and large farmers. A thorough analysis of marketing system is constrained due to the existence of complex markets and hence a separate study is required.

1.3 Scope of the Study

In India the balance of trade is always negative. Vegetables bring good amount of foreign exchange to our country. This is the era of organic production and more exports can be obtained by growing organic vegetables. Wayanad

district is having a good scope for improving the exports of the country. Many studies on organic farming can be taken up in detail in the future.

1.4 Organization of Study

The thesis is presented in five chapters. The first chapter 'Introduction' highlights the back ground 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, 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 research problem is essential to find the appropriate methodology and to support the research findings. This study has objectives of studying the economics of organic vegetable production, consumer preference and marketing of organic vegetables. An extensive literature survey was done to identify similar studies with similar problems. The reviews thus obtained are provided under the following headings.

2.1 Studies on economics of organic and conventional farming

2.2 Studies on marketing of agricultural products

2.3 Studies on resource use efficiency

2.1 STUDIES ON ECONOMICS OF ORGANIC AND CONVENTIONAL FARMING

Scofield (1986) stressed that organic farming does not simply refer to the use of living materials, but emphasizes the concept of 'wholeness', implying the "systematic connection or co-ordination of parts in one whole''.

In a study on economic analysis of potato cultivation in jaunpur district of U.P, Singh *et al.* (1991) found that the farmers operating at higher level of technology obtained higher level of returns over variable cost.

Anderson (1994) found that the lower yields on organic farms contrasted with conventional farms which were balanced by lower production costs in USA.

Gristina *et al.* (1994) measured yields for a number of vegetable and grain crops in California grown under organic, low input and conventional systems. Each system had some crops which had the highest yields. Overall, they conclude that the conventional system was most productive and the organic systems least productive but the differences were not large. The organic system has the most stable yields.

John (1994) reviewed the various field experiments conducted on organic farming in Canada. Many sample farms recorded yields that were the same or slightly below conventional farms. Even though some market regulatory problems exist in case of organic products, the prices for them were higher (about 30%) than the conventional products. Overall, the study concluded that 72 per cent of farmers strongly convinced that 'organic farming is as profitable as conventional'.

Lampkin (1994) summarized studies conducted on economics of organic farming in different crops in South and West of England and parts of Scotland and Wales and concluded that organic farming systems were more diverse in terms of enterprise mix; have lower yields and higher labour costs which were not compensated for fully by reduced input costs.

Padel and Uli (1994) reviewed several studies on costs and returns of organic farming in various crops in Germany and revealed that organic farming was equally profitable with conventional farming. Lower yields for arable crops were compensated by reduced costs of inputs and premium prices leading to financial stability of farmers.

Wynen (1994) carried out a review study on organic farming in Australia. He concluded that the wheat yields were almost similar between organic and conventional farms. The study also indicated that the variability of wheat yields on organic farms was lower than on conventional farms. The financial results of two groups of farmers per hectare were remarkably similar.

Brumfield *et al.* (1995) examined the profitability of fresh tomatoes using organic, IPM and conventional methods grown in the Rutger's University research farm. Results showed that organic plots had higher chemical costs, higher labour costs and lower net returns than the conventional or IPM systems, while the latter two had similar net returns.

Burgoyne *et al.* (1995) studied 336 conventional farms and 16 organic farms in Quebec and reported that organic farms had economic and financial performance at least as good as the highest yielding conventional farms.

Reganold *et al.* (1995) summarise data from previous studies to show that bio-dynamic farming generally had better soil quality and was just economically viable on a per hectare basis compared to their conventional counterparts.

For grape production, White (1995) examined growing methods and costs over five years to conclude that grapes could be grown successfully using organic methods although at a higher cost compared to conventional methods. He concluded that premiums would be necessary to make organic production economically successful.

Dobbs and Smolik (1996) compared an organic farm and a conventional farm on the western edge of the Corn belt over an eight-year period. They found that earnings on both farms were acceptable but the conventional farm was more profitable on average compared to the organic farm when organic premiums were excluded.

Gliessman *et al.* (1996) compared a strawberry crop on conventional and organic land in California over three years. They found that the organic crop was slower growing, had lower yields, and increased labour requirements but there was little economically important pest damage, no nutrient deficiencies and an increase in predators and beneficial nematodes.

Higginbotham *et al.* (1996) reported on profitability on one farm as it converted to organic farming. Results were varied and they conclude that care is needed when comparing only one year's results.

Nieberg and Schulze (1996) reported the profitability of 107 farms converting to organic production. A comparison of the last year of conversion with the first four years of organic production showed that profitability depended on the extensification premium and the marketing possibilities for organic products.

Stonehouse *et al.* (1996) compared organic, low input and conventional farms in Ontario. These were mixed farms cropping maize, autumn cereals and

beans. Each farm type had similar resource endowments but the conventional farms were largest and the organic farms were the most diversified and smallest.

Total direct production costs were lowest for organic farmers. Gross margins were highest for organic farms for all three crops and lowest for conventional farms.

Cost and returns per hectare of vegetable production was estimated in patan block of Jabalpur district by Singh (1997) which indicated that per hectare operational cost was highest in the case of tomato followed by brinjal and okra. Same trend was also observed in the case of net returns of vegetable crops.

In a study on economic analysis of production and marketing of vegetables in Azamgarh district of Uttar Pradesh, Chauhan (1998) observed that tomato and brinjal were the most profitable crops among the crops studied .Results also revealed greater scope for the increase in farm income through readjustment of resources.

In a review of organic farms in Germany by Leithold (1999) shows similar findings - yields for organic crops were lower than for conventional crops but incomes were higher. Some studies failed to examine the effect of premiums for organic products.

The growth of organic farming in India and other Asian countries has been slow due to the emphasis given to food security rather than food safety. This is in contrast to the growth of organic farming in Latin American countries where it was encouraged by increased opportunity for export of organic products (Naik, 1999).

Colman and Tinker (2000) reviewed the UK farming system and compared the profitability of conventional and organic farming. They found that the major categories of organic farming (dairying, cropping and mixed farming) were more profitable per hectare, on average, than conventional farming.

The economics of onion production and marketing in Karnataka was examined by Balappa and Hugas (2003) and it was found that the overall average net returns obtained by the onion growers amounted to Rs (45, 429.29 per hectare)

with gross returns of (69,828.67) per hectare. However farmers of Gulbarga (Rs 70,355.01 per hectare), Bijapur (67,414.41 per hectare) and Raichur (Rs 64,421.35 per hectare) districts obtained net returns more than three times of Dharwad (Rs 22,365.18 per hectare) and Belgaum(16,578.86 per hectare) districts mainly due to cultivation of onion with irrigation in these districts .

Navadekar *et al* (2003) reported that the per hectare cost of cultivation of tomato for summer season cultivation was more expensive followed by kharif and rabi seasons, the per hectare gross as well as net returns were relatively more in kharif season followed by summer and rabi season.

Dattatray (2004) did the economic analysis of coconut based cropping systems in Konkan region. The per hectare cost of cultivation in sole cropping system of coconut worked out to Rs 53,586 of which share of cost A and cost B was 39.36 per cent and 81.86 per cent respectively.

Based on a questionnaire on Norwegian farmers, the results in Koesling *et al.* (2004) indicated that organic farmers perceived themselves to be less risk-averse than conventional farmers. For both conventional and organic farmers, crop prices and yield variability were the two top-rated sources of risk, followed by institutional risks.

Klonsky and Greene (2005) summarized organic sales figures, noting the increase of sales from $3.5 billion in 1997 to $10.3 billion by 2003, with fruits and vegetables comprising over 40 per cent of the most recent sales data. In 2003, fresh produce made up over 90 per cent of organic produce sales.

The economics of elephant foot yam in lowland production system in Kerala was analyzed by Srinivas and Ramanathan (2005) and they reported that, the gross cost of cultivation was Rs 1, 73,105 per hectare in which expenditure on planting material was maximum. On an average, farmers got a yield of 33.5 tonnes per hectare with a gross income of Rs 2, 36,368 at the average selling rate of Rs 7.15 per kilogram of tuber. Benefit cost ratio was worked out to be 1.38: 1.

Farm business income, owned-farm business income, farm investment income and family labour income were estimated as Rs 91,395, Rs 85,033,Rs 67,353,and Rs 80,943 respectively .

According to Kshirsagar (2006) the cost of cultivation of organic sugar cane was lower by 15.39 per cent than inorganic sugarcane. The cost of cultivation of organic sugarcane was Rs 35, 362 per ha and for inorganic sugarcane it was Rs 42, 115 per ha, the lower cost of 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 chemicals.

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

It was found that consumer ethical values and particular attitudes had a great deal of influence when making the decision to purchase organic goods (Honkanen *et al.*2006).

Kerselaers *et al.* (2007) simulated a model on 685 conventional Belgian farms and concluded that the economic potential from conversion to organic production is higher than generally perceived. They conclude that surveys reveal that economic potential is underestimated and that this hampers conversion behaviour.

A common denominator for the results in these studies seem to be that idealistic reasons are important for taking the decision to convert but perceived income risk factors associated with yield and price seem to be important for not converting from conventional to organic farming. These results are in line with views expressed in a Swedish study (Cahlin *et al.* 2008).

The financial support payments are supposed to compensate for lower yields and an uncertain market. Due to frequent changes in the level of support and the conditions surrounding the payments, the support itself could be regarded

as a risk factor. The empirical results suggest that the crop- specific real net returns are higher in general and less risky for organic crops than conventional. This is in line with the idea of organic farming as more profitable but contrary to the idea of organic farming as potentially more risky as suggested by Acs *et al.,* (2009) among others.

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 Wayanad district of Kerala. They found that the labour cost on the inorganic farm is nearly 28 per cent higher than organic farms; the material cost was significantly higher by about 57per 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 per cent higher as compared to organic farms.

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

Naik (2010) found that for both organic chilli 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.

Chatterjee *et al.* (2011) studied the economics of solanaceous vegetables in the gangetic alluvial of west Bengal. it was found that when brinjal, hybrid tomato and chilli were cultivated with an open pollinated local cultivar, the per hectare returns obtained were Rs 2.46, Rs 3.14and Rs 1.27 respectively for every rupee spent. The study concluded that during that during autumn- winter season in

west Bengal the cultivation of hybrid tomato was the most remunerative activity, which was closely followed by brinjal.

It is likely that the affluent group is among the top groups to send their children overseas to University, it is reasonable to assume that organic and all natural foods will not be a cultural barrier for this group, especially since 5% of Chinese organic consumers are from overseas returnees bringing western culture back home with them (International Trade Centre, 2011)

Soman (2012) found that the cost of cultivation per hectare of cowpea was found to be the highest for VFPCK farmers and Kudumbasree farmers. Cost A_2 was estimated as Rs 1,10,150, Rs 54, 968 and Rs 1,25,532 per hectare and cost C_3 was estimated as Rs 3,30,613, Rs 2,95,422, and Rs 3,65,867 per hectare respectively for VFPCK, Kudumbasree and other farmers . the input wise split of total cost of cultivation of cowpea at cost A_2revealed that the most important cost item was hired labour for VFPCK (31 per cent) and other farmers (41 per cent) while it was panthalling materials (39 per cent) for Kudumbasree farmers .The second most important item at cost A_2 was manures for all three categories of farmers.

Varghese (2012) found that for organic pepper cost A was worked out to Rs 82, 192 of which hired labour accounted to about 54 per cent , followed by manures which worked out to 28 per cent of cost A. cost B_1, B_2, C_1, 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 c2 to c2 and it was worked out as Rs 5, 84,361. The gross returns 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.

