ICAR Ad-Hoc Scheme
On Economic Analysis Of Vegetable Production In Kerala State

FINAL REPORT

17-06-2002 to 16-06-2005

Department Of Agricultural Economics
College Of Horticulture
Kerala Agricultural University
Vellanikkara, Thrissur, Kerala- 680 656

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PROJECT TEAM

Principal Investigator	:	Dr. K. Jesy Thomas Associate Professor
Co-Investigator	:	Dr. E.K. Thomas Associate Professor & Head
Research Associates	:	Sri. Thomas T.T. (17 - 06 -02 to 31-10- 04) Ms. Sreeja K.G. (01- 12- 04 to 16- 06-05)

FINAL REPORT OF RESEARCH SCHEME

1. Project Title and no : Economic Analysis of Vegetable Production in Kerala State
   Scheme code : 3039021076

2. Sanction No : No.F.6-14/99-ESM dated 26th March 2002 of Dr. J.P. Mishra, Assistant Director General (ESM), ICAR.

3. Date of Start : 17-06-2002

4. Date of Termination : 16-06-2005

5. Institution Name : College of Horticulture, Kerala Agricultural University

Place : Vellanikkara
District : Thrissur
State : Kerala
Dept/ Div. Name : Dept. of Agrl. Economics
Actual Location : College of Horticulture, Kerala Agricultural University, Vellanikkara, Thrissur - 680656
(Location of research scheme to be carried out)

6. Principal Investigator

Name : Dr. K. Jesy Thomas,
Designation : Associate Professor
Division/ Section : Dept. of Agrl. Economics
Experience : 21 years
Institute Address : College of Horticulture, Vellanikkara Thrissur, Kerala-680 656

7. Co-Investigator

Name : Dr. E.K.Thomas
Designation : Associate Professor & Head
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Instt. Address : College of Horticulture, Vellanikkara Thrissur, Kerala-680 656

8. Objectives:

The study aims to examine the comparative economics of vegetable production under various Government programmes in Kerala. The specific objectives of the study are

- To work out the costs and returns of major vegetable crops in Kerala.
- To examine the labour utilisation pattern in vegetable production with special emphasis on gender issues.
- To analyse the extent of adoption of scientific practices of different vegetable crops.
- To study the marketing channels, marketing costs and, marketing margins of vegetable crops
- To examine the techno-socio-economic constraints faced by vegetable cultivators in the state

9. Duration of Scheme: Three years

10. Total cost of the scheme: Rs.5,47,404/- (Revised to Rs.649464/- on account of upward revision of emoluments to Research Associate in the scheme)

    Recurring Contingencies: Rs.60,000/- for I & II years and Rs.45,000/- for the third year.

    Pay of Research Associate: Rs.1,10,880/- per year (Revised to Rs.144900/-)

    Year: 2003-04

Name of Post	Pay scale	Number of posts	Total
Research Associate	8800+HRA@5% (Revised to Rs.11500 +HRA@5%)	one	one

Pay and allowances of Second year (17-06-2003 to 16-06-2004)

Year	Name of Post	Amount Sanctioned (Rs.)	Amount spent (Rs.)
2003-04	Research Associate	110880	110880

Contingencies of Second year (17-06-2003 to 16-06-2004)

Year	Recurring		Non-Recurring		Total	
	Sanctioned (Rs.)	Spent (Rs.)	Sanctioned (Rs.)	Spent (Rs.)	Sanctioned (Rs.)	Spent (Rs.)
2003-04	60,000	56779	---------	---------	60,000	56779

11. Total Amount Sanctioned for the Second year . : Rs. 170880/-

12. Total Amount Spent : Rs. 167659/-

13. Results of practical/ scientific value:

1. There is an urgent need for the integration of marketing activities of VFPCK at the state level through a well-connected market network.
2. Analysis of constraints in production showed that incidence of pests and diseases and lack of irrigation water were the most important constraints for all the categories of farmers.
3. The lack of storage facilities was pointed out as the major constraint in marketing by all the categories of farmers.

14. Papers published : 2

1. Jesy Thomas K., T.T. Thomas and E.K. Thomas (2005) Constraints of vegetable production in Kerala. Proceedings of XVIIth Kerala Science Congress, Jan. 29-31,2005 Peechi, Thrissur: P 268

2. Jesy Thomas, K. and Sreeja K.G. (2005). Economics of Vegetable Seed Production. Mini C. and Krishnakumary K. (Ed.) Guide on tropical vegetable seed production. Kerala Agricultural University, Thrissur. pp 103-106

Signature: Principal Investigator
Name : Dr. K. Jesy Thomas
Designation of Principal Investigator : Associate Professor
Date : 30-09-05

Signature : Director of Research
Name :

15. Comments of the Project Co-ordinator/ Referee

16. Remarks of the council

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CHAPTER 1
INTRODUCTION

In rapidly developing Asian countries including India, food consumption has drastically expanded and diversified. This phenomenon, which has obvious relevance for economists as well as policy makers, is mainly attributed to high population growth, considerable enhancement of household income, and drastic changes in life style due to rapid urbanization (Ishida *et. al.* 1999; Rae, 1997, 1998). Thus, agriculture is facing the challenge of diversifying production to achieve sustainable higher output and at the same time safeguard the environment and conserve natural resources to adapt to climate changes and growing population demands. In order to release the pressure on cereals as well as to improve upon the human nutrition through consumption of the other nutritious crops, diversification in cropping pattern has been identified as a better option. In this context the increased production and consumption of horticultural crops including vegetables offer promise for the future. Vegetables are rich source of nutrients (especially vitamins and minerals), besides its medicinal values (Nath and Dutta, 2002). They are particularly important as a source of vitamin A, vitamin C, and folate (folic acid, folacin). Most vegetables are a good source of thiamine (B1) and potatoes and green leafy vegetables are a good source of riboflavin (B2). Vegetables are generally very good sources of most minerals (with the exception of iron). Tubers and roots as an energy source aside, it is the protective phytochemicals and the vital vitamin C, vitamin A, and folic acid content that make vegetables essential to human well-being.

India is the second largest producer of vegetables in the world and accounts for about 15% of the world's production of vegetables. The current production level is over 71 million MT and the total area under vegetable cultivation is around 6.2 million hectares which is about 3% of the total area under cultivation in the country. The traditional system of vegetable cultivation is more of a disjointed nature as there is no linkage between production of agricultural produce and its demand in the market. Poor on-farm practices in harvest and post harvest handling and poor infrastructure in terms of transportation, storage and market coupled with the extreme difficulty in collection from the numerous small farms make traditional cultivation of vegetables a risky venture.

In order to tap the potential for raising vegetables in the state of Kerala by taking advantage of the diverse climate and other favourable features and to cater to the problems faced by traditional cultivation of vegetables such as numerous intermediaries, high level of wastages, lack of transparency in prices, demand and customer preferences, poor infrastructure for storage, packaging, transportation / no cold chain and poor linkages in the marketing channel massive vegetable development programmes have been implemented in the state such as the Intensive Vegetable Development Programme (IVDP) and the Kerala Horticulture Development Programme (presently VFPCK).

1. Vegetable And Fruit Promotion Council Of Keralam (VFPCK)
(Erstwhile Kerala Horticulture Development Programme (KHDP))

Kerala Horticulture Development Programme started its field activities in November 1993. The Programme is receiving financial support from the European Union and the Government of Kerala and is being implemented through an autonomous Programme Directorate, which facilitates guides and co-ordinates all Programme activities. Total grant of the EU amounts to ECU 28 million. EU also funds a team of National and Expatriate Experts. Government of Kerala contributes a total of ECU 8 million (Rs. 360 million).

The Programme aims at enhancing and sustaining the income of participating farmers through high-tech cultivation practices and appropriate marketing of vegetables, banana, pineapple and mango. Around 35,000 farmers will benefit directly from the Programme. Most of the farmers are lease farmers, who derive their income from very smallholdings.

In addition to the direct benefits expected, there will be indirect benefits associated with processing, marketing and transport activities.The six year project was launched in 1992 – 93 and is expected to culminate in the formation of a new apex body. The Kerala Horticulture Promotion Council, which would carry forward the works initiated by KHDP.

Nine years after inception, KHDP assists 37,000 vegetable and banana farmers, cultivating 14,230 Ha, spread over seven districts. Most of them are marginal farmers, cultivating mainly leased land.

Nearly 75% of these farmers have increased their income because of KHDP's activities.17,700 farmers have received over Rs 130 crores of bank loans with an impressive repayment rate of nearly 90%. Prior to the arrival of KHDP, less than 50% of these farmers were able to get such loans. KHDP has set up 78 farmer markets near the production centers where farmers are able to bargain with traders and get higher prices. So far the farmers have marketed over 41;000 MT of produce.

More than 200 extension staff are every day out in the fields helping farmers to help themselves. As a testimony to the success of collective strength and farmer centred development, participating farmers are extending their activities beyond horticulture to their social life boosting their self-confidence and making them better citizens.

Self Help Groups:

Local communities will be strengthened through the Self Help (SHG) concept. The development of group organizational and management skills are being promoted with less reliance on the services from the Government.

The Programme adopts an integrated approach involving activities encompassing all spheres of horticultural production and produce handling and it operates in selected geographic locations in the State of Kerala to develop replicable models.

All Programme activities are converged into voluntary neighborhood self help group of about 20 participating farmers. Each SHG nominates Master farmers who will be trained and will take up a lead role and will act as facilitators. This system is aimed at providing sustainability to the development process and ensures greater farmer participation. The farmers were selected and inducted to the Programme on clearly set criteria. The Programme has introduced a unique concept of promoting Master farmers to take up functional leadership in production, marketing and credit related activities in each SHG.

The SHG farmers are organized into Sites and Sites in turn to Pilot Projects. At Site level one Technical Officer/ Technical Assistant provides Technical guidance to 200-250 farmers. Pilot Project level activities are coordinated by one Asst Coordinator supported by a team of Asst. Project Managers.

Credit:

A credit system suited to farmers production needs is already in place and firm linkages have been established between farmers and associating banks/ credit institutions. A revolving fund, having a corpus of Rs 47 crores, is available to the participating farmers through various banking institutions like State Bank Of India, State Bank of Travancore, Union Bank of India and Canara Bank. An innovative insurance coverage for pest, disease and natural calamities has been devised in association with New India Assurance Company.

Marketing:

The marketing effort of the Programme revolves around group marketing activities. Under group marketing 15-20 Self-Help groups, ie. About 200-300 farmers get together and the farmers' produce is graded, bulked and traded together. This helps the farmers to have a good volume so that they are in a better position to trade/ negotiate /bargain with the wholesalers in order to "optimize their returns'.

The large volumes induce the traders visit the farmers and buy it at their field Centers(FCs0. This helps the farmer to negotiate and increase his income, in addition to savings in his transport expenses and time.

Field Centers:

Members of 10-15 SHGs contribute capital and form a bulking center, where they pool their produce. Large volumes attract traders to the center. A management committee consisting of the marketing MFs of the participating SHGs negotiates with the traders for better prices. A commission pf 6-7% is retained which is used to pay for overheads and generate an annual bonus. In addition to better price, farmers enjoy reduced transportation & handling cost, proper grading & weighing and timely payment. With increased volumes and effective management system in place the bulking centers are upgraded as field centers, many of which are achieving legal registration as Swasraya Karshaka Samithi.

The shift from "What is possible to produce" to "Produce what is marketable" is actively promoted. This warrants better understanding of the markets and the changing needs of consumers.

Market Information:

The market information centers collects market prices and arrival data from major production& consumption centers affecting the price of produce in Kerala markets. This information is made available to farmers and the trade through the print and broadcast media. The center is envisaged as the primary source of market information on horticulture in Kerala.

Research Backup

Applied R&D programmes are being conducted to develop crop management packages for vegetable crops, bananas, mango and pineapple. Pest and Disease monitoring and quick pesticide residue analysis kits in the field are also important features of the Project.

The Programme is promoting development of appropriate technology through Participatory Technology Development. Farmer experiments for developing better technologies and for adapting existing technologies which will combine latest scientific knowledge in the field with the practical wisdom of the farming community.

The Programme is promoting pest and disease surveillance in the pilot project areas to provide timely warning and forecasting of possible outbreaks of pests and diseases in the field, with an objective of reducing the indiscriminate and over usage of pesticides by farmers.

Quality Seeds:

The production of seeds and planting material is being organized in association with selected farmers in Palakkad district to satisfy farmers demand for high performance varieties. A seed processing plant has been established, as part of the project at Alathur in Palakkad District.

Training:

Training forms one of the critical inputs of the Programme. Through a holistic approach the client system is equipped and empowered. The unit organizes sequential technological and Human Resources Development trainings to farmers as well as to the extension functionaries of the project. And the Programme staff, bankers, traders etc. are also exposed to appropriate trainings. The trainings are organized on national need analysis coupled with feed back analysis.

Office less Extension:

KHDP's extension is designed to defectively transfer high quality information on topics such as production and marketing rather than distributing products, commodities or subsidies.

The basic approach involves going to farmers doorsteps, listening to their problems and helping to find solutions collectively. This is well appreciated by all the 37,000 participating farmers.

Agro Processing:

Value addition to produce is the aptest method for making food cultivation more lucrative and for the development of the interest of a large section of rural population. The sector is gaining more importance due to the increasing demand for convenience foods, exodus of rural population to urban areas, increasing middle class segment of the population and stimulate agricultural production by obtaining marketable consumer products. Conversion of produce to value added products is thus a major area of thrust. The scope for fruits and vegetables in processed form, their quality to withstand processing and the regular supply makes it an ideal item for processing. The concept of farm family empowerment can be materialised by the initiation of small scale processing units of this type. This can be undertaken as a part of rural development activity empowering the women members of the families and thereby generating additional income.

A modern fruit processing plant is coming near Muvattupuzha in Ernakulam District for the processing of pineapple and mango. The factory has a total raw material capacity of 80 tonnes pineapple, 50 tonnes mango or 90 tonnes guavas and similar fruits per day and a finished product output of nearly 40 tonnes per day comprising juice concentrates, candies and Ready-to-Serve Beverages. The factory will demonstrate value addition opportunities for agriculture produces. The factory would be operated as a public limited company with farmers as the major shareholders.

Tomato cultivation is undertaken in Palakkad district in the panchayaths of Vadakarapathy and Kozhinjampara in 2 seasons. The crop gets very low prices owing to market glut during the peak production months of December and January. In order to

save the farmers from this heavy loss, a market intervention mechanism was undertaken by the Council. Tomato was procured from the farmers and processed by VFPCK.

Ringing in the New:

By the time the Programme draws to a close, substantial investment would have been made in each of the pilot project areas in production, handling, marketing and organizational infrastructure with a view of making the activities under the project self-sustaining. The novel concepts of credit, crop management, processing and marketing., introduced as part of the Programme has caught the imagination of fruit and vegetable growers in the State. A wind of change is sweeping across the State's horticulture sector. Clearly, Kerala is on the threshold of horticulture revolution.

2. Intensive Vegetable Development Programme (IVDP)

This was implemented in all districts through 1400 Haritha Sangham @ 5 ha for an area of 7000 ha. Assistance was given @ 50% of cost of seeds, organic manures, Plant protection chemicals, Irrigation facilities, Pandal etc. limited to a maximum of Rs.10000/ ha. Each Haritha Sangham cultivated a minimum of 5 varieties of vegetables. Minor tubers were to be included but the area could not exceed 10% of the total. Seeds may be purchased from the farms of Dept/KAU and other government-recognized agencies and connected registers with details of crop may be maintained in the concerned Krishi Bhavan.

PP equipments:

An amount of Rs. 0.40 lakh was earmarked as assistance to Haritha Sangham for purchase of 50 sprayers @ 50% cost subjected to a maximum of Rs. 800/ sprayer.

School Vegetable garden:

Assistance @ Rs.1000 was provided to 1000-vegetable garden (maximum 10% each) in schools/ colleges for meeting the cost of seeds, organic manure & fertilizers plant protection chemicals, agricultural implements and fencing etc. Joint Director of Agriculture arranged quality seeds from recognized sources.