2.2 STUDIES ON MARKETING OF AGRICULTURAL PRODUCTS

Numerous studies have investigated the determinants of consumer demand for organic products and the reasons for which consumers are willing to pay a price premium over conventional products (Thompson, 1998).

In Baroda and Ahmedabad, more than 70 per cent of the consumers with incomes above Rs. 5,000 per month were ready to pay 15-20 per cent premium for organic food. This premium is required to make initial returns from organic farming comparable to that from conventional agriculture (Naik, 2001).

Research related to consumer attitudes and preferences for organic products is very imperceptible, results of studies confirmed that consumers have positive attitudes towards organic products where one of the most common mentioned reason for purchasing organic products was it is perceived as healthier than conventional alternatives (Chinnici *et al.,* 2002).

For example in the USA, 80 per cent of all organic food sales were made by farmers to wholesale outlets, 13 per cent directly to consumers, and seven per cent to retail outlets (Klonsky and Smith, 2002).

Growing market is another important stimulant for organic farming in India. Several countries are interested in buying organic cotton, the annual demand for which is around 15 million bales (Bajwa, 2003).

The super markets have the purchasing power, drive, dynamism, adequate logistics, omnipresence, efficiency, quality management, and communication power though they also have their own agenda and practices like ethical trade inertia, dumping, and technical barriers which may not be in tune with that of the organic producers and other players (Haest, 2003).

A study conducted by Saha and Mukhoppadyay (2003) on the inter temporal variations in marketing margin and price of potato in West Bengal found that, wholesale price harvest price, marketing margin have unidirectional inter-year fluctuation. The fluctuation in marketing margin is more associated with that of whole sale price. Such an association implies the great control of the whole salers in determination of marketing margin which seems to be consistent with the

advantageous position (monopsonistic and monopolistic) assumed by the whole salers both at buying and selling ends.

On the other hand, high price expectations, delayed delivery, quality restrictions, lack of certification and marketing networks are some of the constraints in marketing organic products internationally (Singh, 2003).

Organic farmers can receive higher prices for their organic products and consumer's exhibit higher willingness to pay for organic products (Stevens-Garmon, *et al.,* 2007).

In the economic analysis of organic farming in northern Karnataka, Ganesh (2010) found that the paddy, jaggery, vanilla, cashew and pepper were sold separately under organic market to a considerable extent. Price premium received under organic market for vanilla , jaggery, banana ,chickpea , wheat, cashew and vegetables, pepper, and paddy was 40 per cent, 36.36 per cent, 25 per cent , 25 per cent , 20 per cent , 20 percent,14.25 per cent, 12.5 percent and 11.1 percent respectively. However, most of the organic produces were sold only under conventional markets due to lack of separate organic markets in the locality.

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

In a study of Chinese consumers´ purchase intention of organic food, Thøgersen and Zhou (2011) also found that both injunctive and descriptive norms were insignificant at a significance level of 0.05, indicating that purchase intention of organic food is primarily determined by attitude.

2.3 STUDIES ON RESOURCE USE EFFICIENCY

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

In the analysis on cotton farms, Tzouvelekas *et al.* (2001) found that technical efficiency (TE), with respect to their specific technology (organic and conventional) was higher in conventional farming's favour.

Oude Lansink *et al.* (2002) compared efficiency measures of organic and conventional farms in Finland. They suggested that organic producers have higher technical and sub-vector efficiencies than conventional farms in their own reference groups, but overall efficiency measures suggest that organic farms are using less productive technology.

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 vine yards 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 agro group of vine yards. About 79 percent of the variation in yield of grapes was explained by variables included in the function.

A study conducted 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 to 92 percent in different cropping systems of coconut.

In Italy, Madau (2005) applied a stochastic frontier production model and found that conventional cereal farms were significantly more efficient than organic cereal farms, with respect to their specific technology, which counter the findings from Tzouvelekas *et al.* (2001).

In a study of resource use efficiency of paddy cultivation in Peechi command area, Suresh and Reddy (2006) found that the elasticity coefficient for the chemical fertilizers, farm yard manures and human labour were significant and positive. The allocative 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 (SAPEP). For APEP farmers, the resource use efficiency 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.

Two different methods of multivariate data analysis were applied to identify differences between organic and conventional farmers. A principle component factor analysis was performed to pool and reduce the number of variables to a smaller number of factors which display farmers' motives for conversion to organic production methods (Hair *et al.,* 2010).

As per review of various studies (Mayen *et al.,*2010) higher technical efficiency score of one sample farm relative to their counterpart means that, on average, the former lay closer to their specific production frontier than the sample counterpart does with their respective production frontier.

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

MATERIALS AND METHODS

3. MATERIALS AND METHODS

Selection of an appropriate methodology is essential to bring out a meaningful result from research. Based on the review of literature given in the previous chapter, suitable methodology was selected for each aspect of the study. This chapter briefly describes 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.

The methodology is presented under the following headings:

3.1 DESCRIPTION OF THE STUDY AREA

3.2 SELECTION OF THE AREA OF STUDY

3.3 METHOD OF DATA COLLECTION

3.4 VARIABLES AND THEIR MEASUREMENT

3.5 TOOLS FOR ANALYSIS

3.6 RESOURCE USE EFFICIENCY

3.7 CONSUMER'S PREFERENCE TOWARDS ORGANIC VEGETABLES

3.8 GARRETT'S RANKING TECHNIQUE

3.9 MARKETING CHANNEL

3.10 PRICE SPREAD ANALYSIS

3.1 DESCRIPTION OF THE STUDY AREA

3.1.1 Location

Located among the mountains of the Western Ghats, lies Wayanad, one of the loveliest hill stations of Kerala. This green paradise, located at a distance of 76 kms, from the seashores of Kozhikode, lies at a height of 700-2100 m above sea level, on the north eastern part of the State. Comprising an area of 2,126 sq. kms, Wayanad has a powerful history.

The population of Wayanad is 8, 17,420, which accounts for 2.31 per cent of the state total. The male and female population are 4, 01,684 and 4, 15,736 respectively. The sex ratio is 995 per 1000. The literacy in the region is 89.03 per cent. Male literacy ratio is 92.51 and female literacy ratio is 85.70. (2011 census)

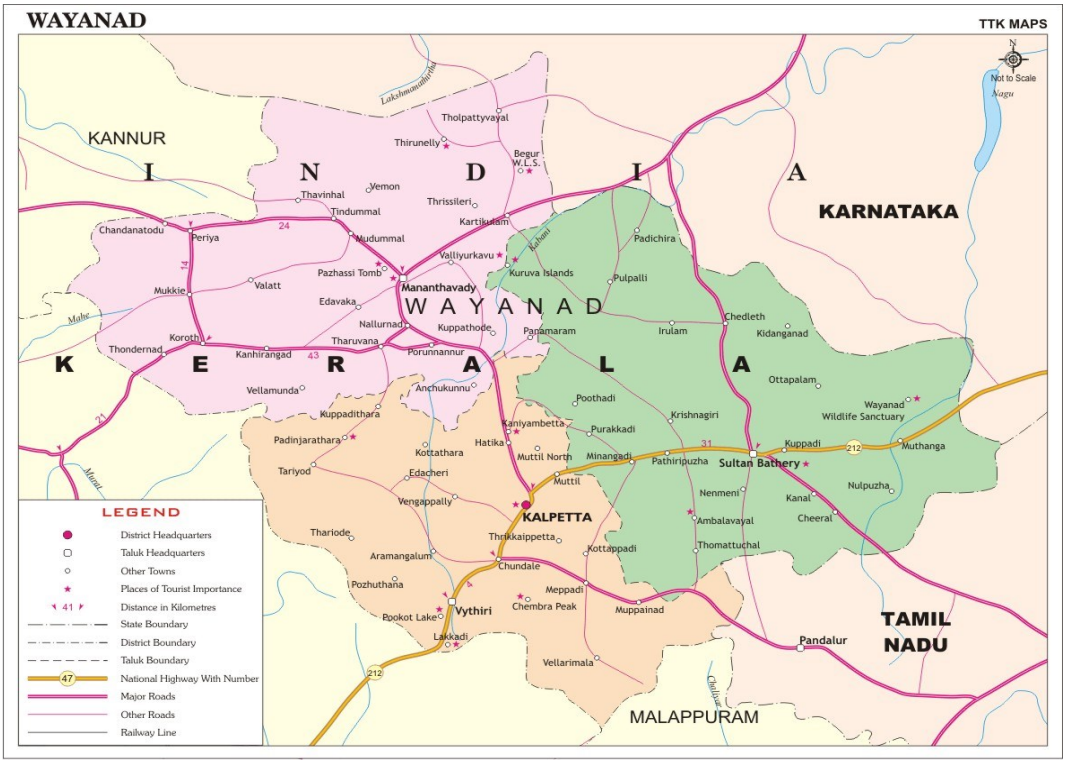
3.1.2 Topography

Wayanad lies between north latitude 11º 27' and 15 º 58' and east longitude 75 º 47’ and 70º 27'. It is bounded on the east by Nilgiris and Mysore districts of Tamilnadu and Karnataka respectively, on the north by Coorg district of Karnataka, on the south by Malappuram and on the west by Kozhikode and Kannur. The east flowing rivers of Wayanad are in striking contrast to the various rivers of the rest of Kerala. The river Kabani of Wayanad is a perennial source of water to Cauvery. The Panamaram rivulet, originating from Lakkidi and the Mananthavady rivulet originating from Thondarmudi Peak meet six kms north of Panamaram town and after the confluence, the river is known as Kabani.

Wayanad has a salubrious climate. The mean average rainfall in this district is 2322. mm. Lakkidi, Vythiri and Meppadi are the high rainfall areas in Wayanad. High velocity winds are common during the southwest monsoon and dry winds blow in March-April. High altitude regions experience severe cold. In Wayanad (Ambalavayal) the mean maximum and minimum temperature for the last five years were 29°C and 18°C respectively. This place experiences a high relative humidity, which goes even up to 95 per cent during the Southwest monsoon period.

There are about 79,386 cultivators and 2, 90,044 agricultural labourers. A total area of 47,831 ha is under vegetables and an area of 2,379 ha of bitter gourd crop grown in the Wayanad district, total cropped area is 1, 75,300 ha and net sown area of 1, 14,966 ha. (Office of the Principal Agricultural Officer- Kalpetta)

Figure 2. Map of Wayanad district.



3.2. SELECTION OF THE STUDY AREA

Wayanad is one of the major vegetable producing districts in the north eastern part of Kerala. The total area under vegetables is 47,831 ha in the year 2011.Certified Organic cultivation of vegetables is practiced largely in the district. Hence Wayanad district was purposively selected for the study. The major vegetables grown were bitter gourd, cucumber, ash gourd, etc. apart from yard long bean. With the information obtained from the State Horticulture Mission, Trivandrum, two crops yard long bean and bitter gourd which are largely grown organically in the Wayanad district, were selected.

3.2.1 Selection of the Sample Respondents

The study was conducted to compare the costs involved, yield, marketing, prices and the returns to organic cultivation and to inorganic cultivation of vegetables and problems faced by the farmers of organic vegetables. 20 farmers each practising organic cultivation of yard long bean and bitter gourd were

selected and 20 farmers each practising conventional cultivation of bitter gourd and yard long bean spread over the district of Wayanad were also selected randomly for the study.

3.3 METHOD OF DATA COLLECTION

For evaluating the specific objectives designed for the study, primary data was collected from the sample farmers. Majority of the respondents did not maintain records of the cost and returns from the cultivation of both the crops. Hence, data collected was based on the memory of the respondents. At the time of interview, personal bias of the sample farmers was minimized by convincing them about the genuinety of the purpose for which the data were collected.

Data were based on the entire operations practiced in the cultivation of both the crops organically and also inorganically. The data on the type, pattern and levels of use of manures, fertilizers and plant protection measures and the cost, yields, market prices and returns involved under both the types of farming were collected by personal interview method with the help of structured pre-tested schedule. Similarly, the problems of organic vegetable growers were collected through opinion survey. The data pertained to the year 2012-13.

3.4 VARIABLES AND THEIR MEASUREMENT

3.4.1 **Cost of Planting Materials**

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

3.4.2 Cost of Human Labour

3.4.2.1 Cost of Hired Labour

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

3.4.2.2 Cost of Family Labour

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

3.4.3 Cost of Machine Labour

The human labour in using the machine is accounted under various headings of family and hired labour. Cost of maintenance of farm machinery is 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 Pandal Materials

The material costs of stalking and trailing materials used were evaluated at the purchasing price. Cost of bamboo poles, wooden stakes are evaluated under the cost of pandal material. Cost of wires and coir piths used for vining are also evaluated under pandal cost.

3.4.5 Cost of Manures, Fertilizers and Bio Fertilizers.

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

3.4.6 Cost of Plant Protection Chemicals

It is evaluated at the purchase price.

3.4.7 Cost of Irrigation

This cost involves labour cost for irrigating the field, electricity charges, diesel cost, and other irrigation structures used particularly for irrigating bitter gourd and yard long bean.

3.4.8 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 the crop period, since this is the rate at which farmers got crop loans from financial institutions.

3.4.9 Interest on Fixed Capital

The present value of fixed assets and equipment forms the fixed capital. Interest on this can be calculated in the same way as in the case of interest on working capital. Interest on fixed investments (excluding land) was estimated at the rate of 11 per cent per annum being the lending rate of commercial banks.

3.4.10 Rental Value of Owned Land

It is evaluated at an interest of 11 per cent per annum on the value of land for the crop period since it is the lending rate of commercial banks.

3.4.11 Land Revenue

This was taken as the actual rate paid to the revenue department which was calculated as Rs.80 per acre.

3.4.12 Depreciation

This was worked out to meet the wear and tear of the implements and machinery used in the cultivation of yard long bean and bitter gourd. The annual rate of depreciation is being worked out on each item using straight line method and the total depreciation was calculated.

3.4.13 Miscellaneous Cost

This is the cost involved in replacing the damaged or disease infected vines. It also included other sundry charges.

3.5 TOOLS FOR ANALYSIS

Appropriate statistical tools are employed to analyse 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 the farmers such as age, educational status, land holding, annual income and family size. It is also used in the cost of cultivation.

3.5.2 Cost of cultivation

Cost of cultivation of the commodity is the sum total of cost incurred on various inputs that are used in the production of the commodity. Correct identification of these inputs as their measurement is crucial for the realistic assessment incurred in the production. A B C cost concepts were used to calculate cost of cultivation of yard long bean and bitter gourd for the year 2012-13.

3.5.2.1 A B C cost concepts

Cost A includes

a) Cost of hired human labour
b) Cost of manures, fertilizers, soil ameliorants
c) Cost of plant protection chemicals
d) Cost of pandal material
e) Land revenue
f) Depreciation
g) Annual repairs
h) Interest on working capital
i) Miscellaneous

Cost B_1

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

Cost B_2

This includes cost B_1 and rental value of owned land.

Cost C_1

This comprises of cost B_1 and imputed value of family labour.

Cost C_2

This comprises of cost B_2 and imputed value of family labour

Cost C_3

This is the sum of cost C_2 and 10 percent of cost C_2 to account for managerial input of the farmer.

3.6 Resource Use Efficiency

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

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

The important problem of increasing agricultural production in any region is to increase output per unit of input. Therefore it is necessary that the available resources should be used economically and efficiently. 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 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. In this study we find the allocative efficiency of yard long bean and bitter gourd production in both organic and conventional systems 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

$$Y = a\, x_1^{b1}\, x_2^{b2}\, x_3^{b3}\, x_4^{b4}\, x_5^{b5}\, x_6^{b6}\, x_7^{b7}\, e$$

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

$$\text{Log } Y= \log a + b_1 \log X_1+b_2 \log X_2+b_3 \log X_3+b_4 \log X_4+b_5 \log X_5+b_6 \log X_6 +b_7 \log X_7+e$$

Where,

Y= Yield of yard long bean and bitter gourd

X_1= Quantity of seed

X_2= Quantity of fertilizers

X_3= Quantity of manures

X_4= Quantity of hired labour

X_5= Quantity of family labour

X_6 = Quantity of pesticide

X_7= Quantity of fungicides

b_i s are regression coefficients of explanatory variables.

The Cobb–Douglas 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 tests such as coefficient of multiple determination and t test was carried out for each variable. The regression coefficient (b_i's) were tested for their significance using't' test at chosen level of significance.

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

3.6.1.1 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 out put

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

b_i = the regression coefficient of the 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

$$\text{Marginal value productivity of } X_i = b_i P_y \frac{\overline{y}}{\overline{x}}$$

Where
P_y = price of yard long bean and bitter gourd (Rs/kg)
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 calculation of allocative efficiency of input, price of input i.e. MFC is taken as unity.

3.7 CONSUMER'S PREFERENCE TOWARDS ORGANIC VEGETABLES

Consumer preference towards organic vegetables was being carried out as an opinion survey, with a total number of respondents as 30. They were asked to respond to the questionnaire prepared for the consumer's preference towards organic vegetables separately and results are analyzed.

3.8 GARRETT'S RANKING TECHNIQUE

Different constraints in organic cultivation were identified in consultation with the farmers. The respondents were asked to rank these constraints. These ranks were converted into percent position by using the formula.

Percent position = $100 X(R_{ij} – 0.5) / N_J$
R_{ij} = rank given for i^{th} factor by j^{th} individual

Nj = 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 constraints 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 the routes through which agricultural produce moves from producers to consumers. This was identified by interviewing the market intermediaries in yard long bean and bitter gourd. A separate questionnaire was prepared for market intermediaries. VFPCK, Fair trade centres, whole saler and retailers were covered in this survey.

3.10 PRICE SPREAD ANALYSIS

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

The cost involved in moving the produce 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.

Profits of various market functionaries involved in moving of 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 this study price spread is analysed by comparing the prices prevailing at the successive levels of marketing at the producer‘s, whole saler‘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.

RESULTS AND DISCUSSIONS

4. RESULTS AND DISCUSSIONS

This study entitled economic analysis of production and marketing of organic vegetables in Wayanad district was aimed to bring out the economics and marketing aspects under organic and conventional yard long bean and bitter gourd, consumer's preference towards organic vegetables and constraints faced by the organic farmers in growing the vegetables. All the respondents selected were found to be growing both yard long bean and bitter gourd in the kharif season 2012-13. The data collected was analysed and the results are presented in this chapter under the following heads.

4.1 GENERAL CHARACTERISTICS OF SAMPLE FARMERS

4.2 ECONOMICS

4.3. RESOURCE USE EFFICIENCY

4.4 MARKETING

4.5 CONSUMER PREFERENCE TOWARDS BUYING OF ORGANIC VEGETABLES

4.6 CONSTRAINTS FACED BY THE FARMERS IN CULTIVATION OF ORGANIC VEGETABLES

4.1 GENERAL CHARACTERISTICS OF SAMPLE FARMERS

4.1.1 Age of the Farmers

The sample farmers were classified into three age groups - less than 30, 30-50 and above 50 years and the details are presented in table 1. The average age of organic farmers was 51.2 years while that of conventional farmers was 58.2 years. In the case of organic and conventional farmers, maximum concentration was observed in the age group of 50 and above, followed by the age group of 30-

50 years for organic and conventional farmers. 40 per cent of the organic farmers are in the age group below 50 years. 25 per cent of the organic farmers are below the age group of 50 years. This shows that the younger age group of farmers are inclined towards organic farming.

Table 1. Distribution of farmers according to age

Age group (years)	Organic farmers (number)	Percentage (per cent)	Conventional Farmers (number)	Percentage (per cent)
< 30	1	5	0	0
30-50	8	40	5	25
50 and above	11	55	15	75
Total	20	100	20	100

4.1.2 Educational Status of the Farmers

The sample farmers were classified under four groups as illiterate, primary, high school and college education. Organic farmers were having 100 per cent literacy while the conventional farmers were having only 80 per cent literacy.

Ninety per cent of the organic farmers were having higher education (High school or more) while only sixty per cent of the conventional farmers were having higher education (High school or more). This indicate that the organic farmers are well educated than their counter parts. Ten per cent of the organic farmers and twenty per cent of the conventional farmers were having primary education.

4.1.3 Occupation of the Farmers

All the sample organic farmers were primarily dependent on agriculture while 95 per cent of the inorganic farmers were primarily dependent on agriculture for their income and a meagre 5 per cent of inorganic farmers were having a petty business as their primary occupation. Organic farming is practised more by full time farmers.

Table 2. Educational status of the farmers

Education	Organic	Inorganic
Illiterate	0 (0)	4 (20)
Primary	2 (10)	4 (20)
High school	14 (70)	8 (40)
College	4 (20)	4 (20)
Total	20 (100)	20 (100)

Note: Figures in parentheses indicate per cent to total

4.1.3 Occupation of the Farmers

All the sample organic farmers were primarily dependent on agriculture while 95 per cent of the inorganic farmers were primarily dependent on agriculture for their income and a meagre 5 per cent of inorganic farmers were having a petty business as their primary occupation. Organic farming is practised more by full time farmers.

Table 3. Occupation of the farmers

Occupation	Organic farmers	Inorganic farmers
Agriculture as a main occupation	20 (100)	19 (95)
Agriculture as a subsidiary occupation	0 (0)	1 (5)
Total	20 (100)	20 (100)

Note: Figures in parentheses indicate per cent to total

4.1.4 Family Size of the Farmers

Distribution of family size indicated that 16.66 per cent of both organic and inorganic farmers had small family size (1-3 members), while 65 per cent of the organic farmers and 75 per cent of the inorganic farmers had medium family

size (4-6 members). 20 per cent of the organic farmers and 10 per cent of the inorganic farmers had large families (7 and more).

Table4. Family size of the farmers

Family size	Organic farmers	Percentage	Inorganic farmers	Percentage
Small (1-3)	3	15	3	15
Medium (4-6)	13	65	15	75
Large (7 and above)	4	20	2	10
Average	5	-	4.85	-
Total	20	100	20	100

4.1.5 Land holding size of the farmers

In the case of organic farmers of yard long bean (80 per cent) and (90 per cent) of bitter gourd farmers had land holding ranging from 1-20 cents. In the case of conventional farmers, 70 per cent of yard long bean farmers and 95 per cent of bitter gourd farmers belonged to this group. The results of the table indicate that most of the organic and conventional farmers were having small land holdings ranging from one cent to twenty cents.

4.1.6 Varieties used

The different varieties used by the organic famers for yard long bean were local, Sarika, and Lola. The bitter gourd varieties used were Priyanka and local. The different varieties used by the conventional farmers were local variety for yard long bean and Priyanka for bitter gourd.

Table 5. Land holding size of farmers

Size of holding (cents)	Organic (number of farmers)		Conventional (number of farmers)	
	Yard long bean	Bitter gourd	Yard long bean	Bitter gourd
1-20	16 (80)	18 (90)	14 (70)	19 (95)
20-40	3 (15)	1 (5)	5 (25)	1 (5)
40 and above	1 (5)	1 (5)	1 (5)	0 (0)
Total	20(100)	20(100)	20(100)	20(100)

Note: Figures in parentheses indicate per cent to total.