Assistance to Non Governmental and Charitable Organizations:

Assistance to Non Governmental and charitable organizations for purchase of seeds, organic manures, irrigation implements pandal etc. @ 5000/ha.

Vegetable Melas, Haritha Karshaka Sanghamam:

An amount of one lakh was allotted for organizing Haritha Karshaka Sanghamam or Vegetable Melas for effective dissemination of advanced technology in the field of vegetable cultivation.

Vegetable seed kits:

Under this 1200 no seed kits each was distributed in the corporation area of Thiruvananthapuram, Kollam, Eranakulam, Thrissur& Kozhikode and 1500 seed kits was distributed to the "greens" a secretariat organization. Thus a total of 7500 assorted vegetable seed kits were distributed each kit worth Rs.10 and consisting of five varieties of vegetable seeds.

Awards:

Awards were being provided to the best HS, School, Voluntary organizations etc. in order to generate a healthy competition in vegetable cultivation.

1.	a. Best HS in the state	: Rs.50000
	b. Second Best HS in the state	: Rs. 25000
2.	a. Best HS in the district	: Rs. 10000
	b. Second Best HS in the	: Rs. 5000
3.	a. Best vegetable garden in school in the state	: Rs. 10000
	b. Second Best vegetable garden in school in the state	: Rs. 5000
	c. Third Best vegetable garden in school in the state	: Rs. 3000
4.	a. Best school garden in the District	: Rs. 5000
	b. Second best school garden in the District	: Rs. 3000
	c. Third best school garden in the District	: Rs. 2000
5. Study tour for school students		: Rs. 50000
6. Awards to Members of selected voluntary organizations		:

Ist prize: Rs.5000 2nd Prize : Rs.3000

3rd prize: Rs. 2000

Improving Marketing facilities:

Assistance was provided @ Rs.20000 per centre for starting new procurement and distribution centres for vegetables.

Extension activities by FIB and state Vegetable cell:

Arranging publicity through video coverage of the activities under taken in HS and voluntary organizations for giving wide exposure through mass media.

Wells and Pumpsets:

In order to establish irrigation facilities to schools/ colleges which undertake veg. Cultivation of more than 25 cents of land assistance were provided @ Rs.6000/well for digging 50 wells and @ Rs. 7500/pumpset for installing 50 pumpsets for which Rs. 6.75 lakhs was earmarked.

Practical/ Scientific Utility of the study

The interventions of these programmes have resulted in drastic changes in the fruit and vegetable sector of the state which is evident by the increase in area and production of fruits and vegetables These programmes In addition to promoting the cultivation of vegetables in the state, also aim at improving the existing market structure for vegetables so as to make the cultivation of vegetables more lucrative for the farmers. This study aims to compare the various aspects of production and marketing of vegetables cultivated through the vegetable production programmes as well as through the traditional vegetable cultivation systems so that the potentials, possibilities and constraints of both are brought to light.

The specific objectives of the study are:

- To work out the costs and returns of major vegetable crops in Kerala.
- To examine the labour utilisation pattern in vegetable production with special emphasis on gender issues.
- To analyse the extent of adoption of scientific practices of different vegetable crops.
- To study the marketing channels, marketing costs and, marketing margins of vegetable crops
- To examine the techno-socio-economic constraints faced by vegetable cultivators in the state.

CHAPTER 2
REVIEW OF LITERATURE

2.1 Economics of Production

Various past studies indicate the profitability of vegetable production through the calculation of the cost of cultivation as well as the assessment of financial performance through measures such as benefit cost ratio and various income measures. The input components such s labour, manure, fertilizers etc. have also been subject to analysis to understand their relative importance in the production process.

Venkatanarayanan (1990) analysed the economics of chilli cultivation in Khammam district of Andhra Pradesh. High input output- ratio revealed the profitability of chilli farming and break-even analysis that chilli cultivation was a highly paying proposition. Sikka et. al. (1994) while studying the agro-climatic conditions of North-western Hilly Region of India reported that cultivation of various fruits and vegetables gave very high returns to farmers as compared with traditional crops. Thakur et al. (1994) showed that vegetable production was highly cost intensive or expensive but at the same time highly remunerative. Among the total variable costs, human labour (hired and family labour combined) occupied the lion's share of 25.40 percent on an average. In a study of the economic analysis of winter tomato crop around Ludhiana city, Indersain et.al., (1999) opined that hired labour occupied the highest share in production cost. It was found to be highest in the case of small farms. With regard to the economics of production and marketing of cauliflower in Ranchi district of Bihar, Madan et.al. (1999) observed that medium sized farmers had both the advantage of more family labour, and better capacity to make capital expenditure on fertilizer, pesticides and irrigation. Small farmers had the advantage of more family labour relative to land size, but they lacked capital. Mishra et al. (1999) opined that on an average, human labour accounted for 16.56 percent of the cost of production of chillies. Seed cost accounted for seven percent and manures and fertilizers formed the largest share of cost of 28.19 percent. Nagesh (2001) in his study on the economics of vegetable cultivation in Thiruvananthapuram district of Kerala recorded that the major item of input cost was for organic manures followed by

hired labour and fertilizer costs. The cost of organic manure ranged from 12.4 percent to 16.4 percent whereas that of hired labour ranged between 6.1 to 8.2 percent.

2.2 Marketing aspects of vegetable production

For fresh produce, the physical distribution itself includes all the handling and movement features of harvest, loading and unloading, grading, packaging, storage and subsequent dispersal through the markets to the consumers. In addition, marketing as an entire process also includes the vital auxiliary functions of production planning, production and dissemination of market information, financing of markets and their administration, the activities of marketing intermediaries, the provision of training and extension to individuals and groups involved in marketing, and research activities which seek to improve the marketing system in some way. Marketing of fruit and vegetables are not notified under regulation throughout the country uniformly. This goes to prove that marketing of fruits and vegetables has received little attention so far and there is reason to believe that there is much larger gap between the producer price and the consumer price due to a large number of intermediaries operating in unregulated and unsupervised vegetable and fruit markets.

Lal (1989) has reported that smaller the channel of marketing higher would be the producer's share in consumer's rupee and vice-versa. The benefit derived from an increase in consumer price did not go to the producer but was absorbed by the retailers. The non-availability of quality and certified vegetable seeds were the major constraints. Sandhya (1992) studied the economics of production and marketing of vegetables in Thrissur district. The wholesalers' margin accounted for 16.45 percent of the consumers' price of bittergourd and 23.76 percent of the consumers' price of ashgourd. Prasad (1996) on the basis of a study on vegetable marketing in two agricultural markets in Bihar arrived at the conclusion that high marketing costs and large price spread result due to the high margins charged by the intermediaries. Hutabarat and Winarso (1994) observed that the development of horticulture was subject to the interaction of existing market forces. Other factors affecting the development are existing market organization and costs and margin of marketing of the commodities. The research also identified that the major constrains to development of marketing organization and agent are lack of capital and

facility to enter the market. Sikka et. al. (1994) while studying the agro-climatic conditions of North-western Hilly Region of India reported that fruits and vegetables being highly perishable required immediate disposal especially in absence of cold storages. This called for elaborate arrangements for marketing of these perishable goods. Due to the increasing volume of production the marketing problems were aggravating. Moreover the share of producer in consumer's rupee was very low. Devi (1996) in a study on marketing of fruits and vegetables in Kerala estimated the producer's share in consumer's rupee to vary between 49-53 percent in vegetables. The share of marketing margins in consumer's rupee was much higher than the share of cost incurred by them in the case of vegetables. According to Buckley & Chapman(1997), the existing governance structures that control the market at present must be the one that minimizes most on transaction costs.. In the case of the Philippines, transactions built on trust dominate exchanges that occur in the vegetable market. Trust is crucial in initiating a transaction and more significantly, in overseeing its completion. Trust is the most important among the various components of social capital. With voluntary cooperation, the abilities of individuals to solve their collective-action problems are improved. Bilonikar et al. (1998) found that co-operative marketing societies operated more efficiently than the other agencies in marketing the vegetables of their member growers. Sen and Maurya (1999) who had studied the marketing of vegetables in Varanasi district of Uttar Pradesh revealed that the producer's share in consumer's rupee was lowest for tomato and highest for brinjal.

2.3 Constraints in production and marketing

High incidence of pest and diseases, paucity of irrigation water, unavailability of quality seeds, numerous intermediaries, high level of wastages, lack of transparency in prices, demand and customer preferences, poor infrastructure for storage, packaging, transportation / no cold chain and poor linkages in the marketing channel are some of the major constraints identified in the production and marketing of highly perishable commodities like vegetables.

Sikka et. al. (1994) studying the agro-climatic conditions of North-western Hilly Region of India conductive for cultivation of various fruits and vegetables reported that

ruits and vegetables are highly perishable and require immediate disposal especially in he absence of cold storages. Elaborate arrangements for marketing of these perishables ire required Due to the increasing volume of production these marketing problems were ound to be aggravating. Thakur *et. al.* (1994) in a study on economics of vegetable cultivation in Himachal Pradesh concluded that un-organised marketing, high marketing nargins, lack of proper storage and processing units were some of the major constraints nvolved in the marketing of vegetables. In their study on resource productivity and esource use efficiency in vegetable farms, Sailaja *et. al.* (1998) identified the major constraints in vegetable production as non-availability of quality seeds, imbalanced use of manures and fertilizers, inadequate credit facilities, non-availability of labour, shortage of good quality of water etc. The study concluded that for increasing the productivity and improving the quality of vegetables required at national and international markets, proper attention should be given to the above problems and infrastructure facilities should be developed. Shiyani et al (1998) studying the marketing of vegetables in South Saurashtra zone of Gujarat opined that inadequacy of storage facilities for vegetables is a major constraint in production and marketing. Nagesh (2001) in his work on the economics of vegetable cultivation in Thiruvananthapuram district of Kerala observed that vegetable growers in Kerala had to resort to distress sales due to uncertain situations in the market especially when the market supply is more.

2.4 Economics of Vegetable Seed Production

Traditional cultivation of vegetables in the state had been greatly handicapped by the non-availability of quality planting material (Thomas *et al,* 2005). Therefore the vegetable development programmes in the state have been promoting cultivation of vegetables for seed production in order to meet the growing demand for vegetable seed material. Vegetable seed trade has also become highly competitive with the increasing global dimension acquired by the markets as well as through the entry of multinational hybrid seed companies into the seed production scenario. The value of vegetable seed export from India had been increasing over the years.

Several studies in the past in the state throw light on the economic aspects of vegetable cultivation for seed purpose. Manuring, *Panthalling*, harvesting and seed

processing expenditures are found to occupy the paramount position in almost all vegetable crops grown for seed purpose (Thomas and Sreeja, 2005). Though Rajendran and Habeeburrahman (1994) had reported that seed production was less profitable than production for fresh vegetable purpose, several other workers like Narayanankutty *et. al.* (1998) and Rajan and Sukumar (1998) have reported that vegetable cultivation for seed production is indeed a viable option. The percentage increase in income from the seed crops of okra, cowpea and chilli per hectare as against the corresponding commercial crops were 518.18, 346.15 and 516 respectively (Satyanarayanan and Raza, 1999). It was found by Das (2000) that amaranthus and cucumber were preferred crops in vegetable seed production due to the low risk, low care and attention and low labour required by these crops.

CHAPTER 3
METHODOLOGY

The present study was conducted in three agroclimatic regions of Kerala namely Southern, Central and Northern regions. From each region, one district was selected with largest area under vegetables. Accordingly Thiruvananthapuram, Palakkad and Malappuram districts were selected respectively from Southern, Central and Northern regions.

3.1 SECONDARY DATA COLLECTION

During the initial period details of secondary data collected is as given below.

- Vegetable crops grown in the state
- Area under vegetables in different region
- Production and productivity of vegetables
- Annual rainfall data
- Land utilization pattern and cropping pattern in the study area

3.1.1 Description of the Study Area

A. Thiruvananthapuram District:

Bordered on the east and north east by mountain ranges of Western ghats, the south by the fertile rice bowl district of Kanyakumari of Tamil Nadu and west by Arabian sea, Thiruvanathapuram district is positioned in between three major rivers, the Neyyar, Karamana, and Vamanapuram. The area under the district is 2192 sq km. Thiruvananthapuram taluk lies in the coastal strip; Nedumangad is generally hilly on the east and enclosed by backwaters and lagoons on the west. The district may be largely classified into three natural divisions viz., high land, mid land and low land. The chief backwaters of the district from South to North are Veli, Kadinamkulam, Anjengo and the Edava-Nadayara kayals. Besides these systems of backwaters and canals there is a fresh water lake at Vellayani in Thiruvanathapuram Taluk. Average rainfall in Thiruvananthapuram district is 170 cm. Area and production of important crops in Thiruvananthapuram district is presented in Table. 3.2.1 & 3.2.2.

Figure - 1: Districts selected for study in each agroclimatic zone.

B. Palakkad District:

Located between north latitude 10° 46' and 10° 59' and East longitude 76° 28'and 76° 39', Palakkad district shares borders with Malappuram district in the North and Northwest, Trichur in the South and Coimbatore district of Tamil Nadu in the East. Sprawling over the midland-plains and mountainous highlands, the district does not have a coastline. The midland plains are at an altitude of 10 m to 80 m above sea level and highlands are 914 m to 2133 m above sea level. The major rivers are Bharathapuzha (Nila), Kollengode, Kannadi, Kalpathy, Chitturpuzha, Bhavani, Shiruvani, Thuthapuzha and Gayatri. The district has some key irrigation projects and dams at Malampuzha, Walayar, Mangalam, Gayatri, Chittur, Meenkara, Pothundi and Kanhirapuzha. Malampuzha Dam irrigates over 20,000 hectares of farming land while Chittur Irrigation Project covers over 18,000 hectares and Kanhirapuzha project waters over 10,000 hectares.

Vegetables, Groundnut, black gram, coconut, cotton, ragi, pepper, banana, cashew, sugarcane and pea add in to the roll of other major crops. Sugar Cane is grown extensively in the Chittur taluk. Around 284 lakh hectares of the district (64 % of geographical area) is used for farming. Area and production of Important crops in Palakkad district is presented in Table. 3.2.1 & 3.2.2.

C. Malappuram District

Malappuram district with Nilgiris in the east and the Arabian Sea in the west it consists of Ernad, Perintalmanna and Nilambur taluks. The location of Malappuram district is 75° to 77° east longitude and 10° to 12° north latitude, in the geographical map. Like most of the other districts of the state, Malappuram too consists of three natural divisions: lowland, midland and highland. The lowland stretches along the sea coast, the midland in the centre the highland region towards the east and north eastern parts. The topography of the district is highly undulating; starting from the hill tops covered with thick forests on the east along the Nilgiris, it gradually slopes down to the valleys and the small hills, before finally ending on the sandy flat of luxuriant coconut groves in the west. Four important rivers of Kerala, flow through Malappuram district. They are,

Chaliyar (Beypore river) Kadalundipuzha, Bharathapuzha and Tirurpuzha. Chaliyar is 169 Kms. long and orginates from Illambaleri hills in Tamilnadu. Chaliyar traverses through Nilambur, Mampad, Edavanna, Areekode, Vazhakkad and flows into the sea at Beypore in Kozhikode district. Kadalundipuzha is formed by the confluence of two rivers, the Olipuzha and Veliyar. Bharathapuzha, the second longest river in Kerala, flows by the southern border of the district and drains into the sea at Ponnani. Tirurpuzha, 48 Kms. Long. Area and production of Important crops in Malappuram district is presented in Table. 3.2.1 & 3.2.2.

Table.3. 1 Area under crops in selected Districts – (2001-02)

SI. No	Crop	Area in hectares		
		Thiruvananthapuram	**Palakkad**	**Malappuram**
1	Rice			
	a) Autumn	3336	57462	6908
	b) Winter	3466	51104	14023
	c) Summer	8	7338	1723
	Total	6810	115904	22654
2	Other cereals/ millets	7256	2432	0
3	Pulses	651	1164	673
4	Sugar crops	150	4769	843
5	Spices and condiments	9190	20830	30224
6	Vegetables	71638	206484	118016
7	Fresh fruits	21413	29427	37046
8	Cashew	2461	5947	10953
9	Oil seeds	88660	54201	104609
10	Fibre drugs, Narcotics	36	3770	582
11	Plantation crops	29395	34520	29507
12	Fodder grass	106	333	27
13	Green manure crops	355	2180	5560
14	Other non food crops	3488	19225	7932

Source: Farm Guide-2004, Government of Kerala

It was noticed that of the selected districts Palakkad had the maximum area under vegetables followed by Malappuram and Thiruvananthapuram. Palakkad thus was found to possess around 52 percent of the total vegetable cultivated area in the three districts combined whereas Thiruvananthapuram had only 18 percent of the total area under vegetable cultivation in the three districts.