4.2 ECONOMICS OF ORGANIC AND CONVENTIONAL YARD LONG BEAN AND BITTER GOURD

The number of family labour and hired labour days engaged by the farmers for cultivation of organic yard long bean per hectare were 175 man days and 118 man days respectively, as presented in tables 6 and 7. The number of hired labour and family labour days used by the farmers for the cultivation of organic bitter gourd per hectare were 269 man days of family labour and 114 man days of hired labour.

The number of hired labour and family labour days used by the farmers for cultivation of conventional yard long bean per hectare were 110 man days and 100 man days respectively. The number of hired labour and family labour days used by the farmers for cultivation of conventional bitter gourd per hectare were 304 man days and 113 man days respectively.

Use of family labour was highest in the case of inorganic bitter gourd and the use of family labour and hired labour were comparatively higher for organic farmers than that for inorganic farmers in the case of organic yard long bean.

Table 6. Family and hired labour use per hectare of yard long bean

Item	**Organic yard long bean**			**Conventional yard long bean**		
	F.L.	**H.L**	**Total**	**F.L.**	**H.L**	**Total**
Labour use Average/hectare	175	118	293	110	100	210
Total/hectare	3494	2364	5858	1544	1404	2948

Note: H.L. - Human labour, F.L. - Family labour

Table 7. Family and hired labour use per hectare of bitter gourd

Item	**Organic bitter gourd**			**Conventional bitter gourd**		
	F.L.	**H.L**	**Total**	**F.L.**	**H.L**	**Total**
Labour use Average /hectare	269	114	383	304	113	417
Total/hectare	5381	2288	8667	9743	3621	13,364

Note: H.L. - Human labour, F.L. - Family labour

Table 8 gives the details of the costs on material inputs incurred by organic and conventional yard long bean and bitter gourd farmers.

Planting material cost for organic yard long bean and bitter gourd were Rs 16,190/- and Rs 19,227/- per ha respectively. Planting costs of conventional yard long bean and bitter gourd were Rs 12,360/- and Rs 12,099/- per ha respectively.

Cost of seed for growing organic yard long bean and bitter gourd were Rs 5,843/- and Rs 14,820/- per ha respectively. Cost of seed for growing conventional yard long bean and bitter gourd were Rs 5,927/- and Rs 9,920/- per ha respectively. Cost of organic manure for organic yard long bean and bitter

gourd were Rs 9,920/- and Rs 7,129/- per ha respectively. Cost of bio-fertilizers for organic yard long bean and bitter gourd were Rs 10,523/- and Rs 5,346/- per ha respectively. Cost of fertilizers applied for conventional yard long bean and bitter gourd were Rs 8,694/- and Rs 18,734/- per ha respectively.

Cost of bio-pesticides for organic yard long bean and bitter gourd were Rs 7,026/- and Rs 9, 460/- per ha respectively. Cost of pesticides for the conventional yard long bean and bitter gourd were Rs 22,563/- and Rs 17,788/- ha^{-1} respectively.

Cost of erecting pandal for organic yard long bean and bitter gourd were Rs 9,593/- and Rs 13,326/- per ha respectively. Cost of erecting pandal for conventionally grown yard long bean and bitter gourd were Rs 17,514/- and Rs 19,190/- per ha respectively.

Market selling price of yard long bean and bitter gourd grown conventionally and organically is presented in table 9.

The market selling price for organic yard long bean and bitter gourd were Rs 32 and 30.50 per kg respectively. The market selling price for conventional yard long bean and bitter gourd grown were Rs 32.50 and 31 per kg respectively showing that there was not much difference in prices as separate market for organic markets are not available.

Data on productivity of yard long bean and bitter gourd grown conventionally and organically is presented in table 10.

The average productivity of the organic yard long bean and bitter gourd grown were 591 and 511 kg ha^{-1} respectively. The average productivity of the yard long bean and bitter gourd grown conventionally were 425 and 814 kg ha^{-1} respectively, indicating that the productivity of the organically grown yard long bean was higher than that of the conventionally grown yard long bean and productivity of conventional bitter gourd was higher than that of organic bitter gourd.

The productivity of organic bitter gourd was comparatively low due to the high disease and pest incidence in bitter gourd especially during that year 2012. Yard long bean is more amenable for organic cultivation as it is having a low pest and disease incidence and a higher market price compared to that of bitter gourd.

Table 8. Cost of material inputs for yard long bean and bitter gourd (Rs/ha)

Item	**Yard long bean**		**Bitter gourd**	
	Organic	**Inorganic**	**Organic**	**Inorganic**
Planting material	16,189.76	12,359.55	19,226.69	12,099.36
Seed	5,843.37	5,926.96	14,819.92	9,919.87
Organic manure	6,464.60	0	7,129.24	0
Bio fertilizer	10,523.34	0	5,346.19	0
Fertilizers	0	8,693.82	0	18,733.97
Bio pesticides	7,025.60	0	9,459.75	0
Pesticides/fungicides	0	2,2563.20	0	17,788.46
Pandal material	9,593.37	17,514.04	13,326.28	19,190.71
Total	55,640.04	67,057.57	69,308.07	77,732.37

Table 9. Average price of yard long bean and bitter gourd as received by the farmer

Item	**Organic**	**Inorganic**
Price received by farmer yard long bean (Rs/kg)	32.00	32.50
Price received by farmer bitter gourd (Rs/kg)	30.50	31.00

Table 10. Productivity of organically and conventionally grown yard long bean and bitter gourd (kg ha^{-1}).

Item	Organic	Inorganic
Productivity of yard long bean (kg ha^{-1})	591.52	425.29
Productivity of bitter gourd (kg ha^{-1})	510.80	813.60

Cost concepts were used to represent the cost of cultivation of one hectare of yard long bean and bitter gourd. Net returns and B-C ratio with respect to cost A, B_1, B_2, C_1, C_2 and C_3 were worked out.

The cost of cultivation per hectare of organic and conventional yard long bean and bitter gourd were worked out using ABC cost concepts and is presented in tables 10, 11, 12 and 13 respectively.

The initial cost of organic certification incurred by the farmers was Rs 60,000/- for a group of 100 farmers for a period of three years. After the initial three years period of certification the farmers paid Rs 600/- per farm every year from the 4^{th} year of certification for growing organic crops. For individual farm certification the farmer has to pay Rs 1000 every year.

4.2.1 Economics of organic yard long bean cultivation

The cost of cultivation details for the organic yard long bean crop for the year 2012-13 was worked out using A,B and C cost concepts and is presented in table 11.

For organic yard long bean, cost A was worked out to be Rs 1,50,277 ha^{-1} of which cost of hired labour accounted for 32.60 per cent of cost A, followed by depreciation on use of farm implements (18.74 per cent of cost A). Interest on working capital accounted for 9.20 per cent of cost A.

These were followed by the cost of manures which accounted up to 8.82 per cent of cost A, plant protection chemicals which accounted for 8.69 per cent

of cost A. The cost of pandal material remained less with a share of 8.51per cent per cent of cost A. Cost B_1, B_2, C_1, C_2 and C_3 were Rs 1,82,078 ha^{-1}, Rs 4,68,975 ha^{-1}, Rs 2,50,413 ha^{-1}, Rs 5,37,311 $ha^{-1}$and Rs 5,91,042 ha^{-1}respectively.

There was a huge hike in the cost B_2 of organic yard long bean cultivation which is due to the high rental value of owned land. Cost C_1 was calculated at Rs 2, 50,413 ha^{-1} which shows higher family labour utilisation.

4.2.2 Economics of Conventional Yard Long Bean Production

The cost of cultivation details for the conventional yard long bean for the year 2012-13 was worked out using cost concepts and is presented in table 11.

For conventional yard long bean crop, cost A was worked out to be Rs 1, 46,277 ha^{-1} of which cost of hired labour accounted for 34.37 per cent followed by interest on working capital (10.95 per cent) and depreciation (10.56 per cent). These were followed by the plant protection chemicals which accounted up to 8.11 per cent of cost A followed by pandal material (8.66 per cent). The cost of manures and fertilizers remained less with a share of 5.81 per cent of cost A.

Cost B_1, B_2, C_1, C_2 and C_3 were Rs 1,63,255 ha^{-1}, Rs 3,75,334 ha^{-1}, Rs 2,16,556ha^{-1}, Rs 4,28,635 ha^{-1}, Rs 4,71,498 ha^{-1}respectively.Cost C_1 was calculated at Rs 2,16,556 $ha^{-1}$and the use of the family labour is comparatively less in the case of conventional farmers in growing yard long bean.

As in the case of organic cultivation, hired labour was the major input constituting 34.37 per cent. When compared to the organic yard long bean cultivation, the cost of conventional production was less for all the cost concepts. Cost A and cost C_1which was 1,46,277.22 and 2,16,555.94 respectively accounting for 2.66 and 13.52 per cent lower than organic cultivation. This shows that more family labour use in organic farming.

Table 11. Cost of cultivation of organic yard long bean in the year 2012-13.

Sl.No	Item	Cost (Rs/ha)	Percentage to cost A
1	Hired labour	48,493.98	32.60
2	Plant protection (bio-pesticides)	13,064.76	8.69
3	Manures	13,260.54	8.82
4	Pandal material	12,801.20	8.51
5	Land revenue	1,859.94	1.23
6	Depreciation	28,176.20	18.74
7	Annual maintenance/repairs	8,659.63	5.76
8	Interest on working capital	13832.38	9.20
9	Miscellaneous	10,128.01	6.73
	Cost A	150,276.64	100
10	Interest on fixed capital	31,200.90	-
11	Cost of certification	600	-
	Cost B1	1,82,077.54	-
12	Rental value of owned land	2,86,897.60	-
	Cost B2	4,68,975.14	-
13	Family labour	68,335.84	-
	Cost C1	2,50,413.38	-
	Cost C2	5,37,310.98	-
	Cost C3	5,91,042.08	-

4.2.2 Economics of Conventional Yard Long Bean Production

The cost of cultivation details for the conventional yard long bean for the year 2012-13 was worked out using A, B and C cost concepts and is presented in table 11.

For conventional yard long bean crop, cost A was worked out to be Rs 1, 46,277 ha^{-1} of which cost of hired labour accounted for 34.37 per cent followed by interest on working capital (10.95 per cent) and depreciation (10.56 per cent). These were followed by the plant protection chemicals which accounted up to 8.11 per cent of cost A followed by pandal material (8.66 per cent). The cost of manures and fertilizers remained less with a share of 5.81 per cent of cost A.

Cost B_1, B_2, C_1, C_2 and C_3 were Rs 1,63,255 ha^{-1}, Rs 3,75,334 ha^{-1}, Rs 2,16,556 ha^{-1}, Rs 4,28,635 ha^{-1}, Rs 4,71,498 ha^{-1} respectively. Cost C_1 was calculated at Rs 2,16,556 $ha^{-1}$and the use of the family labour is comparatively less in the case of conventional farmers in growing yard long bean.

As in the case of organic cultivation, hired labour was the major input constituting 34.37 per cent. When compared to the organic yard long bean cultivation, the cost of conventional production was less for all the cost concepts. Cost A and cost C_1 which were Rs 1,46,277.22 ha^{-1} and Rs 2,16,555.94 ha^{-1} respectively accounting for 2.66 and 13.52 per cent lower than organic cultivation. This shows that more family labour use in organic farming.

4.2.3 Economics of Organic Bitter Gourd Cultivation

The cost of cultivation details for the organic bitter gourd was worked out by using cost A B C cost concepts. The details were being presented in table 13.

For organic bitter gourd, cost A was worked out to be Rs 1, 59,077 ha^{-1}. Out of this cost of which cost of hired labour accounted for 28.63 per cent and depreciation on farm implements accounted for 24.91 per cent.

Of the inputs, manures followed by the pandal material accounted for 9.10 per cent and 8.31 per cent of cost A respectively. Cost B_1, B_2, C_1, C_2, and C_3 were

2,03,570 ha^{-1}, Rs 6,07,172 ha^{-1}, Rs 3,10,403 ha^{-1}, Rs 7,14,004 $ha^{-1}$and Rs 7,85,405 ha^{-1} respectively.

As in the case of organic yard long bean, there was a huge hike in cost B_2 of organic bitter gourd cultivation which was due to the high rental value of owned land. Cost C_1 was calculated at Rs 3, 10,403 ha^{-1} which is due to the higher use of family labour in the organic cultivation.

4.2.4 Economics of Conventional Bitter Gourd Production

The cost of cultivation details for the conventional bitter gourd crop for the year 2012-13 was worked out by using ABC cost concepts and is presented in table 14.

For conventional bitter gourd crop, cost A was worked out to be Rs. 2,21,059 ha^{-1} of which cost of hired labour accounted for 27.20 per cent followed by depreciation of farm implements (15.84 per cent),13.05 per cent was accounted by pandal material, (10.99 per cent) was accounted by the interest on working capital and Plant protection chemicals accounted for 9.77 per cent of cost A. The cost of manures and fertilizers remained less with a share of 8.49 per cent of cost A.

Cost B_1, B_2, C_1, C_2 and C_3 were Rs 2,59,804 ha^{-1},Rs 7,43,778/ ha^{-1}, Rs 4,04,035 ha^{-1}, Rs 8,88,009 ha^{-1} and Rs 9,76,810 ha^{-1} respectively. Cost C_1 was calculated at Rs 4, 04,035 ha^{-1} and the use of the family labour was comparatively less in the case of conventional farmers in growing bitter gourd.

As in the case of organic cultivation, hired labour was the major input constituting 27.20 per cent. When compared to the organic bitter gourd cultivation, the cost of conventional production was less for all the cost concepts. Cost A and cost C_1 which was 2,04,964.26 and 3,87,940.09 respectively accounting for 22.38 and 19.98 per cent higher than organic cultivation. This shows that the cost of cultivation is higher for conventional farmers in case of bitter gourd.

Table 12. Cost of cultivation of conventional yard long bean cultivation in the year 2012-13.

Sl.No	Item	Cost (Rs/ha)	Percentage to cost A
1	Hired labour	50,280.90	34.37
2	Plant protection (bio-pesticides).	12,675.56	8.66
3	Manures	8,511.26	5.81
4	Pandal material	11,867.98	8.11
5	Land revenue	1,127.10	0.07
6	Depreciation	15,448.74	10.56
7	Annual maintenance/repairs	16,853.93	11.52
8	Interest on working capital	14,767.56	10.95
9	Miscellaneous	14,744.19	10.07
	Cost A	1,46,277.22	100
10	Interest on fixed capital	16,978.16	
	Cost B_1	1,63,255.38	
11	Rental value of owned land	2,12,078.7	
	Cost B_2	3,75,334.08	
12	Family labour	53,300.56	
	Cost C_1	2,16,555.94	
	Cost C_2	4,28,634.64	
	Cost C_3	4,71,498.10	

Table 13. Cost of cultivation of organic bitter gourd in the year 2012-13

Sl. No	Item	Cost (Rs/ha)	Percentage to cost A
1	Hired labour	45,550.85	28.63
2	Plant protection (bio-pesticides)	6,620.76	4.16
3	Manures	14,480.93	9.10
4	Pandal material	13,230.93	8.31
5	Land revenue	2,623.94	16.94
6	Depreciation	39,637.71	24.91
7	Annual maintenance/repairs	8,951.27	5.62
8	Interest on working capital	17396.19	10.93
9	Miscellaneous	10,585.05	6.65
	Cost A	1,59,077.63	100
10	Interest on fixed capital	43,892.80	
11	Cost of certification	600	
	Cost B_1	2,03,570.43	
12	Rental value of owned land	4,03,601.70	
	Cost B_2	6,07,172.13	
13	Family labour	1,06,832.60	
	Cost C_1	3,10,403.03	
	Cost C_2	7,14,004.73	
	Cost C_3	7,85,405.20	

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Table 14. Cost of cultivation of conventional bitter gourd in the year 2012-13.

Sl. No	Item	Cost (Rs/ha)	Percentage to cost A
1	Hired labour	55,769.23	27.2
2	Plant protection (bio-pesticides)	20,032.05	9.8
3	Manures	17,419.87	8.5
4	Pandal material	26,762.82	13
5	Land revenue	2,572.11	1.2
6	Depreciation	32,471.96	16
7	Annual maintenance/repairs	14,022.44	6.8
8	Interest on working capital	22,532.37	11
9	Miscellaneous	13,381.41	6.5
	Cost A	2,04,964.26	100
10	Interest on fixed capital	38,745.03	
	Cost B1	2,43,709.29	
11	Rental value of owned land	4,83,974.40	
	Cost B2	7,27,683.69	
12	Family labour	1,44,230.80	
	Cost C1	3,87,940.09	
	Cost C2	8,71,914.49	
	Cost C3	9,59,105.94	

4.2.5. Gross Returns from Yard Long Bean and Bitter Gourd

Returns from organic and conventional yard long bean were presented in table 14. The yield obtained from the organic yard long bean was 30 per cent more and for bitter gourd it was less by 5 per cent when compared to conventional cultivation. The corresponding gross returns was to the extent of 27 per cent more

and 7 per cent less for organic yard long bean and bitter gourd respectively as the prices are slightly lesser.

4.2.6 Benefit- cost Ratio for Yard Long Bean

The yard long bean cultivation was profitable in both conventional and organic systems after considering paid out costs and at cost $c_1$the imputed value of family labour and without rental value of land which was 1.25 and 1.13 respectively. When both the systems were considered, at cost A, the organic yard long bean was more profitable with B-C ratio of 2.09 compared to that of the conventional yard long bean with B-C ratio of 1.68. The B-C ratio is only around 0.50 at cost c_2 and c_3 which indicates that the cultivation is not profitable while taking the rental value of owned land and managerial cost.

Table 15. Gross returns from yard long bean and bitter gourd

Parameter	Organic		Conventional / inorganic	
	Yard long bean	Bitter gourd	Yard long bean	Bitter gourd
Yield (kg/ha)	9819.27	6027.54	7570.22	6346.15
Price (Rs/kg)	32.00	30.50	32.50	31.00
Gross returns (Rs/ha)	3,14,216.64	1,83,839.97	2,46,032.20	1,96,730.70

4.2.7 Benefit-cost Ratio for Bitter gourd

When compared to yard long bean cultivation, the cultivation of bitter was not at all profitable wherein the B-C ratio was less than 1 except for organic bitter gourd at cost A_1 with B-C ratio of 1.15, at cost c_1 the B-C ratio was 0.59 and 0.50 respectively for organic and conventional bitter gourd. At c_2 and c_3 the B-C ratio was around 0.20 for both organic and conventional cultivation.

Table 16. Benefit cost ratio for yard long bean

Cost	Net returns (Rs/ha)		B-C ratio	
	Organic	Conventional	Organic	Conventional
Cost A	1,50,276.64	1,46,277.22	2.09	1.68
COST B_1	1,82,077.54	1,63,255.38	1.72	1.50
COST B_2	4,68,975.14	3,75,334.08	0.67	0.65
COST C_1	2,50,413.38	2,16,555.94	1.25	1.13
COST C_2	5,37,310.98	4,28,634.64	0.58	0.57
COST C_3	5,91,042.08	4,71,498.10	0.53	0.52

4.7 RESOURCE USE EFFICIENCY

Cobb-Douglas production function was used to work out the resource use efficiency. Seven independent variables namely quantity of seed used, quantity of fertilizer used, quantity of manures used, hired labour, family labour, pesticide quantity and fungicide quantity were taken for the study, while yield was taken as the dependent variable.

It is expressed in the form of

$$y = b_0 X_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} X_6^{b6} X_7^{b7}$$

$$\log Y = \log b_0 + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + b_7 \log X_7$$

Table 17: Benefit-Cost Ratio for bitter gourd

Cost (Rs/ha)	Net returns (Rs)/ha		B-C ratio	
	Organic	Conventional	Organic	Conventional
Cost A_1	1,59,077.63	2,04,964.26	1.15	0.95
Cost B_1	2,03,570.43	243,709.29	0.90	0.80
Cost B_2	6,07,172.13	7,27,683.69	0.30	0.27
Cost C_1	3,10,403.03	3,87,940.09	0.59	0.50
Cost C_2	7,14,004.73	8,71,914.49	0.25	0.22
Cost C_3	7,85,405.20	9,59,105.94	0.23	0.20

For organic yard long bean the coefficient of determination (adjusted R^2) is 0.74 which showed that the 74 per cent of the variation in the dependent variable was explained by the selected independent variables. Out of the variables selected, only seed quantity and hired labour quantity were observed to be statistically significant and positive.

For conventional yard long bean, coefficient of determination (adjusted R^2) was 0.77 which showed that the 77 per cent of the variation in the dependent variable was explained by the selected independent variables. Out of the variables selected, quantity of the seed used, hired labour quantity, family labour quantity and quantity of pesticide applied were observed to be statistically significant and positive.

For organic bitter gourd, coefficient of determination (adjusted R^2) is 0.90 which showed that the 90 per cent of the variation in the dependent variable was explained by the selected independent variables. Out of the variables selected, only quantity of the seed used was found to be statistically significant and positive. Family labour was nearly significant with a t - value of 1.95. For conventional bitter gourd, coefficient of determination (adjusted R^2) was 0.58 which showed that 58 per cent variation in the dependent variable was explained

by the selected independent variables. Out of the variables selected only hired labour quantity was observed to be statistically significant and positive.

Table 18. Production function for organic and conventional yard long bean

Sl No	Explanatory variable	Elasticity of production	
		Organic yard long bean	Conventional yard long bean
1	Constant	1.94	2.06
2	Quantity of seed	0.80*	0.59**
3	Quantity of fertilizer	-0.28	-0.33
4	Quantity of manures	0.019	-
5	Hired labour	0.36*	0.46**
6	Family labour	0.72	0.49*
7	Pesticide quantity	0.56	0.37*
8	Fungicide quantity	-0.84*	-0.40*
9	Adjusted R square	0.74	0.77
10	Returns to scale	1.34	1.18
11	F – value$_{(5,44)}$	8.89	18.86

(*significance at 5per cent level; ** significance at 1per cent level)

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 product (MVP) and marginal factor cost (MFC) is used to find allocative efficiency as shown in table 20.

Table 19. Production function for organic and conventional bitter gourd

Sl no	Explanatory variable	Elasticity of production	
		Organic bitter gourd	Conventional bitter gourd
1	Constant	0.68	2.85
2	Quantity of seed	0.49**	0.02
3	Quantity of fertilizer	-0.56	-0.15
4	Quantity of manures	0.73	0.05
5	Hired labour	0.12	0.54**
6	Family labour	0.53*	0.63
7	Pesticide quantity	-0.05	-0.004
8	Fungicide quantity	0.03	0.11
9	Adjusted R square	0.90	0.58
10	Returns to scale	1.30	1.21
11	F – value$_{(5.44)}$	25.54	4.85

(*significance at 5per cent level; ** significance at 1per cent level)

To calculate the marginal value of product, geometric mean of yield, geometric mean of independent variables (cost of inputs), elasticity coefficient and price per unit of yard long bean and bitter gourd were used .The price taken was Rs 32/kg and Rs 32.50/kg for organic and conventional yard long bean respectively and Rs 30.50/kg and 31/kg for organic and conventional bitter gourd respectively.