Table.3.2. Production of important crops in selected Districts – (2001-02)

Sl. No	Crop	Production in tonnes		
		Thiruvananthapuram	Palakkad	Malappuram
1	Rice			
	a. Autumn	7335	129463	13313
	b. Winter	7345	119346	25638
	c. Summer	6	20493	5108
	Total	14686	269302	44059
2	Arecanut	493	4007	11085
3	Banana	13637	66041	55835
4	Other Plantain	40824	47915	24944
5	Tapioca	455574	133313	166980
6	Coconut (million nuts)	627	284	599
7	Rubber	33536	31759	32904

Source: Farm Guide-2004, Government of Kerala

3.1.2 Major Vegetable Crops Grown in the Study Area

The major vegetable crops grown in the study area are presented below:

Table 3.3: Major Vegetable Crops Grown in the Study Area

Common Name	Scientific Name	Family
Bitter Gourd	*Momordica charantia*	Cucurbitaceae
Ash Gourd	*Benincasa hispida*	Cucurbitaceae
Cow pea	*Vigna sinensis*	Leguminaceae
Bhindi	*Abelmoschus esculentus*	Malvaceae
Snake Gourd	*Trichosanthes anguina*	Cucurbitaceae
Bottle Gourd	*Laginaria vulgaris*	Cucurbitaceae
Pumpkin	*Cucurbita moschata*	Cucurbitaceae
Tomato	*Lycopersicon esculentum*	Cucurbitaceae
Brinjal	*Solanum melongina*	Solanaceae

Table.3. 4 Area under vegetables under VFPCK Scheme in the selected districts

Sl. No.	District	No. of SHGs	No. of Farmers	Area (ha)
1	Thiruvanathapuram	176	3208	1397
2	Palakkad	214	3314	1491
3	Malappuram	292	3170	1456

Source: Vegetable and Fruit Promotion Council of Keralam, Ernakulam

3.2 SAMPLING FRAME

Based on the secondary data gathered two taluks were selected from each district based on the probability proportional to area under vegetables. From each taluk panchayats having all the groups of vegetable cultivators Viz. KHDP, IVDP and traditional was listed and three panchayats were selected at random. The detailed list of area under study is as given below.

Table 3.5 List of selected taluks and panchayats

District	Taluks selected	Panchayats selected
Thiruvananthapuram	Thiruvananthapuram, Neyyattinkara	Kalliyur, Pothencode, Venganoor Chenkal, Kottukal, Kollayil
Palakkad	Chittur Alathur	Nenmara, Elavanchery, Vadakarapathy Kottayi, Parali, Peringottukurissi
Malappuram	Nilambur Eranadu	Chungathara, Wandoor, Thiruvali Trikkalangode, Kavanur, Pandikkad

3.2.1 Area Under Vegetables in the Selected Panchayats

The area under vegetables in the panchayats under study is presented in Tables.3.4.1.

Table.3.6 Area under vegetables in selected panchayats of Thiruvananthapuram District

Panchayaths	Area under vegetables (in hectares)
Kalliyur	104
Pothencode	135
Venganoor	46
Chenkal	60
Kottukal	76
Kollayil	84

Source: Office of the Joint Director of Agriculture, Thiruvananthapuram

The Pothencode panchayat was found to have the highest area under vegetables in the selected panchayats of Thiruvananthapuram district. The least area under vegetables was in the panchayat of Vengoor.

Table.3.7 Area under vegetables in selected panchayats of Palakkad District

Panchayats	Area under vegetables (ha)
Nenmara	125
Elavanchery	210
Vadakarapathy	380
Kottayi	89
Parali	200
Peringottukurissi	34

Source: Office of the Joint Director of Agriculture, Palakkad

The Vadakarapathy panchayat was found to have the highest area under vegetables in the selected panchayats of Palakkad district. The least area under vegetables was in the panchayat of Peringottukurissi.

In the district of Malappuram it was found that the panchayat of Wandoor had the maximum area under vegetables. The least area was reported in the panchayat of Kavanur.

Table.3.8 Area under vegetables in selected panchayats of Malappuram District

Panchayaths	Area under vegetables (in hectares)
Chunkathara	110
Wandoor	425
Thiruvali	135
Thrikkalangode	230
Pandikkad	134
Kavanur	100

Source: Office of the Joint Director of Agriculture, Malappuram

From the above panchayats 10 farmers each representing the above classes was selected based on the list collected from the KHDP office, Ernakulam and concerned Krishibhavan in the area. The details of sampling is as given below.

Table.3.9 Category wise distribution of respondents

District	Number of farmers		
	VFPCK	Traditional	Total
Thiruvananthapuram	60	60	120
Palakkad	60	60	120
Malappuram	60	60	120
Grand Total			**360**

3.3 PRIMARY DATA COLLECTION

The selected farmers in the different agroclimatic regions cultivating vegetables under the VFPCK scheme and also through traditional means were contacted through visiting these farms in two seasons for two consecutive years. A well-structured interview

schedule was prepared for collection of information with respect to vegetable cultivation from both the categories of farmers. The questionnaire was pre-tested and finalised. This questionnaire was used to obtain information regarding vegetable cultivation as well as their marketing from the farmers.

3.4 ECONOMIC ANALYSIS OF VEGETABLE PRODUCTION

Two major crops from each agro-climatic region were selected for detailed economic analysis. Accordingly, the crops selected in each region are:

Southern Zone:	Cowpea and Snakegoud
Central Zone:	Tomato and Bittergourd
Northern Zone:	Bittergourd and Cowpea

3.4.1 Cost and Returns

Input-wise cost of cultivation

Explicit costs such as cost of land preparation, cost of seeds, cost of organic manure, fertilizer costs, cost of panthalling materials, cost of staking materials, cost of human labour, land revenue and rent on leased in land as well as implicit costs such as interest on working and fixed capital, depreciation, family labour, cost of management are considered for the calculation of costs of cultivation of the major crops cultivated in the selected agro-climatic zones.

The ABC cost concept was employed to arrive at the different factor shares.

Benefit- Cost Ratio

The total market value of the vegetables was divided by the total cost of production for each vegetable cultivated under VFPCK scheme as well as traditional cultivation in each agroclimaic zone to arrive at the benefit cost relationship in vegetable production. This also gave the output per rupee invested as input in the production process. The benefit cost ratio at various costs were worked out.

Input-Output Relationship

The relationship between inputs used in vegetable production and the outputs were expressed in measures such as Total explicit cost, Total implicit cost, Net returns at

explicit cost, Net returns at total cost, Benefit-cost ratio at explicit cost and Benefit/ cost ratio at total cost.

3.4.2 Labour Utilization Pattern

The labour utilisation pattern in the production of the various vegetables under VFPCK and traditional system of cultivation in the selected districts was carried out. The utilization of labour was analysed to find out the contribution of various components such as family and hired labour. An analysis of the gender component in labor was also performed to understand the relative contribution of women and men labour in the various operations.

3.4.3 Adoption of Scientific Practices

The extent of adoption of recommended scientific practices for the various vegetables was also recorded as part of the study. Soil and water conservation measures, Plant protection methods, Weed management methods, Irrigation methods, fertilizers used, status of soil testing, pre and post harvest processing adopted, extent of technical advice followed in pesticide application etc. were analysed to arrive at the extent of adoption of scientific practices.

3.4.4 Marketing Aspects of Vegetable Production

Sampling Frame

Thirty farmers each from both the categories were contacted in each district for collecting information regarding the marketing of vegetables in the state. Thus, a total of 90 farmers in each category were contacted for collection of information. The sample frame is presented below:

Category	Number of farmers			
	Thiruvananthapuram	Palakkad	Malappuram	Total
VFPCK	30	30	30	90
Traditional	30	30	30	90
Grand Total				**180**

The agro-climatic zone-wise comparison did not yield any significant results. Hence a category-wise comparison for different vegetable crops was attempted.

Marketing costs and margins

The cost of marketing of the different vegetables grown under the two systems along with the margin at the level of various market functionaries was arrived at.

Marketing Channels

The identification of the major marketing channels involved in the marketing of the vegetables produced under the two systems of cultivation was also carried out for the three agro climatic zones.

3.4.5 Constraints in Vegetable Production and marketing

The techno-socio-economic constraints faced by vegetable cultivators of the selected regions in the cultivation of vegetables were examined on a five-point continuum as most important, important, somewhat important, less important and least important with scores 5,4,3,2 and 1. For each constraint the frequency of response under each category was multiplied with its respective score and added to get a cumulative score for that particular constraint. The constraints were ranked based on this cumulative score.

The techno-socio-economic constraints faced in the marketing of vegetables were also subjected to a similar analysis as explained above.

3.4.6 Economics of Vegetable Seed Production

With the various vegetable cultivation improvement programmes undertaken in the state the availability of quality seeds for vegetable production became a major limitation. Hence, VFPCK had initiated vegetable seed production programmes so that quality seeds are available to the farmers at reduced cost. Hence an analysis of the economics of vegetable seed production was undertaken in order to arrive at the cost and returns as well as the benefit cost ratios of vegetable seed production.

CHAPTER 4
RESULTS

The present study on the Economic Analysis of Vegetable production in Kerala was undertaken with the objectives of examining the comparative economics and marketing systems under various vegetable production programmes viz. Kerala Horticultural Development Programme (KHDP) and Intensive Vegetable Development Programme (IVDP) in the different agroclimatic regions of Kerala.

As already mentioned, after the inception of Kerala Horticultural Development Programme (KHDP, now VFPCK), the number of farmers who cultivated vegetables under the IVDP scheme has decreased drastically. Though in the initial stages of the study we could identify farmers under IVDP scheme, mainly through secondary data collected through the respective Krishi Bhavans, in the later stages of primary data collection, it became extremely difficult to identify the IVDP farmers due to the shift from one scheme to the other. Hence the analysis carried out here pertain to the farmers under VFPCK and other farmers who are undertaking traditional cultivation of vegetables.

The results of the analysis are presented in the following sections in accordance with the objectives for the three agroclimatic regions with respect to the two farmer categories viz. VFPCK and traditional farmers, hereinafter referred to as Category I and Category II respectively.

4.1 SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

4.1.1 Size of the family

The average family size of the members of VFPCK and traditional category were worked out and is presented in Table 4.1. It was found that the average family size of Category I respondents were found to be 4.5 and for Category II respondents it was 5.51. There was not much variation among the districts with respect to the family size.

Table. 4.1 Classification of respondents According to the size of the family

Name of the District	Average Family Size	
	Category I	Category II
Palakkad	4.2	5.9
Malappuram	4.8	5.9
Thiruvananthapuram	4.5	4.9
Average size of the family	4.5	5.5

4.1.2 Age of respondents

The farmer respondents belonged to three age groups as detailed in Table 4.2 and it was observed that majority of the respondents in Category 1 and II were in the age group of 36 to 55 years consisting of 65 per cent and 73 percent respectively. Around 25 percent and 16 percent of the respondents in Category I and II respectively belonged to 21-35 years age group while 10 percent in Category I and 11 percent in Category II were above 55 years of age. A similar trend as noted above was observed in all the districts studied.

Table 4. 2 Classification of Respondents According to age

Name of the District		Age group (years) & Number of respondents			
		21-35	36-55	>55	Total
Palakkad	Ctgry. I	20 (33.33)	36 (60.00)	4 (6.67)	60 (100)
	Ctgry.II	14 (23.33)	43 (71.67)	3 (5.00)	60 (100)
Malappuram	Ctgry. I	9 (15.00)	44 (73.33)	7 (11.67)	60 (100)
	Ctgry. II	5 (8.33)	42 (70.00)	13 (21.67)	60 (100)
Thiruvananthapuram	Ctgry. I	16 (26.67)	37 (61.67)	7 (11.66)	60 (100)
	Ctgry. II	9 (15.00)	47 (78.33)	4 (6.67)	60 (100)

(Figures in parentheses show percentage to total)

4.1.3 Educational status

The classification of respondents according to educational status as presented in Table 4.3 revealed that in category I, 76 per cent of the farmers were having education upto SSLC and 17 per cent had education up to plus-two level while 7 percent of farmers were graduates and above.

In the case of Category II, 83 percent were having education upto SSLC and remaining 17 percent had education upto plus-two level with none of the respondents having graduation. It was observed that Category I farmers had more education as compared to Category II farmers and the district-wise analysis revealed similar trends as above.

Table 4.3 Classification of respondents according to educational status

Name of the District		Age group (years) & Number of respondents			
		Upto SSLC	Plus-Two	Graduation & above	Total
Palakkad	Ctgry. I	48 (80.00)	8 (13.33)	4 (6.67)	60 (100.0)
	Ctgry.II	53 (88.33)	7 (11.67)	0 (0.00)	60 (100.0)
Malappuram	Ctgry. I	45 (75.00)	13 (21.67)	4 (6.67)	60 (100.0)
	Ctgry.II	51 (85.00)	9 (15.00)	0 (0.00)	60 (100.0)
Thiruvananthapuram	Ctgry. I	44 (73.33)	10 (16.67)	2 (3.33)	60 (100.0)
	Ctgry.II	45 (75.00)	15 (25.00)	0 (0.00)	60 (100.0)

(Figures in parentheses show percentage to total)

4.1.4 Occupation

The respondents were classified into three categories according to their occupation and the results are presented in table 4. 4.

It was revealed that among Category I, 59 percent of respondents were having agriculture as the only occupation while 31 percent had agriculture as their main occupation and for 10 percent agriculture was a subsidiary occupation. The district wise analysis exhibited similar trends as above.

Table 4.4 Classification of Respondents According to their occupation

Name of the District		Age group (years) & Number of respondents			
		Agriculture as the only occupation	**Agriculture as the main occupation**	**Agriculture as the sub occupation**	**Total**
Palakkad	**Ctgry. I**	40 (66.67)	14 (23.33)	6 (10.00)	60 (100.0)
	Ctgry.II	35 (58.33)	17 (28.33)	8 (13.34)	60 (100.0)
Malappuram	**Ctgry. I**	33 (55.00)	22 (36.67)	5 (8.33)	60 (100.0)
	Ctgry.II	19 (31.67)	23 (38.33)	18 (30.00)	60 (100.0)
Thiruvananthapuram	**Ctgry. I**	34 (56.67)	19 (31.67)	7 (11.66)	60 (100.0)
	Ctgry.II	32 (53.33)	13 (21.67)	15 (25.00)	60 (100.0)

(Figures in parentheses show percentage to total)

Among Category II, 48 percent had agriculture as the only occupation while the percentage of farmers with agriculture as main occupation was 29 percent and for 23 percent respondents agriculture was the subsidiary occupation. The district wise analysis exhibited similar trends as above.

4.1.5 Land holding pattern

Land holding pattern of Category I, and II farmers are presented in Table 4.5. The average size of land holding for Category I farmers were found to be 1.25 hectares. Among the districts Palakkad had the highest average land holding size with 1.25 ha and 0.85 ha respectively in Category I and II while Thiruvananthapuram had the lowest holding size with 0.5 and 0.39 ha in Category I and II respectively.

Table.4.5 Average size of holding of respondent farmers (Hectares)

District	Area in Hectares	
	Category I	Category II
Palakkad	1.2	0.8
Malappuaram	0.9	0.7
Thiruvananthapuram	0.5	0.4
Average	0.9	0.6

4.1.6 Source of finance

Based on the source from which the finance was availed, the respondents were classified in to two groups viz. those who have availed credit from institutional agencies and those who operated with self-finance. The results as presented in Table 4.6 revealed that the major source of finance for Category I farmers were institutional agencies with 72 percent availing credit from this source, while 28 percent of the farmers were depending on self finance. In the case of category II farmers, 61 percent depended on institutional agencies and 39 percent had not availed any credit. The district wise analysis exhibited similar trends as above.