The ratio ‘k’ (MVP/MFC) was greater than 1 for cost of the seed, cost of bio-fertilizers and cost of bio-pesticides used by the organic yard long bean farmers, indicating their under utilisation of resources and should be increased to

improve allocative efficiency. The ‘k’ value was less than 1 for cost of manures and bio-fungicides, family labour, hired labour used by the organic yard long bean farmers indicating their over utilisation. The use of these resources has to be reduced to improve the allocative efficiency. i.e. why the regression coefficients are negative.

The ratio ‘k’ was greater than 1 for cost of the seed used and cost of pesticides used by the conventional yard long bean farmers, indicating the under utilisation and their use should be increased to improve allocative efficiency. The ‘k’ was less than one for cost of hired labour and cost of family labour, cost of fertilizers and fungicides used indicating excess use of resources, the use of these resources have to be reduced to improve the allocative efficiency.

The ratio ‘k’ was greater than 1 for cost of the seed used and cost of the manures used by the organic bitter gourd farmers, indicating their under utilisation and should be increased to improve allocative efficiency. The ‘k’ value was less than one for cost of hired labour per hectare, cost of family labour per hectare and cost of bio pesticides, cost of bio fertilizers and bio fungicides indicating excess use of resources. The use of these resources has to be reduced to improve the allocative efficiency.

The ratio ‘k’ was greater than 1 for cost of seed used and the cost of pesticides used by the conventional bitter gourd farmers, indicating the under utilisation and should be increased to improve allocative efficiency. The ‘k’ was less than one for cost of the hired labour and family labour, cost of fertilizers used, cost of manures used and cost of fungicides used indicating excess use of resources, the use of these resources have to be reduced to improve the allocative efficiency.

Table 20. Allocative efficiency of organic and conventional yard long bean and bitter gourd.

Explanatory variables/ resource	Geometric mean				MVP			
	Organic		Conventional		Organic		Conventional	
	Yard long bean ($\bar{Y}$) = 475.2)	Bitter gourd ($\bar{Y}$)= 220.87)	Yard long bean ($\bar{Y}$)=328.74)	Bitter gourd ($\bar{Y}$)= 170.4)	Yard long bean	Bitter gourd	Yard long bean	Bitter gourd
Seed cost	295.12	360.72	347.99	283.01	30.67	5.71	18.13	2.07
Fertilizer cost	327.17	918.47	207.99	224.45	12.23	-0.66	-61.60	-1.09
Manure cost	1253.45	221.74	-	39.90	-0.70	13.65	-	-17.90
Hired labour	2061.19	1560.45	2970.16	1435.69	0.46	0.083	0.33	0.23
Family labour	4541.21	4680.46	3758.08	4631.14	0.56	0.048	0.21	0.03
Pesticides cost	1027.52	992.52	251.38	164.83	2.65	0.098	29.91	3.10
Fungicide cost	110.384	110.34	110.34	85.75	-398.93	-22.85	-213.30	-7.98

Table 21. k values of organic and conventional yard long bean and bitter gourd.

Item	k (Organic yard long bean)	k (Conventional yard long bean)	k (Organic bitter gourd)	k (Conventional bitter gourd)
Seed cost	30.67	18.13	5.71	2.07
Fertilizer cost	12.23	-61.60	-0.66	-1.09
Manure cost	-0.70	-	13.65	-17.90
Hired labour	0.46	0.33	0.083	0.23
Family labour	0.56	0.21	0.048	0.03
Pesticides cost	2.65	29.91	0.098	3.10
Fungicide cost	-398.93	-213.30	-22.85	-7.98

4.4 MARKETING

4.4.1 Marketing channels

Six major marketing channels used by the farmers for marketing of their produce were identified and presented in table 22. They were

Channel 1: Producer ➡consumer

Channel 2: Producer ➡retailer ➡consumer

Channel 3: Producer ➡wholesaler ➡consumer

Channel 4: Producer ➡wholesaler ➡retailer ➡consumer

Channel 5: Producer ➡VFPCK ➡ consumer

Channel 6: Producer ➡Fair trade centre ➡consumer

In the 1st channel the farmer producer directly sells his produce to the consumers. 15 per cent of the organic vegetable farmers and 5 per cent of conventional vegetable farmers used this channel for marketing.

Three thousand three hundred and sixty kg of organic vegetables and 140 kg of conventional vegetables were marketed through this channel. The market

selling price for the organic yard long bean and conventional yard long bean were Rs 32.50 per kg and Rs 32 per kg respectively. The market selling price for the organic and conventional bitter gourd was Rs 30.50 per kg and Rs 30 per kg respectively.

In the second channel for the marketing of the produce grown by the farmers in which the farmers sold their produce to the retailer and the retailer sold it to the consumers, 20 per cent of the organic vegetable farmers and 25 per cent of the conventional vegetable growing farmers used this channel for marketing of the produce.

Four thousand two hundred and ninety kg of the conventional vegetables and 4420 kg of organic vegetables were being sold through this channel. The market selling price for the organic and conventional yard long bean were Rs 31 per kg and Rs 31.50 per kg respectively. The market selling price for organic and conventional bitter gourd was Rs 30 per kg.

The 3rd channel is the most important marketing channel for selling of produce which accounted for 50 per cent of the organic vegetable farmers and 55 per cent of the conventional vegetable farmers.

Six thousand one hundred and seventy five kg of the conventionally grown vegetables and 8670 kg of organic vegetables were sold through this channel. The market selling price for organic yard long bean and bitter gourd were Rs 32.00 per kg and Rs 29 per kg and that of conventional yard long bean and bitter gourd were Rs 32.50 per kg and Rs 32 per kg respectively.

The 4th marketing channel accounts for 10 per cent of the conventional vegetable farmers. 1050 kg of vegetables were marketed through this channel. The market selling price for conventionally grown yard long bean and bitter gourd was Rs 32 per kg and Rs 29 per kg respectively.

The 5th marketing channel accounted for 10 per cent of conventional vegetable farmers. 1770 kg of vegetables grown conventionally were marketed through this channel. The market selling price for the conventional yard long bean and bitter gourd was Rs 35 per kg and Rs 32 per kg respectively.

The 6th marketing channel used by the organic vegetable farmers was that of selling their produce in the fair trade centres which accounts to 10 per cent of the total farmers. About 2350 kg of the organically grown vegetables were marketed through this channel. The market selling price of the organically grown yard long bean and bitter gourd was Rs 40 per kg and Rs 32.50 per kg respectively through this channel.

Fair trade centres have been established in Pulpally area in the last few years. They provide premium price for organic products.

Table 22. Marketing channels used by the farmers in selling their produce (organic and conventional)

Item	Number of farmers		Total quantity of produce marketed (kg)		Price of the produce sold (Rs/kg)			
	Organic N=20	Inorganic N=20	Organic	Inorganic	Yard long bean		Bitter 0gourd	
					Organic	Inorganic	Organic	Inorganic
Producer-consumer	3	1	3,360	140	32	32.50	30.50	30
Producer-retailer-consumer	4	5	4,420	4,290	31.50	32	30	30
Producer-wholesaler-consumer	11	10	8,670	6,175	32.50	32	30	29
Producer-wholesaler-retailer-consumer	-	2	-	1,050	-	32	-	29
Producer-VFPCK-consumer	-	2	-	1,770	-	35	-	32
Producer-Fair trade centre-consumers	2	-	2,350	-	40	-	32.50	-

4.4.2 Costs of Marketing

The costs incurred by the farmers in selling their produce in the market were Rs 1.50 per kg for organic farmers and Rs 0.68 per kg for conventional farmers. The cost incurred by the farmers in the market is nil as there was no commission to be borne by the farmers when they sold the produce. Total cost of marketing

incurred by the organic farmers was Rs 29,720/- and Rs 13,680/- for the inorganic farmers for selling their produce.

Table 23. Costs of marketing

Item	Cost incurred by the farmers for selling the produce	
	Total (Rs)	Average (Rs/kg)
Organic	29,720	1.50
Inorganic	13,680	0.68

4.4.3 Price spread of organic and conventional yard long bean and bitter gourd

In Wayanad district, the market transaction of the major marketing channel was through the wholesalers in the market. In the price spread, wholesalers enjoyed a profit margin from Rs 3 - 3.50 per kg on the selling of their produce to the consumer. There was no premium price in the market for the organically produced vegetables.

4.5. CONSUMER PREFERENCE TOWARDS BUYING OF ORGANIC VEGETABLES

Study of consumer preference towards organic vegetables was carried out as an opinion survey, and the results showed that 2/3^{rds} of the consumers preferred organic vegetables due to better quality of the organic vegetables. 73.33 per cent of the consumers preferred organic vegetables due to the health oriented motives, 53.33 per cent of the consumers prefer organic vegetables due to the motivation by media and 46.66 per cent due to motivation by their neighbours.

26.67 per cent of the consumers did not prefer organic vegetables even though they were healthy. 1/3rd of the consumers prefer organic vegetables even though their price was highly volatile. Only 40 per cent of the consumers preferred organic vegetables even though they were of higher price compared to

conventional vegetables. The results of the survey indicated that consumers preferred organic vegetables mainly due to their health effects and the higher quality of the organic vegetables.

Table 24. Price spread of organic and conventional yard long bean and bitter gourd (Rs/kg)

Sl no	Particulars	Organic		Inorganic	
		Yard long bean	Bitter gourd	Yard long bean	Bitter gourd
1	**Producer**				
A	Price received by the producer	32.00	30.50	32.50	31.00
b	Cost of transportation	0.50	0.50	0.50	0.50
C	Net price received	31.50	30.00	32.00	30.50
2	**Wholesaler**				
A	Purchase price	32.00	30.50	32.50	31.50
b	Storage and cleaning cost	1.00	1.00	1.00	1.00
C	Market margin	2.00	2.50	2.00	2.50
d	Sale price	35.00	34.00	35.50	35.00
3	**Consumer's purchase price**	35.00	34.00	35.50	35.00

4.6. CONSTRAINTS FACED BY THE FARMERS IN CULTIVATION OF ORGANIC VEGETABLES

Understanding the constraints of the farmers 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 policy measures. Out of the plausible constraints faced, the farmers ranked those constraints they felt most serious. Using Garrett's ranking technique those ranks

were converted into Garrett's scores and are provided in table 24. The corresponding rank according to the score is also provided in the table 24.

Table 25. Consumer's preference towards buying of organic vegetables

Item	Number of consumers preferring organic vegetables (n=30)		
	Yes	No	Total
Due to higher quality of organic vegetables	20(66.67)	10 (33.33)	30
Health oriented motive	22 (73.33)	8 (26.67)	30
Motivation by neighbours	16 (53.33)	14 (46.66)	30
Motivation by media	14 (46.66)	16 (53.33)	30
Not preferring organic vegetables even though they are healthy	8 (26.67)	22 (73.33)	30
Organic vegetables have high price volatility	10 (33.33)	20 (66.67)	30
High cost in comparison to inorganic vegetables	12 (40)	18(60)	30

Note: Figures in parentheses indicate per cent to total

Variation in climate was the most serious constraint faced by organic vegetable growing farmers followed by the problems in marketing and same price for the produce compared to the conventional farmers. The other import0ant constraints identified were absence of separate market for selling of the organic produce, pest and disease problems, availability of bio-fertilizers, high cost of labour, followed by difficulty in availability of high yielding varieties and organic manures.

For conventional vegetable growing farmers also variation in the climate was the most serious constraint. Unlike the organic vegetable cultivators the next major problems faced by them were difficulty in availability of fertilizers, availability of high yielding varieties, pest and disease problems, low price of the produce, high cost of labour and marketing problems.