Table4.6 Distribution of respondents based on source of finance

Name of the District		Age group (years) & Number of respondents		
		Institutional	Self finance	Total
Palakkad	Ctgry. I	38 (63.33)	22 (26.67)	60 (100.0)
	Ctgry.II	41 (68.33)	19 (31.67)	60 (100.0)
Malappuram	Ctgry. I	46 (76.67)	14 (23.33)	60 (100.0)
	Ctgry.II	31 (51.67)	29 (48.33)	60 (100.0)
Thiruvananthapuram	Ctgry. I	45 (75.00)	15 (25.00)	60 (100.0)
	Ctgry.II	37 (61.66)	23 (38.34)	60 (100.0)

(Figures in parentheses indicate percentage to total)

4.1.7.Source of seed:

It was found that the source of seed for the sample farmers were VFPCK, agricultural University, Agricultural Department, private agencies and other farmers. 70 percent of the farmers in category I obtained seeds from VFPCK, while in category II , the major source was private agencies or fellow farmers (63 percent). Around 23 percent in Category I and 36 percent in Category II purchased seeds from government agencies (Agricultural University and Krishi Bhavan).

Table. 4.7 Distribution based on Source of Seed

Category	Source of purchase			
	VFPCK	University/ Agrl. Dept.	Private Agencies/farmers	Total
Category I	126 (70.00)	42 (23.33)	12 (6.67)	180 (100.00)
Category II	2 (1.11)	64 (35.56)	114 (63.33)	180 (100.00)

(Figures in parentheses indicate percentage to total)

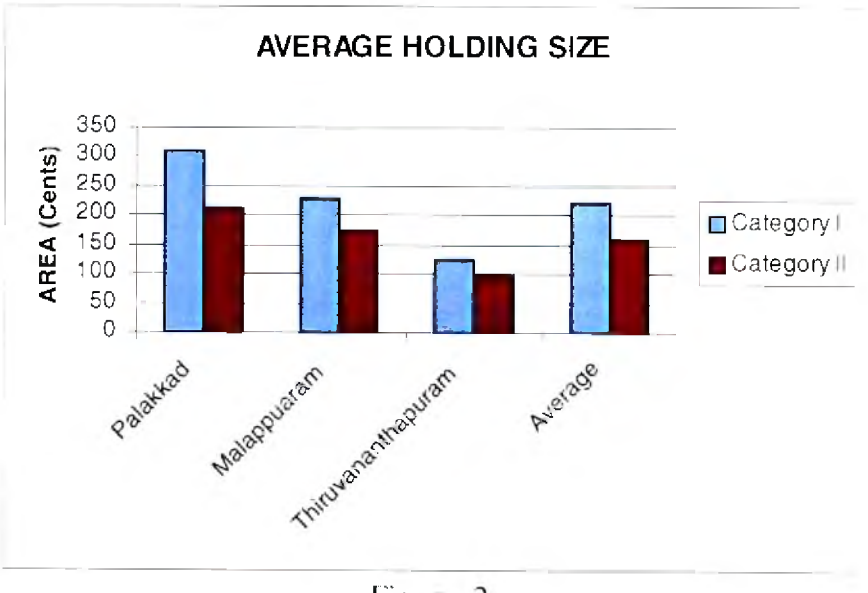

Figure - 2

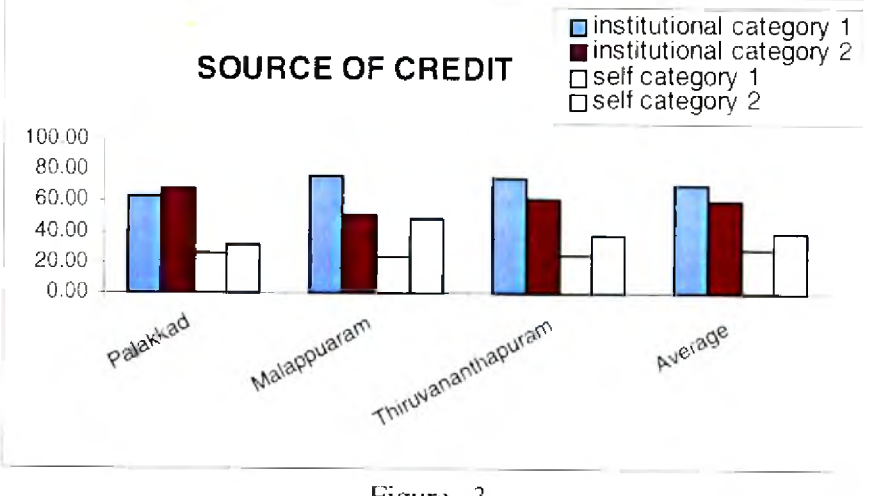

Figure - 3

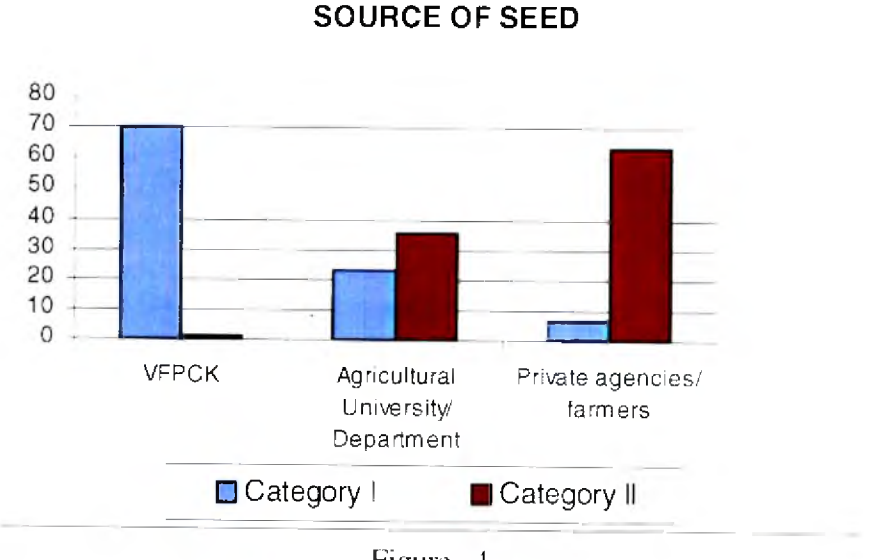

Figure - 4

4.2 GENERAL CULTIVATION PRACTICES OF SELECTED VEGETABLES

4.2.1 COWPEA

Season

Cowpea was grown throughout the year. As a rainfed crop, sowing was done in the month of June. During the second crop and third crop season cowpea was sown in September and January respectively.

Land preparation

Land was ploughed 2-3 times using tractors and channels of 30 cm breadth and 15 cm depth at 2 m apart to drain off excess rainwater were made. Lime was applied at the time of ploughing at the rate of 250 kg per hectare.

Seeds and sowing

Seeds were dibbled in such a way that a spacing of 15 cm was maintained between plants and 25 cm between rows.

Manures and fertilizer application

Farm yard manure(20 t/ha) was applied as basal dose together with phosphorus(30kg/ha) and potash(10kg/ha).Nitrogen(20kg.ha) was given15-20 days after sowing in several split doses. Application of cow dung slurry at an interval of 15 days was also practiced.

Aftercultivation

Hoeing was done at the time of manorial application. Irrigation was also given.

Plant protection

Plant diseases that were found to infect cowpea were mosaic and anthracnose. For controlling fungal diseases farmers used Bordeaux mixture and carbendazin. Pests like aphids, thrips and borers were also noticed in cowpea. /Insecticides used to control these pests included Malthion, Quinalphos and Carbaryl.

4.2.2 SNAKEGOURD

Season

Snakegourd was cultivated in two seasons namely May-August and September-December and the duration of the crop was also 120 days.

Land preparation

Generally, tractor was used for the preparation of land. Mounds of 2 feet diameter and 1-1.5 feet height were taken. Initially, lime was incorporated in the soil followed by farmyard manure at the rate of 10 kg per mound after 10 days.

Seeds and sowing

For snakegourd, four seeds were sown per mound and three healthy plants were retained after germination. Seed rate adopted by the farmers for snakegourd was 2.5 kg/hectare.

Manures and fertilizers

First dose of farmyard manure was given while preparing the land and a second dose was given fifteen days after sowing. Manures were given in split doses, as the intense heat generated out of the manure decomposition would inhibit the germination of seed. Farmyard manures were applied at the rate of 25 t/ha weekly application of cow dung slurry was also practiced. Other manures, which were found to be used by the sample farmers, were poultry manure, neem cake, castor cake, groundnut cake and bone meal.

Chemical fertilizers like Factomphos, 18:18:18, 17:17:17, Murate of potash and Urea were quite common. Fertilizers were given in several split doses at fortnightly intervals. Weeding was done before applying the fertilizers.

Plant protection

Generally, farmers were using insecticides like Furadan, Ekalux, Confidor, Hostathion and Metacid and fungicides like Mancozeb, Radar and Saff.. In snakegourd, insect pests like fruit flies, epilachna beetle, red pumpkin beetle and jassids were predominant. Fungal disease like yellowing and leaf spot was quite common in the area.

Harvesting

First harvest was taken after 45 days of sowing in the case snakegourd. Harvesting was done once in four days. Hence, for these two crops a total of 18 harvests were made.

4.2.3 BITTERGOURD

Season

Bittergourd was observed to be cultivated mainly during May-August. Duration of the crop was 120 days.

Land preparation

Generally, tractor was used for the preparation of land. Mounds of 2 feet diameter and 1-1.5 feet height were taken. Initially, lime was incorporated in the soil followed by farmyard manure at the rate of 10 kg per mound after 10 days.

Seeds and sowing

In the case of bittergourd, eight seeds were sown per mound and after germination five healthy plants were retained. Seed rate adopted by the farmers for bittergourd was 2.5 kg/hectare.

Manures and fertilizers

First dose of farmyard manure was given while preparing the land and a second dose was given fifteen days after sowing. Manures were given in split doses, as the intense heat generated out of the manure decomposition would inhibit the germination of seed. Farmyard manures were applied at the rate of 25 t/ha weekly application of cow dung slurry was also practiced. Other manures, which were found to be used by the sample farmers, were poultry manure, neem cake, castor cake, groundnut cake and bone meal.

Chemical fertilizers like Factomphos, 18:18:18, 17:17:17, Murate of potash and Urea were quite common. Fertilizers were given in several split doses at fortnightly intervals. Weeding was done before applying the fertilizers.

Plant protection

Generally, farmers were using insecticides like Furadan, Ekalux, Confidor, Hostathion and Metacid and fungicides like Mancozeb and Radar.

Harvesting

First harvest was taken after 45 days of sowing in the case bittergourd. Harvesting was done once in four days. Hence, for these two crops a total of 18 harvests were made.

4.2.4 TOMATO

Season

Tomato was cultivated mainly during the two seasons September - December and January to March.

Land preparation and transplanting

Tomato is a transplanted vegetable. Seeds were sown in the nursery at the rate of 400 gram per hectare. After sowing the seeds mulching was given with green leaves. Plants were irrigated daily in the mornings. Mulch was removed immediately after the germination of seeds. One-month-old seedlings were transplanted to the main field. For sowing the seeds raised seedbeds of 90-100 cm width and of convenient length were prepared to which well-decomposed organic matter had been incorporated. Spacing adopted in the main field was 60 x 60 cm.

Manuring and fertilizer application

At the time of land preparation farmyard manure was applied at the rate of 20-25 tonnes per hectare. A fertliser dose of 75:40:25 kg $N:P_2O_5:K_2O$ per hectare was also given in several split doses. Generally half the dose of nitrogen, full phosphorus and half the dose of potash was applied as basal before transplanting One fourth of nitrogen and half of potash was given 20-30 days after planting. The remaining quantities were applied two months after planting.

Aftercultivation

The crop was irrigated at two or three days interval. Staking was also given. Weeding was done at one and two months after transplanting.

Plant protection

Fungal diseases like damping off of the seedlings in the nursery, bacterial wilt and mosaic were most commonly found in the crop. Farmers used Bordeaux mixture to control damping off disease.

Harvesting

Harvesting was done as and when the green colour of matured tomatoes faded to yellow.

4.3 COSTS AND RETURNS IN VEGTABLE CULTIVATION

A comparison of the input-wise cost of cultivation for the major vegetable crops grown in each district selected under VFPCK scheme (Category I) and traditional system of vegetable cultivation (Category II) was performed in order to understand the profitability of vegetable cultivation from the various perspectives of agro climatic differences, institutional differences and crop specific differences. The results of the analysis for the three agroclimatic regions with respect to the input-wise costs and returns are presented below:

4.3.1 Southern Zone: Thiruvanathapuram district

The input-wise cost of cultivation, input-output relationship and benefit-cost ratio of the sample farmers who are engaged in vegetable cultivation in the district of Thiruvanathapuram under both VFPCK (Category I) and traditional (Category II) for the two major crops viz. and snakegourd are presented in this section.

4.3.1.1 Input-wise cost of cultivation

The input-wise cultivation costs of vegetables would include the costs of seed material, hired labour, manures and fertilizers, staking and *Panthalling* material, expenditures on plant protection measures and the imputed costs on family labour, interest on working capital, interest on fixed capital and depreciation. In the case of trailing vegetables, the expenses on staking and *panthalling* material is found to be a major item of cost.

A. COWPEA

The results as presented in Table 4.8 revealed that the total cost of cultivation at Cost C_3 was found to be Rs. 99884 for Category I and Rs. 96094 per hectare for Category II.

The major input contributing towards cost of cultivation of cowpea was family labour incurring 30.64 percent and 33.90 percent of cost respectively in Category I and II. Relatively fewer amounts were being spent on plant protection measures especially among the Category II farmers and they make use of more family labour as compared to VFPCK group. A comparison between the two types of farmers bring out the fact that on the whole Category I farmers spent more on inputs both explicit and implicit. The next important input was manures (16 percent for both Category I and Category II) followed

Table 4.8 - Input-wise cost of cultivation of cowpea (Rupees per hectare)

Item of Cost	Category I		Category II	
Hired labour	13601	(13.62)	12157	(12.65)
Seeds	1100	(1.10)	1250	(1.30)
Manure	16070	(16.09)	15050	(15.66)
Staking and Panthalling material	7500	(7.51)	6598	(6.87)
Fertilizers	5806	(5.81)	4587	(4.77)
Plant protection	2155	(2.16)	1564	(1.63)
Land revenue	100	(0.10)	100	(0.10)
Interest on working capital	2707	(2.71)	2416	(2.51)
Depreciation on fixed capital	415	(0.42)	367	(0.38)
COST A_1	49454	(49.51)	44089	(45.88)
Rental value of leased in land	6850	(6.86)	4840	(5.04)
COST A_2	56304	(56.37)	48929	(50.92)
Interest on fixed capital	250	(0.25)	189	(0.20)
COST B_1	49704	(49.76)	44278	(46.08)
Rental value of owned land	3650	(3.65)	5660	(5.89)
COST B_2	60204	(60.27)	54778	(57.00)
Imputed value of family labour	30600	(30.64)	32580	(33.90)
COST C_1	80304	(80.40)	76858	(79.98)
COST C_2	90804	(90.91)	87358	(90.91)
Imputed value of management	9080	(9.09)	8736	(9.09)
COST C_3	99884	(100.00)	96094	(100.00)

Figures in parentheses indicate the percentage to Cost C_3

by hired labour which took up 14 percent and 13 percent respectively in Category I and Category II respectively.

B. SNAKEGOURD

The input-wise cost of cultivation of snakegourd as shown in Table 4.9 revealed that total cost of cultivation at Cost C_3 was Rs. 117049 and Rs. 116214 for Category I and II respectively.