From the study it is clear that climate is an important factor in vegetable cultivation whether it is organic or conventional production system. In the case of

organic farmers the major problems faced were lack of premium price for the organic produce and the non-availability of a separate market for selling of the organic produce.

Followed by pest and disease problems as the organic farmers do not use the chemicals used by the conventional farmers. Availability of bio fertilizers and high cost of labour were also the major problems faced by both organic farmers, followed by availability of high yielding varieties and organic manures.

The fluctuating prices of the vegetables are always a concern for the conventional and organic farmers. This was mainly due to the apprehension about the future prices for the farmers resulting in price fluctuations.

Table 26. Constraints faced by the organic and conventional vegetable farmers

Sl. No	Constraint	Organic		Inorganic	
		Garrett's score	Rank	Garrett's score	Rank
1	Difficulty in availability of high yielding varieties	64.99	8	27.22	3
2	Low price of the produce	31.66	3	62.77	5
3	Pest and disease problems	61.10	5	53.87	4
4	High cost of labour	30.55	7	33.33	6
5	Variation in climate	90.52	1	81.64	1
6	Difficulty in availability of fertilizers/ bio-fertilizers	77.20	6	34.40	2
7	Difficulty in availability of organic manure	51.66	9	16.66	-
8	Non - availability of separate market for organic produce	19.40	4	56.66	-
9	Marketing problems	23.88	2	69.44	7

SUMMARY

5. SUMMARY

Wayanad district is a major producer of vegetables in the Kerala state. The district also has a large number of organic farmers growing vegetables. The present study was an attempt to understand the organic and conventional vegetable production in the district. The objective of the study was:

To study the economics of organic vegetable production, consumer preference and marketing of organic vegetables in Wayanad district.

This study was done in Sulthan Bathery block of Wayanad district. Data on the general characteristics of the farmers were collected. Percentages and averages were used to study the above features. Cost of cultivation was worked out using the A B C cost concepts. Since yard long bean and bitter gourd were annual crops only the cost of production and maintenance were considered to obtain the total costs. Cost of production was calculated using the rental value of owned land.

Allocative efficiency of the resource was estimated using Cobb- Douglas production function. Consumer preference toward organic vegetables was being analyzed using an opinion survey from the consumers taken randomly. Marketing channel for both organic and conventional yard long bean and bitter gourd were identified and price spread was calculated for both organic and conventional yard long bean and bitter gourd marketing channel

5.1 Salient findings of the study are presented below

1. The sample farmers were classified into three age groups - less than 30, 30-50 and above 50 years and the details are presented in table 1. The average age of organic farmers was 51.2 years while that of conventional farmers was 58.2 years. In the case of organic and conventional farmers, maximum concentration was observed in the age group of 50 and above, followed by the age group of 30-50 years for organic and conventional farmers.45 per cent of the organic farmers are in the age group below 50 years. 25 per cent of the organic farmers are below

the age group of 50 years. This shows that the younger age groups of farmers are inclined towards organic farming.

2. Organic farmers were having 100 per cent literacy while the conventional inorganic farmers were having only 80 per cent literacy. 90 per cent of the organic farmers were having higher education (High school or more) while only 60 per cent of the conventional farmers were having higher education (High school or more). This indicate that the organic farmers are well educated than their counter parts .10 per cent of the organic farmers and 20 per cent of the conventional farmers were having primary education.

3. All the sample organic farmers were primarily dependent on agriculture while 95 per cent of the inorganic farmers were primarily dependent on agriculture for their income and a meagre 5 per cent of inorganic farmers were having a petty business as their primary occupation. Organic farming is practiced more by full time farmers.

4. Distribution of family size indicated that 16.66 per cent of both organic and inorganic farmers had small family size (1-3 members), while 65 per cent of the organic farmers and 75 per cent of the inorganic farmers had medium family size (4-6 members). 20 per cent of the organic farmers and 10 per cent of the inorganic farmers had large families (7 and more).

5. In the case of organic farmers of yard long bean (80 per cent) and of bitter gourd (90per cent) farmers had land holding ranging from 1-20 cents. In the case of inorganic farmers, 70per cent of yard long bean farmers and 95 per cent of bitter gourd farmers belonged to this group. The results of the table indicate that most of the organic and conventional farmers were having small land holdings. (1-20 cents)

6. For organic yard long bean, cost A was worked out to be Rs 1,50,277 ha^{-1} of which cost of hired labour accounted for 32.60 per cent of cost A, followed by depreciation on use of farm implements (18.74 per cent of cost A). Interest on working capital accounted for 9.20 per cent of cost A. These were followed by the cost of manures which accounted up to 8.82 per cent of cost A, plant protection

chemicals which accounted for 8.69 per cent of cost A. The cost of pandal material remained less with a share of 8.51 per cent of cost A. Cost B_1, B_2, C_1, C_2 and C_3 were Rs 1,82,078ha^{-1}, Rs 4,68,975 ha$^{-1,}$ Rs 2,50,413 ha^{-1}, Rs 5,37,311 ha^{-1} and Rs 5,91,042 ha^{-1} respectively.

7. For conventional yard long bean crop, cost A was worked out to be Rs 1, 46,277 ha^{-1} of which cost of hired labour accounted for 34.37 per cent followed by interest on working capital (10.95 per cent) and depreciation (10.56 per cent). These were followed by the plant protection chemicals which accounted up to 8.11 per cent of cost A followed by pandal material (8.66 per cent). The cost of manures and fertilizers remained less with a share of 5.81 per cent of cost A. Cost B_1, B_2, C_1, C_2 and C_3 were Rs 1,63,255 ha^{-1}, Rs 3,75,334 ha^{-1}, Rs 2,16,556 ha^{-1}, Rs 4,28,635 ha$^{-1,}$ and Rs 4,71,498 ha^{-1} respectively.

8. For organic bitter gourd, cost A was worked out to be Rs 1,59,077 ha^{-1} Out of this cost of which cost of hired labour accounted for 28.63 per cent and depreciation on farm implements accounted for 24.91 per cent. Of the inputs, manures followed by the pandal material accounted for 9.10 per cent and 8.31 per cent of cost A respectively. Cost B_1, B_2, C_1, C_2, and C_3 were 2,03,570 ha^{-1}, Rs 6,07,172 ha^{-1}, Rs 3,10,403 ha^{-1}, Rs 7,14,004 ha^{-1} and Rs 7,85,405 ha^{-1} respectively.

9. For conventional bitter gourd crop, cost A was worked out to be Rs 2,04,964.26 ha^{-1} of which cost of hired labour accounted for 27.20 per cent followed by depreciation of farm implements (15.84 per cent), 13.05 per cent was accounted by pandal material, (10.99 per cent) was accounted by the interest on working capital and Plant protection chemicals accounted for 9.77 per cent of cost A. The cost of manures and fertilizers remained less with a share of 8.49 per cent of cost A. Cost B_1, B_2, C_1, C_2 and C_3 were Rs 2,43,709.29 ha^{-1}, Rs 7,27,683.69 ha^{-1}, Rs 3,87,940 ha^{-1}, Rs 8,71,914 ha^{-1} and Rs 9,59,105 ha^{-1} respectively.

10. The yield obtained from the organic yard long bean was 30 per cent more and for bitter gourd it was less by 5 per cent when compared to conventional cultivation. The corresponding gross returns was to the extent of 27 per cent more

and 7 per cent less for organic yard long bean and bitter gourd as the prices are slightly lesser.

11. The yard long bean cultivation was profitable in both conventional and organic systems after considering paid out costs and at cost $c_1$the imputed value of family labour and without rental value of land which was 1.25 and 1.13 respectively. When both the systems were considered, at cost A, the organic yard long bean was more profitable with B-C ratio of 2.09 compared to that of the conventional yard long bean with B-C ratio of 1.68. The B-C ratio is only around 0.50 at cost C_2 and C_3 which indicates that the cultivation is not profitable while taking the rental value of owned land and managerial cost.

12. When compared to yard long bean cultivation, the cultivation of bitter was not at all profitable wherein the B-C ratio was less than 1 except for organic bitter gourd at cost A_1 with B-C ratio of 1.15, at cost C_1 the B-C ratio was 0.59 and 0.50 respectively for organic and conventional bitter gourd. At C_2 and C_3 the B-C ratio was around 0.20 for both organic and conventional cultivation.

13. Cobb-Douglas production function was used to work out the resource use efficiency. For organic yard long bean, the coefficient of determination (adjusted R^2) is 0.74 which showed that the 74 per cent of the variation in the dependent variable was explained by the selected independent variables. Out of the variables selected, only seed quantity and hired labour quantity were observed to be statistically significant and positive. Quantity of bio-fungicides was also observed to be statistically significant but is having a negative sign.

14. For conventional yard long bean, coefficient of determination (adjusted R^2) was 0.77 which showed that the 77 per cent of the variation in the dependent variable was explained by the selected independent variables. Out of the variables selected, quantity of the seed used, hired labour quantity, family labour quantity and quantity of pesticide applied were observed to be statistically significant and positive.

15. For organic bitter gourd, coefficient of determination (adjusted R^2) is 0.90 which showed that the 90 per cent of the variation in the dependent variable was explained by the selected independent variables. Out of the variables selected, only quantity of the seed used was found to be statistically significant and positive. Family labour was nearly significant with a t value of 1.95.

16. For conventional bitter gourd, coefficient of determination (adjusted R^2) was 0.58 which showed that 58 per cent variation in the dependent variable was explained by the selected independent variables. Out of the variables selected only hired labour quantity was observed to be statistically significant and positive.

17 From the allocative efficiency analysis it is understood that the inputs used in both organic and conventional yard long bean and bitter gourd is not optimal and can be increased further.

18 Variation in climate was the most serious constraint faced by organic vegetable growing farmers followed by the problems in marketing and less price for the produce compared to the conventional farmers. The other important constraints identified were absence of separate market for selling of the organic produce, pest and disease problems, availability of bio fertilizers, high cost of labour, followed by availability of high yielding varieties and organic manures.

19 For conventional vegetable growing farmers also variation in the climate was the most serious constraint. Unlike the organic vegetable cultivators the next major problems faced by them were availability of fertilizers, availability of high yielding varieties, pest and disease problems, price of the produce, high cost of labour and marketing problems.

5.2 Conclusion

From the present study it was observed that the cost of cultivation per hectare of yard long bean organically was Rs 1,60,156.90 ha^{-1} and that of conventional yard long bean was Rs 1, 55,698.43 ha^{-1}. It was observed that the organic farmers are getting higher gross returns than that of conventional yard long bean farmers. The cost of cultivation per hectare of bitter gourd organically

was Rs 1,71,503.50 ha^{-1} and that of conventional bitter gourd was Rs 2, 21,058.80 ha^{-1}. It was observed that the conventional farmers were getting higher gross returns than that of organic bitter gourd farmers.

From the allocative efficiency it was understood that the resources are under-utilized in both conventional and organic yard long bean and bitter gourd. The conventional farmers can improve their yield using their inputs efficiently and in the case of organic farmers it can be further improved if the farmers get a premium price for the organic vegetables which are healthy than the conventional vegetables.

5.3 Policy options

India has been one of the leading producer of vegetables due to the diverse climate which ensures availability of all varieties of fresh fruits & vegetables. India is one of the largest producers of vegetables in the world next behind only to china. Recently most of the farmers are leaving vegetable cultivation due to the low returns compared to that of commercial crops.

Some steps which can be taken to improve the vegetable cultivation in Kerala should at enhancing the productivity using high yielding varieties and new technology efficiently. The cultivation of vegetables in the state is on a declining trend .

The government should provide premium prices for the vegetables especially organic vegetables in order to improve the vegetable cultivation further. Institutional credit and incentives to be given to the women and unemployed youth and giving training for cultivation of vegetables using new and high yielding technologies.

Department of Agriculture, Kerala Agricultural University and Indian vegetable research institutes should be able to provide the necessary back up especially in case of organic farmers. Organic farmers can get profits after their conversion period if they are to use their resources efficiently and get higher

returns. The government and the institutions should further encourage the organic farming and try to create a few separate markets for selling the organic produces at their premium prices.

Availability of organic manures and the bio fertilizers and bio pesticides is the key for the organic farmers growing their crop. The government should take steps to make available organic manures, Bio pesticides and bio control agents' to most of the farmers. The organic farmers should be given technologies and practices to avoid the pest and disease problems which are high due to the non-usage of chemicals.

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APPENDIX – I

APPENDIX – I

KERALA AGRICULTURAL UNIVERSITY

DEPARTMENT OF AGRICULTURAL ECONOMICS

COLLEGE OF AGRICULTURE, VELLAYANI

SCHEDULE

ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF ORGANIC VEGETABLES IN WAYANAD DISTRICT.

Block:_____ Village:_____

Taluk: _____

Organic/ inorganic farmer

If organic: certifying agency: _____

year of certification: _____

I . General Information :

Name : _____ Age : _____

Education_____

Occupation : Major : _____ Subsidiary: _____

Family income (Rs) : Major: _____ subsidiary : _____

Number of family members : _____

Address :

_____

_____

Phone no :

II Resource inventory: Land (Bhoomi)

Sl. no	Particulars	
1	Area owned (cents)	
2	Land lased in (cents)	
3	Land leased out (cents)	
4	Net cropped area (cents)	
5	Area under Cowpea (cents)(Perumpayar)	
6	Area under Bitter gourd (cents)((*kayppayka*)	
7	Other crops : 1)	
	2)	
8	Value of owned land	
9	Land revenue/ land tax (Rs/annum)	
10	Water tax Other taxes	

III. Buildings and other permanent structures :

Sl no	Particulars	Value (Rs)	Year of construction	Expected life	Life till date	Maintenance cost
1						
2						
3						

IV. Fixed capital :

Sl.no	Particulars	Number	Year of purchase	Total value	Expected life	Maintenance cost	Depreciation	Remarks
1	Manvetty							
2	Spade							
3	Pick axe							
4	Sprayers							
5	Vaakathi							
6	Ladders (Eni – bamboo)							
7	Pumpsets							
8	Others a)							
	b)							
	c)							

. V Live stock

Type of animal	Variety	Total number	Yield	Returns
Cow	Vechur High range dwarf			
Goat	Malabarika			
Hen	Gramalaxmi Athulya			
Pig	Large White Yorkshire Cross-bred			
Rabbit				
Others				

VI. Land utilisation and cultivation pattern

Sl no	Area (cents)	Cost of irrigation	Planting cost	Maintenance cost	Yield	Income
Cardamom (Elam)						
Coconut (Thengu)						

Banana (Vaazha Pazham)						
Cinnamon (Karuva patta)						
Clove (Grambu)						
Cowpea (Perumpayar)						
Bittergourd (*kayppayka*)						
Others .1 2 3						

VII. Cowpea (Perumpayar) cropping pattern

Area under cowpea (cents)	year of planting	Variety grown	Production (kg)	Price (Rs/kg)
		Bhagya laxmi		
		Kairali		
		Varun		
		Others		

VIII. Cost of cultivation

Material cost

a) Bitter gourd (*kayppayka*)

Sl no	Item	Rate	quantity	Amount (Rs)
1	Land preparation			
2	Varieties			
3	Sowing			
4	Seed rate			
5	Seed treatment			
6	Nursery raising			
7	Organic manure			
8	Pandal raising			
10	Bio-fertilizers applied. (if organic)			
11	Use of bio-pesticides (if organic)			
I2	Inorganic fertilizer			
13	Pesticides(if inorganic)			
14	Weedicide (if inorganic)			
15	Fungicide (if inorganic)			
16	Harvesting			
17	Yield organic Inorganic			

18	Production cost organic Inorganic			
19	Marketing rate organic Inorganic			

IX .cost of cultivation

Cowpea (Perumpayar)

S l no	Item	Rate	quantity	Amount
1	Land preparation			
2	Varieties			
3	Sowing			
4	Seed rate			
5	Seed treatment			
6	Nursery raising			
7	Organic manure			
8	Pandal raising			
10	Bio fertilizers applied. (if organic)			
11	Use of bio pesticides (if organic)			

12	Pesticides(if inorganic)			
13	Weedicide (if inorganic)			
14	Fungicide (if inorganic)			
15	Yield organic Inorganic			
16	Production cost organic/ Inorganic			
17	Marketing rate organic/ Inorganic			

X. labour cost (Bitter gourd (*kayppayka*)

Sl.no	Items	Family labour	Hired labour	Machine labour	Rate	quantity	Amount
1	Land preparation						
2	Varieties						
3	Sowing						
4	Seed rate						
5	Seed treatment						
6	Nursery raising						
7	Organic manure						
8	Pandal raising						
9	Bio fertilizers applied. (if organic)						
10	Use of bio pesticides (if organic)						
11	Pesticides(if inorganic)						
12	Weedicide (if inorganic)						
13	Fungicide (if						

	inorganic)						
14	Inorganic fertilizers						
15	Intercultura l operations						
15	Harvest						

XI. Labour cost Cowpea (Perumpayar)

Sl. no	Items	Family labour	Hired labour	Machine labour	Rate	quantity	Amount
1	Land preparation						
2	Varieties						
3	Sowing						
4	Seed treatment						
5	Nursery raising						
6	Organic manure						
7	Pandal raising						
8	Bio fertilizers applied. (if organic)						
9	Use of bio pesticides (if organic)						

10	Pesticides(if inorganic)						
11	Weedicide (if inorganic)						
12	Fungicide (if inorganic)						
13	Harvest						

XII . REASONS FOR SHIFTING TO ORGANIC CULTIVATION

Reasons Remarks

1: Increasing cost of inorganic chemicals Yes/No

2. Increasing return from organic vegetables Yes/No

3. Quality of organic vegetables Yes/No

4. Soil health oriented motives Yes/No

5. Environmental concern Yes/No

6. Motivation by neighbouring organic farmers Yes/No

7. Motivation by media Yes/No

XIV. Method of sale :

Sl no	Method of sale	Quantity	Price
1.	Pre harvest contract		
2.	Village merchant		
3.	Direct sale to the consumer		
4	Sale in wholesale market		
5	Others		

XV. Marketing aspects at producers level

1. Total quantity produced
2. Quantity retained for home consumption
3. Quantity spoiled

a) Due to physical health
b) Due to perishability

4. Quantity kept for seed purpose
5. Quantity marketed .
6. Gift or charity.

XVI. Cost of Marketing

a) Cost incurred by the farmers
   1) Preparation for market:

   Packing:

   Sack:

   2) Loading and unloading:
   3) Mode of Transport:

      Distance from the market:

      Transport unit/trip:

      Total charges :

   4) Cost incurred by the farmer at the market

      Gate free:

      Stall free:

      Commission:

      Brokerage:

      Taxes:

XVII. Constraints faced by the farmers in production and marketing of organic vegetables?

XVIII. Suggestions regarding improvement of Organic farming

APPENDIX – I (a)

KERALA AGRICULTURAL UNIVERSITY

DEPARTMENT OF AGRICULTURAL ECONOMICS

COLLEGE OF AGRICULTURE, VELLAYANI

SCHEDULE FOR MARKETING INTERMEDIARIES

Type of intermediaries:

Name and address:

Sl no	Particulars	Cost (rupees /kg)
1	Labour loading	
2	Cleaning	
3	Grading	
4	Packaging	
5	Packaging and grading	
6	Storage	
7	Rent	
8	Transport cost	
9	Sales tax	
10	Labour unloading	
11	Miscellaneous	
12	Profit margin	

II .Fixed costs

Sl no	Particular	Expenditure
1	Rent	
2	Furniture	
3	Staff	
4	License fee	
5	Others	

III . Working costs

Sl no	Particular	Expenditure
1	Casual labour	
2	Electricity	
3	Water charge	
4	Spoilage	

IV. Value of business:

Total purchase			Total sales		
Quantity	Price/unit	Value (Rs)	Quantity	Price/unit	Value (Rs)

V .Consumers preference to organic vegetables

1. Preference due to higher Quality of organic vegetables

Yes/No

2. Health oriented motives

Yes/No

3. Motivation by neighbouring people

Yes/No

4. Motivation by media?

Yes/No

5. Not preferring organic vegetables even though they are healthy?

Yes/ No

6. Are the organic vegetables price sensitive?

Yes/ No

7. Organic vegetables not preferred due to high cost compared to inorganic vegetables

Yes/ No

Appendix II

Appendix

GARRETT RANKING CON

The conversion of orders of merits

Per cent	Score	Per cent	Scor		
0.09	99	22.32	65		
0.20	98	23.88	64		
0.32	97	25.48	63		
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	-	-

Abstract

ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF ORGANIC VEGETABLES IN WAYANAD DISTRICT

by

Gurram Jayanth Reddy
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THESIS
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MASTER OF SCIENCE IN AGRICULTURE
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2014

Abstract

The research entitled "Economic analysis of production and marketing of organic vegetables in Wayanad district" was conducted in Sultan Bathery block of Wayanad district. The research was undertaken with the objective to study the economics of organic vegetable production, consumer preference and marketing of organic vegetables in Wayanad district. Cost of cultivation was worked out using A B C cost concepts. The crops selected for study were yard long bean and bitter gourd. The cost of production of both crops was worked out. Resource use efficiency was carried out using Cobb- Douglas production function.

For organic yard long bean, cost A was Rs 1,50,277 ha^{-1}. Cost B_1, B_2, C_1, C_2 and C_3 were Rs 1,82,078 ha^{-1}, Rs 4,68,975 ha^{-1}, Rs 2,50,413 ha^{-1}, Rs 5,37,311 ha^{-1} and Rs 5,91,042 ha^{-1}. For conventional yard long bean crop, cost A was Rs 1, 46,277 ha^{-1}. Cost B_1, B_2, C_1, C_2 and C_3 were Rs 1,63,255 ha^{-1}, Rs 3,75,334 ha^{-1}, Rs 2,16,556 ha^{-1}, Rs 4,28,635 $ha^{-1}$and Rs 4,71,498 ha^{-1}. For organic bitter gourd, cost A was Rs 1,59,077 ha^{-1}. Cost B_1, B_2, C_1, C_2, and C_3 were Rs 2,03,570 ha^{-1}, Rs 6,07,172 ha^{-1}, Rs 3,10,403 ha^{-1}, Rs 7,14,004 ha^{-1} and Rs 7,85,405 ha^{-1} respectively. For conventional bitter gourd crop, cost A was Rs. 2,04,964 ha^{-1}. Cost B_1, B_2, C_1, C_2 and C_3 were Rs 2,43,709 ha^{-1}, Rs. 7,27,684 ha^{-1}, Rs. 3,87,940 ha^{-1}, Rs. 8,71,914 ha^{-1} and Rs 9,59,106ha^{-1} respectively. The B-C ratio of organic yard long bean and bitter gourd were 2.02 and 1.15, for conventional yard long bean and bitter gourd it was 1.68 and 0.95.

Consumer preference towards organic vegetables was studied by carrying an opinion survey. Seventy three per cent of the consumers prefer organic vegetables due to health oriented motives. Six major marketing channels used by the farmers for marketing of their produce were identified. Recently, organic farmers were using fair trade centres as a new channel for the marketing their produce. Organic farming can be practised in the future with the government support of creating special market for organic producers with a premium price which helps in promoting organic farming.