Table 4.9 - Input-wise cost of cultivation of snakegourd (Rupees per hectare)

Item of Cost	Category I		Category II	
Hired labour	15320	(13.09)	14890	(12.81)
Seeds	1913	(1.63)	1900	(1.63)
Manure	19710	(16.84)	19005	(16.35)
Staking and Panthalling material	9181	(7.84)	8940	(7.69)
Fertilizers	4560	(3.90)	3595	(3.09)
Plant protection	2562	(2.19)	2455	(2.11)
Land revenue	100	(0.09)	100	(0.09)
Interest on working capital	2263	(1.93)	2089	(1.80)
Depreciation on fixed capital	210	(0.18)	200	(0.17)
COST A1	55818	(47.69)	53174	(45.76)
Rental value of leased in land	4090	(3.49)	3400	(2.93)
COST A2	59908	(51.18)	55474	(47.73)
Interest on fixed capital	215	(0.18)	195	(0.17)
COST BI	56033	(47.87)	53369	(45.92)
Rental value of owned land	6410	(5.48)	7100	(6.11)
COST B2	66533	(56.84)	63869	(54.96)
Imputed value of family labour	39875	(34.07)	41780	(35.95)
COST C1	95908	(81.94)	95149	(81.87)
COST C2	106408	(90.91)	105649	(90.91)
Imputed value of management	10641	(9.09)	10565	(9.09)
COST C3	117049	(100.00)	116214	(100.00)

Figures in parentheses indicate the percentage to Cost C_3

The major item of expenses was family labour contributing 34 and 36 percent respectively in Category I and II followed by manures (17 and 16 percent respectively in Category I and II) and hired labour contributing around 13 percent in both categories.

4.3.1.3 Input-Output relationships

The total cost in the Category I for cowpea amounted to Rs. 99884 whereas for the Category II this cost was found to be Rs. 96094 only. The total explicit cost in the Category I for cowpea amounted to Rs. 53182 whereas for the Category II this cost amounted to Rs. 46146 only. But on the other hand gross returns were found to be slightly higher for Category I at Rs. 110592 compared to the Category II where the gross returns came upto Rs. 105024 only.

Table 4.10 - Input-Output relationship in cowpea and snakegourd (per hectare)

Particulars	COWPEA		SNAKEGOURD	
	Category I	Category II	Category I	Category II
Total explicit cost (Rs.)	53182	46146	57436	54285
Total implicit cost(Rs.)	46702	49948	59613	61929
Total cost (C3) (Rs.)	99884	96094	117049	116214
Total output (kg/ ha)	9216	8752	19485	18976
Returns (Rs./ ha)	110592	105024	107168	104368
Net returns at explicit cost (Rs.)	57410	58878	49732	50083
Net returns at total cost (Rs.)	10708	8930	-9882	-11846
Benefit-cost ratio at explicit cost	2.08	2.28	1.87	1.92
Benefit/ cost ratio at total cost	1.11	1.09	0.92	0.90

In the case of snakegourd, the total cost in the Category I was observed to be Rs. 57436 which is higher than the cost incurred by Category II at Rs. 54285. There was observed to be a slight increase in the gross returns realized by the Category I farmers compared to the Category II farmers. Another observation made was that the implicit

costs for the Category II was at a higher level (Rs. 61929) compared to the Category I costs (Rs. 59613).

4.3.1.2 Benefit Cost Ratios (BCR)

BCR indicates the value of output per rupee of input cost. A comparison of both the categories of farmers revealed that financial viability at Cost C_3 was more among the Category I of farmers compared to the Category II in the cultivation of snakegourd and cowpea in the Southern Zone. But it was also observed that at Cost A1, Category II was found to be better off for both the crops with a higher BC Ratio than Category I farmers. At Cost A1, Category I farmers had a BCR of 2.24 for cowpea whereas the Category II farmers had a BCR of 2.38. But it was observed that at Cost C3 the Category I topped over Category II with a BCR of 1.11 for cowpea and 1.09 for snakegourd.

Table 4.11 Benefit Cost Ratios (BCR) at various costs for snakegourd and cowpea

At Cost	Cowpea		Snakegourd	
	Category I	Category II	Category I	Category II
A1	2.24	2.38	1.92	1.96
A2	1.96	2.15	1.79	1.88
B1	2.23	2.37	1.91	1.96
B2	1.84	1.92	1.61	1.63
C1	1.38	1.37	1.12	1.10
C2	1.22	1.20	1.01	0.99
C3	1.11	1.09	0.92	0.90

A comparison of the benefit cost ratios of snakegourd and cowpea bring out the fact that in Southern zone cowpea was more profitable than snakegourd. Though the cultivation of snakegourd was found to be financially viable at Cost A1, after taking into account all the implicit costs, especially the imputed value of family labour, the BCR was found to be less than one for snakegourd.

Plate.1. A green chilly field in Parali

Plate 2. Bittergourd field in Venganoor

Plate 3. Cow pea cultivation in Vadakarapathy

Plate 4. Cucumber field in Thiruvali

Plate.5. Watermelon cultivation in Thiruvali

Plate 6. Bittergourd garden in Parali

Plate 7. Bottle gourd cultivation in Chenkal

Plate.8. Coccinia cultivation in Thrikkalangode

Plate 9. Vegetable garden with permanent supports

Plate 10. Traditional pandal for Bitter gourd in Chunkathara

Plate 11. Cowpea plot in Malappuram district

Plate 12. Mixed cropping of Banana, ashgourd, Cowpea and Cassava

4.3.2 Northern Zone: Malappuram district

The input-wise cultivation costs of cultivation, input-output relationships and benefit-cost ratios of two major vegetables viz. Cowpea and Bittergourd cultivated in this zone by the sample respondents are presented below:

4.3.2.1 Input-wise cost of cultivation

The input-wise cultivation costs include the costs of seed material, hired labour, manures and fertilizers, staking and *Panthalling* material, expenditures on plant protection measures and the imputed costs on family labour, interest on working capital, interest on fixed capital and depreciation.

A. COWPEA

As evidenced from Table 4.12, manures and hired labour constitute the major share of explicit input costs in the cultivation of cowpea under both systems of vegetable cultivation. The imputed value of family labour constituted 39 percent and 41 percent of the total cost for Category I and II respondents respectively. The next major item of expenditure is on staking and panthalling material and seeds constitute the least expensive item. A comparison between the two types of farmers bring out the fact that though Category I farmers spent more on explicit items of inputs, the implicit costs are higher for the Category II cultivators.

Table 4.12 - Input-wise cost of cultivation of cowpea (Rupees per Ha)

Inputs	Category I		Category II	
Hired labour	16431	(14.21)	15980	(13.82)
Seeds	1080	(0.93)	1100	(0.95)
Manure	13703	(11.85)	14500	(12.54)
Staking and Panthalling material	13328	(11.53)	10560	(9.14)
Fertilizers	3818	(3.30)	3000	(2.60)
Plant protection	1723	(1.49)	1400	(1.21)
Land revenue	100	(0.09)	100	(0.09)
Interest on working capital	1834	(1.59)	1667	(1.44)
Depreciation on fixed capital	400	(0.35)	341	(0.29)
COST A1	52416	(45.33)	49648	(42.95)
Rental value of leased in land	4500	(3.89)	3020	(2.61)
COST A2	56916	(49.22)	52668	(45.56)
Interest on fixed capital	200	(0.17)	240	(0.21)
COST BI	52616	(45.50)	49888	(43.16)
Rental value of owned land	2900	(2.51)	4380	(3.79)
COST B2	60016	(51.90)	57288	(49.56)
Imputed value of family labour	45100	(39.00)	47800	(41.35)
COST C1	97716	(84.51)	97688	(84.51)
COST C2	105116	(90.91)	105088	(90.91)
Imputed value of management	10512	(9.09)	10509	(9.09)
COST C3	115628	(100.00)	115597	(100.00)

Figures in parentheses indicate the percentage to Cost C_3

B. BITTERGOURD

In the case of bittergourd, the total cost including both explicit and implicit items was recorded to be Rs. 114484 for Category I and Rs. 111876 for Category II. The costs on family labour for both categories was found to be the highest at 37 and 38 percent respectively. In the case of explicit costs incurred, expense on hired labour was followed by expenditure manures followed by expenditure on staking and panthalling material for both the categories of respondents.

Table 4.13 - Input-wise cost of cultivation of bittergourd (Rupees per Ha)

Inputs	Category I		Category II	
Hired labour	16600	(14.50)	15700	(14.03)
Seeds	900	(0.79)	900	(0.80)
Manure	16579	(14.48)	15420	(13.78)
Staking and Panthalling material	10789	(9.42)	11230	(10.04)
Fertilizers	4634	(4.05)	3500	(3.13)
Plant protection	2828	(2.47)	2720	(2.43)
Land revenue	100	(0.09)	100	(0.09)
Interest on working capital	1408	(1.23)	1675	(1.50)
Depreciation on fixed capital	315	(0.28)	320	(0.29)
COST A1	54152	(47.30)	51565	(46.09)
Rental value of leased in land	4525	(3.95)	3875	(3.46)
COST A2	58752	(51.32)	55440	(49.56)
Interest on fixed capital	124	(0.11)	150	(0.13)
COST BI	54276	(47.41)	51715	(46.23)
Rental value of owned land	2875	(2.51)	3525	(3.15)
COST B2	61676	(53.87)	59115	(52.84)
Imputed value of family labour	42400	(37.04)	42590	(38.07)
COST C1	96676	(84.45)	94305	(84.29)
COST C2	104076	(90.91)	101705	(90.91)
Imputed value of management	10408	(9.09)	10171	(9.09)
COST C3	114484	(100.00)	111876	(100.00)

Figures in parentheses indicate the percentage to Cost C_3

4.3.2.3 Input-Output relationships

Comparing the input-output relationship of cowpea among the two categories of farmers it was found that though explicit costs are high for Category I, implicit costs are higher for Category II respondents. The gross returns were high for Category I as compared to the Category II in the cultivation of both cowpea and bittergourd. While the net returns at explicit costs were positive for both the categories for both the crops, it was

observed that the net returns at total costs was negative for cowpea for both the categories taking into consideration the implicit costs like rent, family labour and management costs. On the other hand it was noted that for bittergourd the net returns at total costs was also positive for both categories of respondents with Category I respondents obtaining Rs. 69086 better off than the Category II respondents who earned Rs. 61892.

Table 4.14- Input-Output relationship in cowpea and bittergourd (per hectare)

Particulars	COWPEA		BITTERGOURD	
	Category I	Category II	Category I	Category II
Total explicit cost (Rs.)	54683	50660	56954.0	53445.0
Total implicit cost (Rs.)	60945	64937	57530.0	58431.0
Total cost (C3) (Rs.)	115628	115597	114484.0	111876. 0
Total output (kg/ ha)	9458	9356	22247.0	21721.0
Returns (Rs./ ha)	108769	107598	183570.0	173768.0
Net returns at explicit cost (Rs.)	54087	56938	126616.0	120323.0
Net returns at total cost (Rs.)	-6859	-7999.0	69086.0	61892.0
Benefit-cost ratio at explicit cost	1.99	2.12	3.22	3.25
Benefit/ cost ratio at total cost	0.94	0.93	1.60	1.55

In the case of both cowpea and bittergourd the Category II respondents spent more on implicit inputs whereas the Category I respondents were observed to spent more on explicit inputs.

4.3.2.2 Benefit Cost Ratios (BCR)

An analysis of the financial viability as expressed by the Benefit Cost ratio shows that category I farmers are in a better position compared to the category II farmers.

This may be due to the higher incomes realized by the category I farmers as compared to ıe category II farmers due to the better marketing system developed by VFPCK.

For cowpea, the BC Ratios at different costs ranged from 2.08 to 0.94 for Category I and 2.17 to 0.93 for Category II. Though the BCR at Cost AI was found to be igher for Category II farmers, the BCR at Cost C3 was higher for Category I espondents. In the case of bittergourd the BCR values ranged from 3.39 to 1.60 for Category I respondents and 3.37 to 1.55 in the case of Category II respondents. For ittergourd, both at Cost A1 and Cost C3 the category I respondents were found to have a igher benefit cost ratio than the Category II respondents.

Table 4.15- Benefit Cost Ratios (BCR) at various costs for bittergourd and cowpea

At Cost	Cowpea		Bittergourd	
	Category I	Category II	Category I	Category II
A1	2.08	2.17	3.39	3.37
A2	1.91	2.04	3.12	3.13
B1	2.07	2.16	3.38	3.36
B2	1.81	1.88	2.98	2.94
C1	1.11	1.10	1.90	1.84
C2	1.03	1.02	1.76	1.71
C3	0.94	0.93	1.60	1.55

4.3.3 Central Zone: Palakkad district

The input-wise cultivation costs of cultivation, input-output relationships and benefit-cost ratios of two major vegetables viz. Tomato and Bittergourd cultivated in his zone by the sample respondents of both the categories are presented below:

4.3.3.1 Input-wise cost of cultivation

The input-wise cultivation costs include the costs of seed material, hired labour, manures and fertilizers, expenditures on plant protection measures and the imputed costs on family labour, interest on working capital, interest on fixed capital and depreciation.

A. TOMATO

As presented in Table 4.16, the total cost for tomato at Cost C was found to be Rs. 109748 for Category I respondents and Rs. 110420 for Category II respondents. Expenses on hired labour and manure in both the categories of farmers in tomato cultivation were found to contribute the maximum towards explicit costs on inputs. Expenditure on hired labour for Category I respondents was 17 percent of the total cost whereas Category II respondents spent upto 16 percent of the total costs on inputs on hired labour. Similarly around 18 percent of the total expenditure was towards manure in both the categories of respondents.. This is followed by expenses on fertilizer. On the whole Category I were found to spent more on explicit inputs as compared to the Category II. On the contrary Category II was observed to spent more on implicit inputs such as family labour. Around 30 percent of the expenditure for Category II was found to be for family labour whereas for Category I the contribution of family labour was 28 percent.

Table 4.16- Input-wise cost of cultivation of Tomato (Rupees per hectare)

Inputs	Category I		Category II	
Hired labour	18125	(16.52)	17986	(16.29)
Seeds	1275	(1.16)	1200	(1.09)
Manure	19563	(17.82)	19500	(17.66)
Staking material	6000	(5.47)	5900	(5.34)
Fertilizers	9750	(8.88)	8950	(8.11)
Plant protection	3640	(3.32)	3421	(3.10)
Land revenue	100	(0.09)	100	(0.09)
Interest on working capital	2341	(2.13)	2101	(1.90)
Depreciation on fixed capital	168	(0.15)	164.	(0.15)
COST A1	60961	(55.55)	59322	(53.72)
Rental value of leased in land	5440	(4.96)	2775	(2.51)
COST A2	66401	(60.50)	62097	(56.24)
Interest on fixed capital	260	(0.24)	260	(0.24)
COST BI	61221	(55.78)	59582	(53.96)
Rental value of owned land	2560	(2.33)	5225	(4.73)
COST B2	69221	(63.07)	67582	(61.20)
Imputed value of family labour	30550	(27.84)	32800.	(29.70)
COST C1	91771	(83.62)	92382	(83.66)
COST C2	99771	(90.91)	100382	(90.91)
Imputed value of management	9977	(9.09)	10038	(9.09)
COST C3	109748	(100.00)	110420	(100.00)

Figures in parentheses indicate the percentage to Cost C_3

B. BITTERGOURD

In the case of bittergourd, it was found that the total cost C3 was Rs. 115229 for Category I respondents and Rs. 112171 for Category II respondents. Following the expenses on hired labour which was found to be the major item of explicit expenditure in both categories at 21 percent of the total cost, staking and panthalling material constituted a major item of expenditure in both categories of cultivators at 10 percent of the total expenses. For Category II respondents, expense on Manures was found to be higher at 11

percent of the total cost. In general, the category I farmers were found spending more on inputs compared to the Category II farmers. It was also observed that, as in other zones, the Category II respondents were found to be spending more on family labour at 35 percent whereas the Category I respondents spent only upto 32 percent on this implicit input.

Table 4.17- Input-wise cost of cultivation of Bittergourd (Rupees per hectare)

Inputs	Category I		Category II	
Hired labour	24100	(20.91)	23189	(20.67)
Seeds	940	(0.82)	940	(0.84)
Manure	11563	(10.03)	12620	(11.25)
Staking and Panthalling material	11450	(9.94)	11580	(10.32)
Fertilizers	10010	(8.69)	8410	(7.50)
Plant protection	4120	(3.58)	3640	(3.25)
Land revenue	100	(0.09)	100	(0.09)
Interest on working capital	2243	(1.95)	2046	(1.82)
Depreciation on fixed capital	198	(0.17)	198	(0.18)
COST A1	64723	(56.17)	62723	(55.92)
Rental value of leased in land	4790	(4.16)	3880	(3.46)
COST A2	69513	(60.33)	66603	(59.38)
Interest on fixed capital	250	(0.22)	250	(0.22)
COST BI	64973	(56.39)	62973	(56.14)
Rental value of owned land	3210	(2.79)	4120	(3.67)
COST B2	72973	(63.33)	66853	(59.60)
Imputed value of family labour	36570	(31.74)	39000	(34.77)
COST C1	101543	(88.12)	101974	(90.91)
COST C2	104753	(90.91)	101974	(90.91)
Imputed value of management	10475	(9.09)	10197	(9.09)
COST C3	115228	(100.00)	112171	(100.00)

Figures in parentheses indicate the percentage to Cost C_3

4.3.3.2 - Input-Output relationships

The input-output relationship in tomato and bittergourd are presented in Table 4.18. An examination of the input-output relationship in the cultivation of tomato showed that even though category I farmers incurred higher explicit costs they spent relatively less on implicit inputs. Hence the total cost of cultivation was found to be higher for the Category II farmers. The gross returns were found to be slightly higher for the Category I farmers at Rs. 112000.00. In the case of Bittergourd, Category I respondents spent more on explicit and implicit items of input. The gross income realized was also found to be higher for Category I respondents at Rs. 179920 compared to the category II farmers whose gross returns was found to be Rs. 168248.

Table 4.18- Input-Output relationship in tomato and bittergourd (per hectare)

Particulars	TOMATO		BITTERGOURD	
	Category I	Category II	Category I	Category II
Total explicit cost (Rs.)	63892	59832	67072	64359
Total implicit cost (Rs.)	45855	50587	48156	47812
Total cost (C3) (Rs.)	109748	110419	115228	112171
Total output (kg/ ha)	28000	27854	22490	21031
Returns (Rs./ ha)	112000	111416	179920	168248
Net returns at explicit cost (Rs.)	48107	51584	112847	103889
Net returns at total cost (Rs.)	2251	996	64691	56076
Benefit-cost ratio at explicit cost	1.75	1.86	2.68	2.61
Benefit/ cost ratio at total cost	1.02	1.01	1.56	1.50

4.3.3.3 Benefit Cost Ratios (BCR)

The analysis of benefit cost ratio of bittergourd as shown in Table 4.19 brought out that the BCR ranged from 2.78 to 1.56 at various costs for Category I whereas the values ranged from 2.68 to 1.50 in the case of Category II. For tomato, the BCR analysis brought out that Category I farmers found the cultivation profitable at Cost A1 and Cost C3. For Category II farmers the crop was found to have a BCR of 1.88 at Cost A1 and 1.01 at Cost C3. In the case of bittergourd, the BCR was found to range from 2.78 to 1.56 for Category I respondents. For Category II respondents, the values ranged from 2.68 to 1.50. The results revealed that for bittergourd the Category I farmers obtained greater profit compared to the Category II respondents both at Cost A1 and Cost C3. For tomato the Category II farmers were benefiting more at Cost A1 though at Cost C3 Category I was found to benefit.

Table 4.19- Benefit Cost Ratios (BCR) at various costs for bittergourd and tomato

At Cost	Bittergourd		Tomato	
	Category I	Category II	Category I	Category II
A1	2.78	2.68	1.84	1.88
A2	2.59	2.53	1.69	1.79
B1	2.77	2.67	1.83	1.87
B2	2.47	2.52	1.62	1.65
C1	1.77	1.65	1.22	1.21
C2	1.72	1.65	1.12	1.11
C3	1.56	1.50	1.02	1.01

4.4 LABOUR UTILIZATION PATTERN

Vegetable cultivation is a very labour intensive activity and in this an analysis of the labour utilization pattern in vegetable cultivation is presented. An examination of

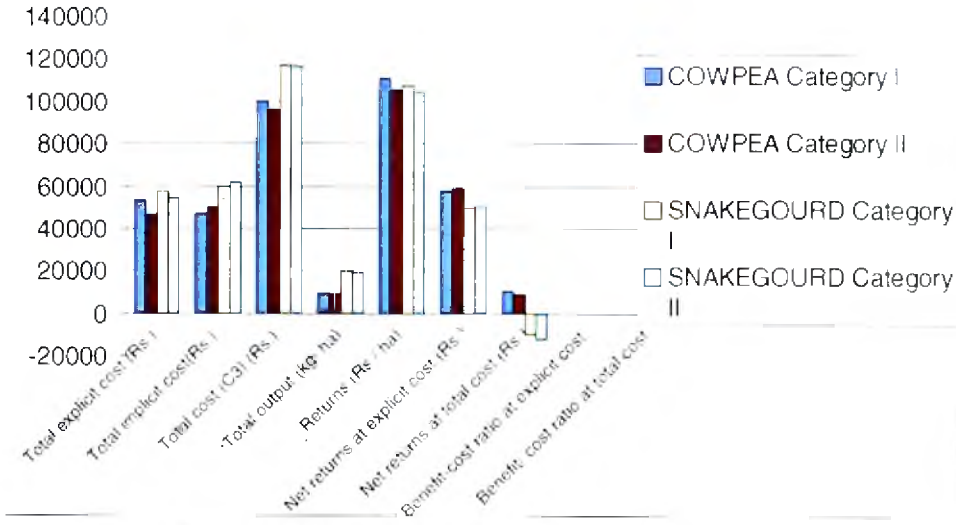

Figure - 5 **Economics of Cultivation: Southern Zone**

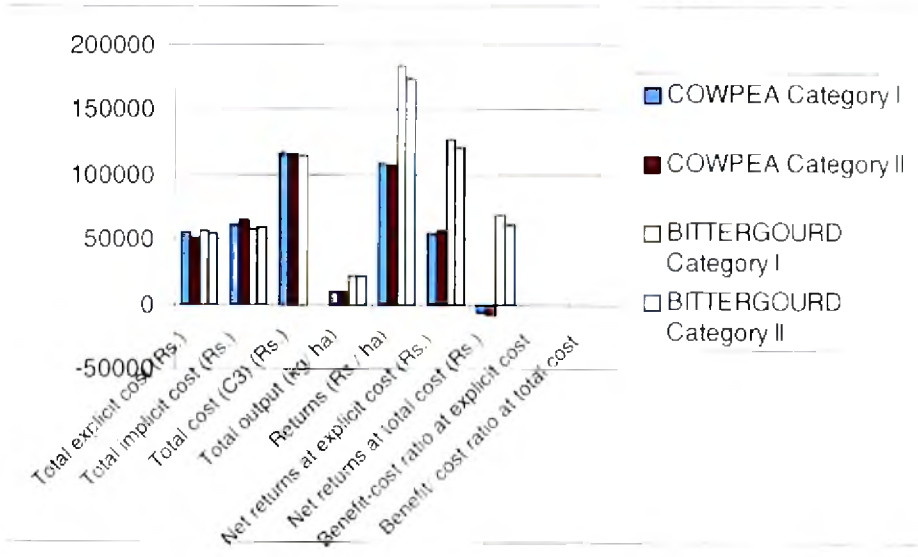

Figure 6 Economics of Cultivation: Northern Zone

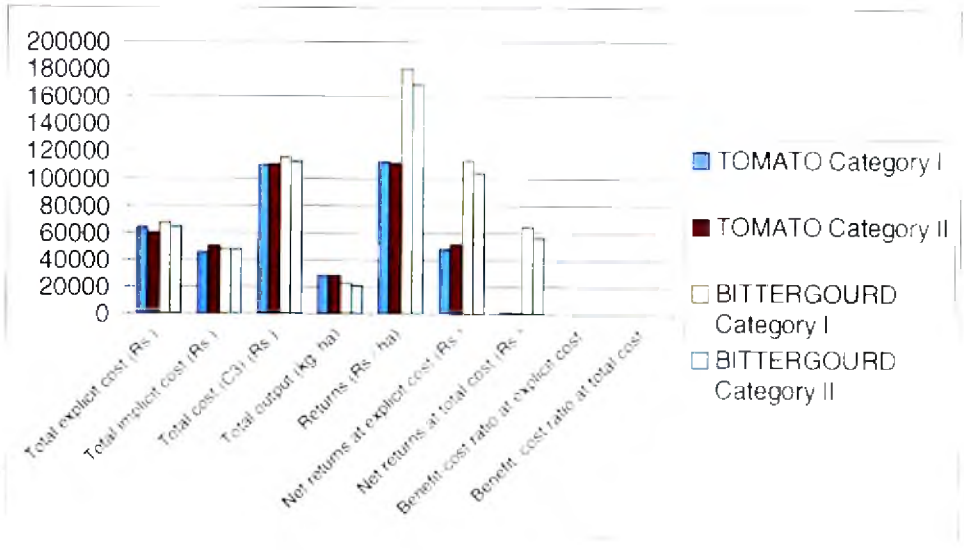

Figure 7 Economics of Cultivation: Central Zone

the various operations in vegetable cultivation from the perspective of amount of labour utilized was made for one major crop in each agroclimatic zone. This section also throws light on the gender component of labour employed in vegetable cultivation. An analysis of the extent of family labour utilized in vegetable cultivation as well as the proportionate utilization in the various operations was also carried out here. The crops included are Cowpea (Thiruvananthapuram, Southern Zone), Tomato (Palakkad, Central Zone) and Bittergourd (Malappuram, Northern Zone).

4.4.1 Labour utilization pattern: Cowpea

The labour utilization pattern of cowpea in the district of Thiruvananthapuram, as presented in Table 4.20 it was noticed that land preparation and staking were the major items of labour use. The largest share of labour was spent on land preparation which used up 15.62 percent of the total labour employed in cowpea cultivation. Staking also took up considerable share of labour (14.75 percent). Harvesting was another major operation which utilized 14.32 percent of the total labour used. Sowing was the activity in which the labour utilization was minimum.

Comparison of hired and family labour

Own labour used was found to be 81.34 percent of the total labour use. Hired labour employed on the other hand was found to be 18.66 percent of the total labour use. Land preparation, staking and harvesting were the major activities which utilize the maximum of family labour. It was further established that irrigation (8.89 percent) and after cultivation (7.59 percent) also utilized considerable amount of family labour. Hired labour was spent mostly on staking (4.56 percent) and land preparation (3.90 percent). There was absolutely no hiring of labour for the operations of harvesting and weeding.

Gender component in labour utilization

The analysis of contribution of women in the farm operations concerned with vegetable cultivation revealed that larger share of the labour utilized was women labour. Whereas men labour formed 49.46 percent of the total labour use, women labour constituted 50.76 percent of the total labour use. Land preparation and irrigation were activities which

utilized predominantly men labour (15.18 percent and 9.76 percent respectively) whereas harvesting and weeding were mostly done by women labour.

Table 4.20: Labour utilization pattern in cowpea (days per hectare)

OPERATION	Total men	% to total labour	Total women	% to total Labour	Hired total	% to total labour	Own total	% to total labour	Total labour	% to total labour
Land preparation	70	15.18	2	0.43	18	3.90	54	11.71	72	15.62
Sowing	6	1.30	11	2.39	4	0.87	13	2.82	17	3.69
Irrigation	45	9.76	9	1.95	13	2.60	41	8.89	54	11.50
Manuring	5	1.08	30	6.51	6	1.30	29	6.29	35	7.59
Staking	52	11.28	16	3.47	21	4.56	47	10.20	68	14.75
Weeding	0	0.00	33	7.16	0	0.00	33	7.16	33	7.16
Plant protection	21	4.56	15	3.25	11	2.39	25	5.42	36	7.81
Fertilizer application	15	3.25	22	4.77	5	1.08	32	6.94	37	8.03
After cultivation	14	3.04	30	6.51	9	1.95	35	7.59	44	9.54
Harvesting	0	0.00	66	14.32	0	0.00	66	14.32	66	14.32
Total Labour	228	49.46	234	50.76	87	18.66	375	81.34	462	100.00

4.4.2 Labour utilization pattern: Tomato

The analysis of labour utilization pattern for tomato in Palakkad district as shown in Table 4.21 revealed that of the total labour use, the largest share of labour was spent on land preparation (which amounted to 17.88 percent of the total labour employed in tomato cultivation). Harvesting took up 16. 06 percent of the labour used followed by irrigation (12.18 percent) and weeding (11.40 percent). Staking was another major operation which required a labour force of 10.10 percent of the total labour. Least labour was used up in the sowing operations (3.37 percent)

Table 4.21 - Labour utilization pattern in tomato (days per hectare)

OPERATION	Total men	% to total labour	Total women	% to total labour	Hired total	% to total labour	Own total	% to total labour	Total labour	% to total labour
Land Preparation	62	16.06	7	1.81	28	7.25	41	10.62	69	17.88
Sowing	5	1.30	8	2.07	3	0.78	10	2.59	13	3.37
Irrigation	42	10.88	5	1.30	2	0.52	45	11.66	47	12.18
Manuring	3	0.78	30	7.77	4	1.04	29	7.51	33	8.55
Staking	35	9.07	4	1.04	15	3.89	24	6.22	39	10.10
Weeding	0	0.00	44	11.40	0	0.00	44	11.40	44	11.40
Plant protection	6	1.55	20	5.18	4	1.04	22	5.70	26	6.74
Fertilizer application	12	3.11	7	1.81	3	0.78	16	4.15	19	4.92
After cultivation	14	3.63	20	5.18	7	1.81	27	6.99	34	8.81
Harvesting	6	1.55	56	14.51	0	0.00	62	16.06	62	16.06
Total Labour	185	47.93	201	52.07	66	17.10	320	82.90	386	100.00

Comparison of hired and family labour

It was established that land preparation was the operation which required the maximum of hired labour which amounted to 7.25 percent of the total labour use. Staking was another major activity in which hired labour was employed. Weeding and harvesting used absolutely no hired labour whereas there was nominal use of hired labour in fertilizer application and irrigation. Harvesting was the operation in which the maximum of family labour was spent (16.06 percent). Irrigation, weeding and land preparation were the other operations in which family labour was utilized.

Gender component in labour utilization

It was found that women labour was mostly employed in harvesting operation. It is also worthwhile noting that harvesting was the operation which took up no share of hired labour at all. Similarly, weeding which also employed no hired labour, employed 11.40 percent of women labour. Fertilizer application, staking and irrigation took up comparatively lesser proportion of women labour. The maximum share of men labour was found employed in land preparation followed by irrigation and staking.

4.4.3 Labour utilization pattern: Bittergourd

As indicated in Table 4.21, labour use in bittergourd for the district of Malappuram was found to be more for the operations of land preparation (15.61 percent) and harvesting (13.64 percent). Sowing took up the least labour share of 3.36 percent. After-cultivation was another major labour using operation.

Comparison of hired and family labour

The analysis brought to light that 85.97 percent of the labour used in the cultivation of bittergourd was family labour. 14.03 percent of labour was hired. In the family labour utilization, harvesting and land preparation was found to take up the major share of the total labour used for cultivation. Weeding by family labour used 10.47 percent of the total labour. Hired labour was used mainly for land preparation and after-cultivation. Other operations of weeding, irrigation and sowing took up very little hired labour.

Gender component in labour utilization

It was found that women labour was mostly employed in harvesting and weeding operations. No women labour at all was employed in land preparation and irrigation. Staking also took up nominal women labour of 0.79 percent of the total labour used. 15.61 percent of labour used was found to be men labour employed in land preparation. Weeding was not performed by men labourers at all. Sowing and manuring were also found to take up minimum of men labour. 49.01 percent of the total labour used was men labour whereas 50.99 percent was women labour.

Table 4.22 : Labour Utilization pattern in bittergourd (days per hectare)

OPERATION	Total men	% to total labour	Total women	% to total Labour	Hired total	% to total labour	Own total	% to total labour	Total labour	% to total labour
Land preparation	79	15.61	0	0.00	13	2.57	66	13.04	79	15.61
Sowing	5	0.99	12	2.37	3	0.59	14	2.77	17	3.36
Irrigation	47	9.29	0	0.00	5	0.99	42	8.30	47	9.29
Manuring	2	0.40	41	8.10	4	0.79	39	7.71	43	8.50
Staking	38	7.51	4	0.79	10	1.98	32	6.32	42	8.30
Weeding	0	0.00	57	11.26	4	0.79	53	10.47	57	11.26
Plant protection	9	1.78	50	9.88	9	1.78	50	9.88	59	11.66
Fertilizer application	22	4.35	7	1.38	3	0.59	26	5.14	29	5.73
After cultivation	36	7.11	28	5.53	20	3.95	44	8.70	64	12.65
Harvesting	10	1.98	59	11.66	0	0.00	69	13.64	69	13.64
Total Labour	248	49.01	258	50.99	71	14.03	435	85.97	506	100.00

4.5 ADOPTION OF SCIENTIFIC PRACTICES

The adoption of modern technologies of soil and water conservation measures, manures and fertilizers, plant protection methods, irrigation and pre and post harvest processing, were analyzed for both categories of farmers. The results obtained have been summarized in the following table.

Table 4.23: Adoption of Scientific Practices

Operation	Scientific practices	
	Category I	**Category II**
Soil and water conservation measures	Mulching, bunding, rain pit	Mulching and bunding
Plant protection methods	Neem based pesticides, application of hormone for growth and flowering Chemical pesticides	Neem based pesticides Chemical pesticides
Weed management	Manual and weedicides	Manual
Type of Irrigation	Channel	Channel
Type of fertilizers used	Urea, potash, factomphos	Urea, potash, factomphos
Whether done soil testing or not	No	No
Pre and post harvest processing adopted	Yes	No
Amount of organic manures used	Use of vermi compost	@ 1tonne per hectare
Using light trap & Hormone trap for pest control	As per technical advise	As per technical advise

It may be noted that both the categories of farmers were adopting scientific practices for vegetable cultivation and following technical advice with respect to the application of manures and control of pests and diseases. It was observed that though organic manures and bio-pesticides were recommended the farmers had the tendency to apply excess doses of chemical fertilizers and pesticides irrespective of the categories.

4.6 MARKETING OF VEGETABLES

Due to the perishable nature of the vegetables, it is imperative that growers have a solid plan in place on where, how and for how much they intend to sell the commodity. Thus, developing an effective marketing strategy is an important key to success for vegetable growers. Produce can be sold directly at the farm gate or at a farmers market. Another avenue is to sell through a wholesaler. There are advantages and disadvantages in any marketing outlet. The best market is not just the one that offers the highest price but also the one that matches the producers' particular circumstances at any given time.

In the present study, the analysis of marketing was undertaken in the three agro-climatic zones as a whole for the major crops selected. The crops studied included tomato, bittergourd, snakegourd and cowpea and the marketing aspects like marketing channels, marketing costs and margins are presented in the following section.

4.6.1 Marketing Channels Involved

An analysis of the various marketing channels involved in the marketing of vegetables by the two categories of farmers were carried out to understand the various options available to the farmers in marketing of the vegetables as well as to find out the most frequently used marketing channel in the case of each category. It may be noted that the following marketing channels were identified for all the crops studied viz. tomato, bittergourd, snakegourd and cowpea.

Plate 13. Rich harvest of Bittergourd in Kottayi

Plate. 14. Harvested cowpea ready for marketing

Plate.15. Harvested vegetables ready for marketing

Plate 16. Bhindi crop in harvesting stage in Thrikkalangode

Plate.17. VFPCK market in Nemmara

Plate 18. Transporting bittergourd from VFPCK market in Nemmara

A. VFPCK farmers (CATEGORY I)

Producer → Consumer

Producer → VFPCK Market → Wholesaler → Retailer → Consumer

Producer → VFPCK Market → Exporter

Producer → Commission Agent → Retailer → Consumer

Producer → Commission Agent → Wholesaler → Retailer → Consumer

Producer → Wholesaler → Consumer

Producer → Wholesaler → Retailer → Consumer

The Producer -VFPCK Market -Wholesaler –Retailer- consumer chain was the most frequently used chain in the case of farmers cultivating vegetables under the VFPCK scheme. It was also noticed that during the lean seasons the marketing goes back to the channel of Producer –Commission agent -Wholesaler –Retailer- consumer chain.

B. Traditional farmers (CATEGORY II)

Producer → Consumer

Producer → Retailer → Consumer

Producer → Wholesaler → Consumer

Producer → Wholesaler → Retailer → Consumer

Producer → Commission Agent → Wholesaler → Consumer

Producer → Commission Agent → Retailer → Consumer

Producer → Commission Agent → Wholesaler → Retailer → Consumer

The Producer - Commission agent -Wholesaler –Retailer- consumer chain was the most frequently used chain in the case of farmers cultivating vegetables in the traditional way. The distribution of respondents according to the type of buyers is presented in Table 4.24.

Table-4.24 Distribution of farmer respondents according to the type of buyers

Type of Buyer	Category I		Category II		Total	
Wholesaler through commission agent	17	(18.89)	74	(82.22)	91	(50.56)
Through VFPCK	69	(76.67)	0	(0.00)	69	(38.33)
Wholesalers and retailers	2	(2.22)	4	(4.44)	6	(3.33)
Wholesalers and consumers	1	(1.11)	3	(3.33)	4	(2.22)
Retailers and consumers	1	(1.11)	5	(5.56)	6	(3.33)
Retailers	0	(0.00)	2	(2.22)	2	(1.11)
Wholesalers. Commission agents and retailers	0	(0.00)	1	(1.11)	1	(0.56)
None	0	(0.00)	1	(1.11)	1	(0.56)
Total	90	(100.00)	90	(100.00)	180	(100.00)

(Figures in parentheses denote the respective percentage shares)

The results revealed that the VFPCK farmers marketed their produce mainly through VFPCK (through the Swashraya Karshaka Vipani or farmer's markets). It was also found that these farmers had the option of selling to the wholesaler through the commission agent (18.89 percent) in the traditional marketing system if prices were found more favourable there. But the majority of the traditional category of farmers (82.22 percent)

marketed their produce through the commission agent to the wholesaler.

4.6.2 Marketing costs and margins

The marketing costs and margins for tomato, bittergourd, snakegourd and cowpea are presented below.

4.6.2.1 Marketing margins and costs for Tomato

The comparison between VFPCK and traditional category of farmers in the marketing of tomato as shown in Table 4.25 bring out clearly that VFPCK farmers obtain a greater share of the marketing margin (46 percent) as compared to the traditional category (44 percent). This is mainly because the VFPCK farmers marketed their produce through the Swashraya Karshaka Vipani and do not have to pay the brokerage fee of the Commission agent. It was also noticed that transportation costs incurred by the producer is also reduced to some extent due to the nearness of the VFPCK market as compared to the traditional market. The total marketing costs amounted to Rs. 1125 for Category I and Rs. 1375 for Category II while the total marketing margins came upto Rs. 6275 and Rs. 6125 respectively for Category I and Category II respectively. The Commission charges incurred by the producers varied from 2.67 percent in Category I to 5.33 percent in Category II.

Table 4.25: Marketing margins and costs for Tomato

Sl. No.	Shares	Category I		Category II	
		Value (Rs./tonne)	Percentage	Value (Rs./tonne)	Percentage
1	Producers' sale price or price paid by wholesaler	4000	53.33	4000	53.33
2	Transportation cost incurred by the producer	250	3.33	300	4.00
3	Commission charges paid by the producers	200	2.67	400	5.33
4	Net price received by producer	3450	46.00	3300	44.00
5	Fixed cost on investment for wholesaler	100	1.33	100	1.33
6	Working cost of wholesaler	150	2.00	150	2.00
7	Wholesalers' net margin	1750	23.33	1750	23.33
8	Price received by wholesaler	6000	80.00	6000	80.00
9	Fixed coast on investment for retailer	200	2.67	200	2.67
10	Transport cost of retailer	150	2.00	150	2.00
11	Other costs by retailer	75	1.00	75	1.00
12	Retailers' net margin	1075	14.33	1075	14.33
13	Consumers' price	7500	100.00	7500	100.00

A. Marketing margins and costs for Bittergourd

The marketing costs and margins for bittergourd as given in Table 4.26 showed that the net price received by the producer as expressed as the share in consumer's rupee amounts to 51.88 percent for VFPCK farmers and 48.75 percent in the case of traditional category of farmers. The total marketing costs was estimated as Rs. 1440 and Rs. 1940 for Category I and Category II respectively. The total marketing margins worked out to be Rs. 12560 for Category I and Rs. 12060 for Category II. The Commission charges incurred by the producers varied from 2.81 percent in Category I to 5.63 percent in Category II.

Table 4.26 - Marketing margins and costs for Bittergourd

Sl.No.	Shares	Category I		Category II	
		Value (Rs./tonne)	Percentage	Value (Rs./tonne)	Percentage
1	Producers' sale price or price paid by wholesaler	9000	56.25	9000	56.25
2	Transportation cost incurred by the producer	250	1.56	300	1.88
3	Commission charges paid by the producers	450	2.81	900	5.63
4	Net price received by producer	8300	51.88	7800	48.75
5	Fixed cost on investment for wholesaler	90	0.56	90	0.56
6	Working cost of wholesaler	200	1.25	200	1.25
7	Wholesalers' net margin	3710	23.19	3710	23.19
8	Price received by wholesaler	13000	81.25	13000	81.25
9	Fixed cost on investment for retailer	160	1.00	160	1.00
10	Transport cost of retailer	200	1.25	200	1.25
11	Other costs by retailer	90	0.56	90	0.56
12	Retailers' net margin	550	15.94	550	15.94
13	Consumers' price	14000	100.00	14000	100.00

B. Marketing margins and costs for Snakegourd

The marketing costs and margins of snakegourd as presented in Table 4.27 revealed that the total marketing costs were Rs. 1390 and Rs. 1740 for Category I and Category II respectively. The total marketing margins for Category I and Category II were Rs. 7110 and Rs.6760 respectively. The share of the producer in consumer's rupee in the cultivation of snakegourd amounts to 51.18 percent for Category I and 47.06 percent in the case of Category II farmers. The Commission charges incurred by the producers varied from 2.94 percent in Category I to 5.88 percent in Category II.

Table 4.27: Marketing margins and costs for Snakegourd

Sl. No.	Shares	Category I		Category II	
		Value (Rs./tonne)	Percentage	Value (Rs./tonne)	Percentage
1	Producers' sale price or price paid by wholesaler	5000	58.82	5000	58.82
2	Transportation cost incurred by the producer	400	4.71	500	5.88
3	Commission charges paid by the producers	250	2.94	500	5.88
4	Net price received by producer	4350	51.18	4000	47.06
5	Fixed cost on investment for wholesaler	90	1.06	90	1.06
6	Working cost of wholesaler	200	2.35	200	2.35
7	Wholesalers' net margin	1710	20.12	1710	20.12
8	Price received by wholesaler	7000	82.35	7000	82.35
9	Fixed coast on investment for retailer	160	1.88	160	1.88
10	Transport cost of retailer	200	2.35	200	2.35
11	Other costs by retailer	90	1.06	90	1.06
12	Retailers' net margin	1050	12.35	1050	12.35
13	Consumers' price	8500	53.13	8500	100.00

C. Marketing margins and costs for Cowpea

Marketing Costs and Margins for Cowpea as given in Table 4.28 revealed a total marketing cost of Rs. 1390 for Category I and Rs. 1940 for Category II . the total Marketing margns came upto Rs. 11110 and Rs. 10560 for Category I and Category II respectively. Cowpea cultivation was found to be more profitable from the point of view of marketing margins especially for the Category I farmer who was found to receive a share of 66.80 percent in the consumer's rupee. The Category II farmer on the other hand was found to receive a share of 62.40 percent in the consumer's rupee. Whereas the Category II farmers had to pay a commission of 10 percent in the wholesale market the Category I farmer on the other hand had to pay only 5 percent at the VFPCK market.

Table 4.28: Marketing margins and costs for Cowpea

Sl. No.	Shares	Category I		Category II	
		Value (Rs./tonne)	Percentage	Value (Rs./tonne)	Percentage
1	Producers' sale price or price paid by wholesaler	9000	72.00	9000	72.00
2	Transportation cost incurred by the producer	200	1.60	300	2.40
3	Commission charges paid by the producers	450	3.60	900	7.20
4	Net price received by producer	8350	66.80	7800	62.40
5	Fixed cost on investment for wholesaler	90	0.72	90	0.72
6	Working cost of wholesaler	200	1.60	200	1.60
7	Wholesalers' net margin	1710	13.68	1710	13.68
8	Price received by wholesaler	11000	88.00	11000	88.00
9	Fixed coast on investment for retailer	160	1.28	160	1.28
10	Transport cost of retailer	200	1.60	200	1.60
11	Other costs by retailer	90	0.72	90	0.72
12	Retailers' net margin	1050	8.40	1050	8.40
13	Consumers' price	12500	100.00	12500	100.00

PRODUCERS' SHARE IN THE MARKET FOR TOMATO

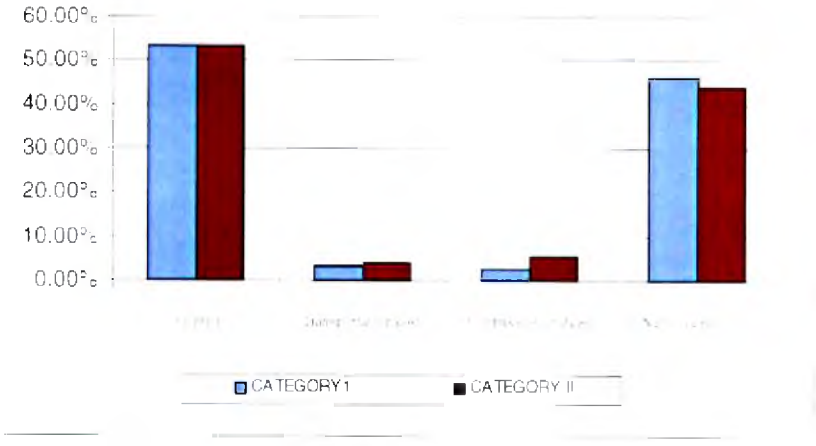

Figure - 8

PRODUCERS' SHARE IN THE MARKET FOR BITTERGOURD

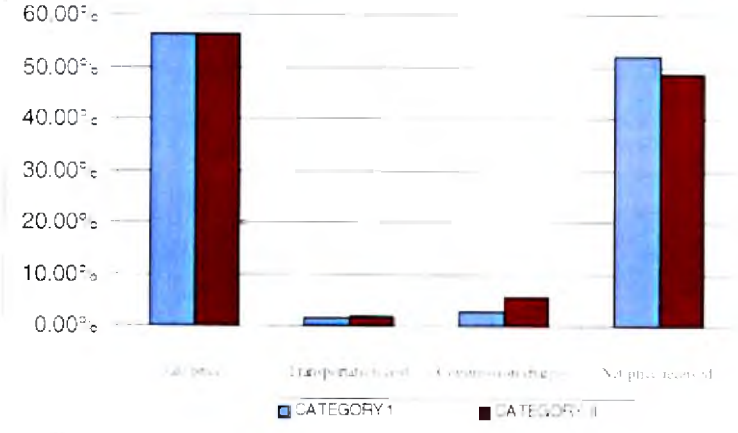

Figure - 9

PRODUCERS' SHARE FOR SNAKEGOURD

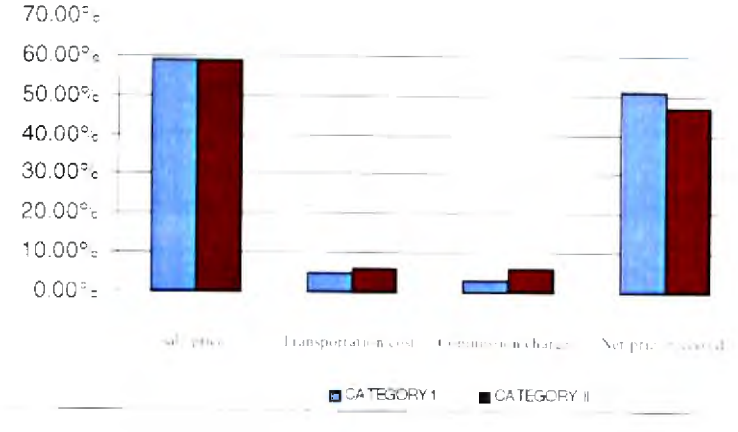

Figure - 10

4.7. CONSTRAINTS IN VEGETABLE PRODUCTION

4.7.1 Constraints in Production

The major constraints experienced by the sample respondents were identified while conducting pilot survey. The major constraints were tabulated and the response of the farmers regarding these problems were gathered in order of their importance, classified as most important, important, somewhat important, less important and least important. The score assigned to these classes were 5,4,3,2 and 1 in the order of their rank. The cumulative rank for each constraint was estimated and the results showed that lack of irrigation water was the most important constraint in Category I with a total score of 790 followed by incidence of pests and diseases scoring a total of 731. Non-availability of full time Agricultural Officer/KHDP Officer in the area also was found to be an important problem with a score of 468, while the problem of lack of insurance to vegetables had a score of 326.

Among Category II respondents incidence of pests and diseases was the most important constraint with a total score of 834 followed by lack of irrigation water scoring a total of 757. Lack of insurance to vegetables was found to be an important problem with a score of 640, while the problem of Low price for the produce was with a score of 595.

The major constraints experienced by the sample respondents were identified while conducting pilot survey. The major constraints were tabulated and the response of the farmers regarding these problems were gathered in order of their importance, classified as most important, important, somewhat important, less important and least important. The score assigned to these classes were 5,4,3,2 and 1 in the order of their rank. The cumulative rank for each constraint was estimated and the results for Category I are presented in Table.4.29 and 4.30.

It was found that lack of irrigation water was the most important constraint in Category I with a total score of 790 followed by incidence of pests and diseases scoring a total of 731. Non-availability of full time Agricultural Officer/KHDP Officer in the area also found to be an important problem with a score of 468, while the problem of lack of insurance to vegetables was with score of 326.

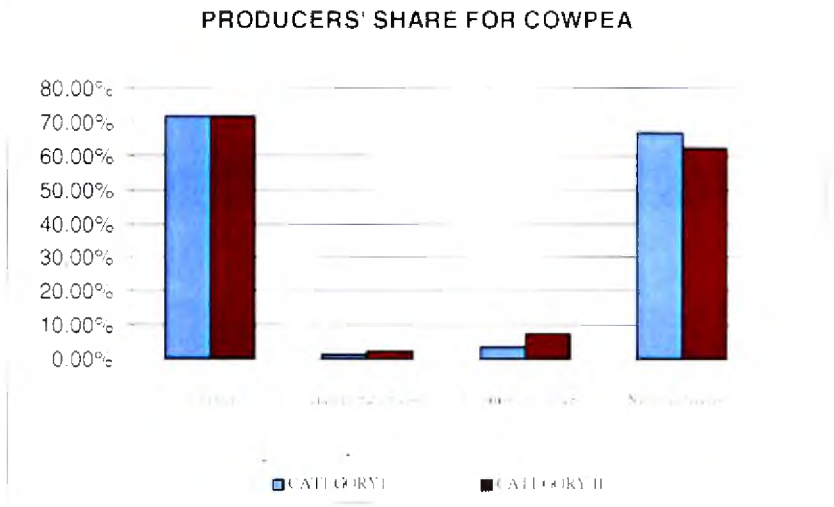

Figure - 11

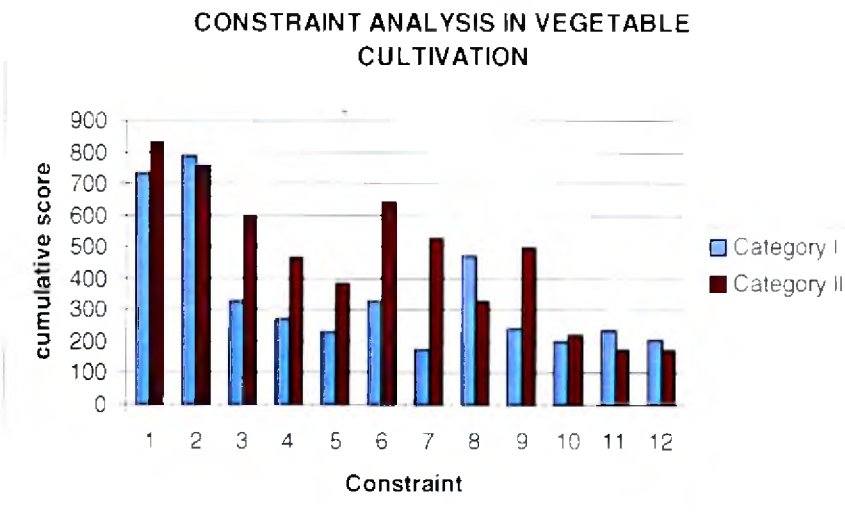

Figure - 12

1. Incidence of pests and diseases
2. Lack of Irrigation water
3. Low price for the produce
4. Non availability of bank loans
5. Lack of timely supply of input materials
6. Lack of insurance to vegetables
7. Non availability of quality seeds
8. Non-availability of full time Agrl. Officer/ KHDP Officer in the area
9. Lack of training programmes on modern cultivation practices
10. High unit cost for leased land
11. Non availability of additional land for cultivation
12. High interest rate for bank loans

Table. 4.29 Major constraints as perceived by Category I respondents

Constraints	5	4	3	2	1	Cumulative Score
1. Incidence of pests and diseases	86	59	6	18	11	731
2. Lack of Irrigation water	92	76	4	6	2	790
3. Low price for the produce	12	26	42	14	8	326
4. Non availability of bank loans	6	11	16	48	51	269
5. Lack of timely supply of input materials	4	6	24	31	53	231
6. Lack of insurance to vegetables	42	16	7	9	14	327
7. Non availability of quality seeds	12	7	16	14	8	172
8. Non availability of full time Agrl. Officer/KHDP Officer in the area	37	24	41	26	12	468
9. Lack of training programmes on modern cultivation practices	8	23	14	12	42	240
10. High unit cost for leased land	6	7	18	32	24	200
11. Non availability of additional land for cultivation	11	5	32	13	38	235
12. High interest rate for bank loans	6	4	24	28	32	206

5: Most Important; 4: Important; 3: Some what important; 2: Less Important; 1: Least Important

Regarding Category II, incidence of pests and diseases was the most important constraint in Category II with a total score of 834 followed by lack of irrigation water scoring a total of 757. Lack of insurance to vegetables was found to be an important problem with a score of 640, while the problem of Low price for the produce was with a score of 595.

Table. 4.30- Major constraints as perceived by Category II respondents

Constraints	5	4	3	2	1	Cumulative Score
1. Incidence of pests and diseases	123	51	4	1	1	834
2. Lack of Irrigation water	57	114	3	4	2	757
3. Low price for the produce	9	64	73	29	7	595
4. Non availability of bank loans	21	14	77	33	8	466
5. Lack of timely supply of input materials	16	11	66	28	5	383
6. Lack of insurance to vegetables	34	116	8	10	6	640
7. Non availability of quality seeds	15	13	105	38	9	527
8. Non-availability of full time Agrl. Officer/ KHDP Officer in the area	22	6	58	36	17	325
9. Lack of training programmes on modern cultivation practices	9	42	55	46	28	498
10. High unit cost for leased land	3	11	8	52	31	218
11. Non availability of additional land for cultivation	7	2	26	18	15	172
12. High interest rate for bank loans	3	6	17	34	18	176

5: Most Important; 4: Important; 3: Some what important; 2: Less Important; 1: Least Important

4.7.2 Constraints in marketing

An efficient agriculture marketing system requires a healthy environment, smooth channels for the transfer of produce, physical infrastructure to support marketing activities, easy cash support to the widely scattered community of producers and also a sense of market orientation among the farmers. The absence of rural road connectivity and other infrastructure, combined with improper management, lack of market intelligence and inadequate credit support results in a system unfavourable to the farmers. The adverse impact of all these is more pronounced in the case of the small and marginal farmers who constitute a large chunk in the farming community.

Lack of independent Information sources, too many Intermediaries who work as a substitute for infrastructure, power balance and terms of trade tilted towards intermediaries and not Farmers all result in too much of value being locked into the Supply Chain penalising both Producer and Consumer.

Table 4.31 - Major constraints as perceived by Category I respondents

Constraints	5	4	3	2	1	Cumulative Score
1. Low price for the produce	46	92	7	3	1	626
2High Transport cost	12	36	54	23	42	454
3. High rate of brokerage or commission	46	57	12	32	65	623
4. Low demand during peak harvest season	105	58	12	33	8	867
5. Lack of storage facilities	145	38	13	2	1	921
6. High loading and unloading charges	24	16	3	90	46	419

5: Most Important; 4: Important; 3: Some what important; 2: Less Important; 1: Least Important

The results as presented in Table 4.31 indicated that in Category I, the lack of storage facilities as the major constraint in marketing followed by the low demand during peak harvest season. Low price for the produce was identified as the third major constraint in marketing. It is the low demand during the peak seasons that has forced the farmers to demand for storage facilities. The highly perishable nature of vegetable produce forces the farmers to dispose off the produce at a low price in times of market glut.

Table 4.32- Major constraints as perceived by Category II respondents

Constraints	5	4	3	2	1	Cumulative Score
1. Low price for the produce	36	95	23	5	7	600
2High Transport cost	17	40	28	36	15	666
3. High rate of brokerage or commission	78	42	5	18	4	603
4. Low demand during peak harvest season	64	33	11	47	12	591
5. Lack of storage facilities	78	25	56	18	7	701
6. High loading and unloading charges	35	48	5	23	19	447

5: Most Important; 4: Important; 3: Some what important; 2: Less Important; 1: Least Important

The traditional group of cultivators also identified the lack of storage facilities as the major constraint. The high transportation costs and high rate of brokerage were the next major constraints for this category of farmers.

4.8. ECONOMICS OF VEGETABLE SEED PRODUCTION

There is increased demand for quality seeds in the vegetable production sector. Traditional cultivation of vegetables in the state had been greatly handicapped by the non-

availability of quality planting material. Therefore the vegetable development programmes in the state have been promoting cultivation of vegetables for seed production in order to meet the growing demand for vegetable seed material. Vegetable seed trade has also become highly competitive with the increasing global dimension acquired by the markets as well as through the entry of multinational hybrid seed companies into the seed production scenario. The value of vegetable seed export from India had been increasing over the years.

Seven Panchayats in the District of Palakkad in the Central zone of Kerala have entered into vegetable seed production under VFPCK. These are Vadakarapathy, Eruthenpathy, Kozhinjampara, Muthalamada, Kollengode and Elevancherry. During the year 2004 an area of 200 ha were under vegetable seed production with a production of 11 tonnes of seed material. Seed Growers Associations have been formed under VFPCK. The vegetables which are cultivated for seed purpose include:

Table 4.33: Vegetables cultivated for seed purpose

Sl. No.	Crop	Variety
1	Cowpea	Lola, Kanakamony
2.	Bittergourd	Preethi
3	Snakegourd	Koumudi
4	Kanivellari	Local
5	Bhindi	Arka Anamika
6	Bottlegourd	Arka Bahar
7	Ashgourd	Indu
8	Pumpkin	Ambili
9	Amaranthus	Arun, CO-1
10	Chilli	Vellakanthari

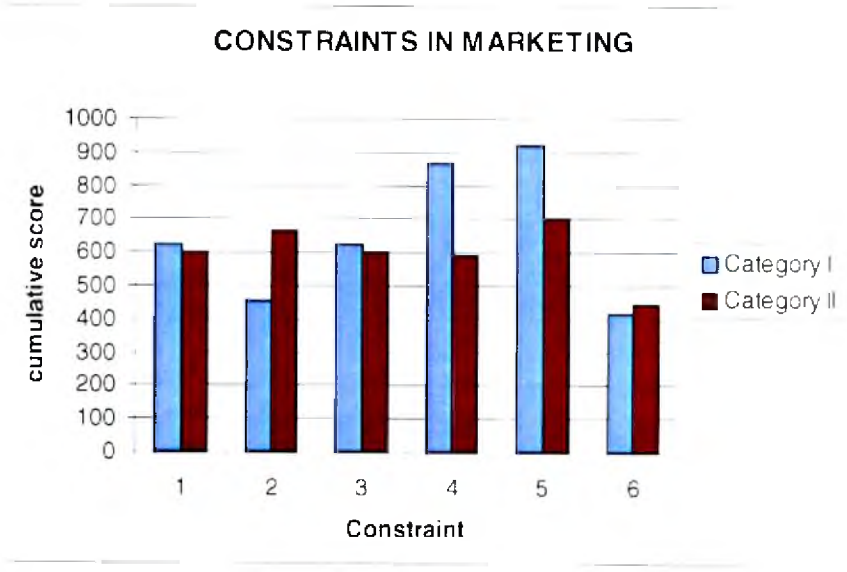

Figure - 13

1. Low price for the produce
2. High Transport cost
3. High rate of brokerage or commission
4. Low demand during peak harvest season
5. Lack of storage facilities
6. High loading and unloading charges

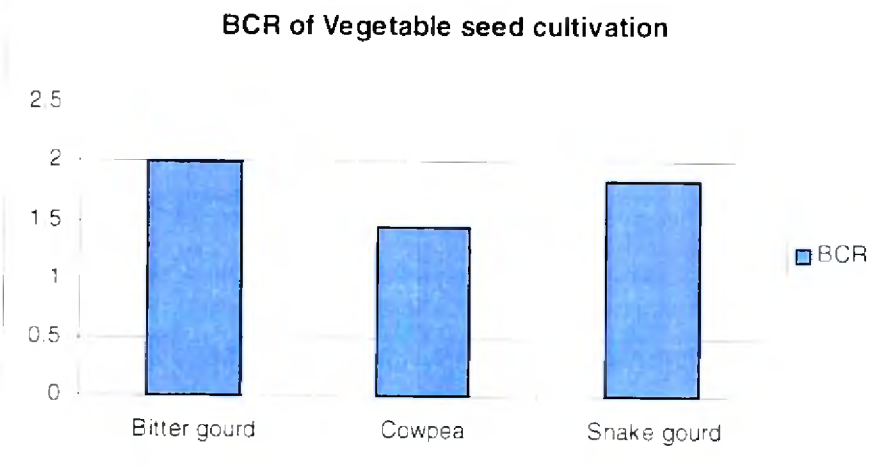

Figure - 14

Breeder seeds are obtained from Kerala Agricultural University, Indian Institute of Horticultural Research, Bangalore etc.

Economics of Production:

The economics of production involves the calculation of the cost of cultivation as well as the assessment of financial performance to judge whether the venture is financially viable.

Cost of Cultivation:

The cultivation costs of vegetables for seed production would include the added costs of seed extraction and processing compared to vegetable cultivation for fresh vegetable purpose. Manuring, *Panthalling*, harvesting and seed processing expenditures are found to occupy the paramount position in almost all vegetable crops grown for seed purpose. In bittergourd and snakegourd human labour was the single largest item of expenditure. Fertilizers account for close to seven percent of the total cost of cultivation. When it comes to vegetable production for seeds the use of plant protection chemicals is greater compared to cultivation for vegetable production. The cost of staking materials has gone up in the recent times due to paucity of bamboo poles.

Cost of Production:

The cost of production per kilogram is expressed as the ratio of cost of cultivation per hectare to the yield on the farm. This can be obtained by dividing the total costs by the output. As seen from Table 4.34, the cost of production was highest for bitter gourd (Rs.211.24/kg).

Returns:

The income from seeds, vegetables and by-products like dehydrated bitter gourd, chilli powder etc. determine the gross returns received by the seed growers.

Plate.19. Seed Purpose Bittergourd cultivation in Vadakarapathy

Plate.20. Harvest of Seed purpose bittergourd

Table 4.34 – Cost and Returns of Vegetable Seed Cultivation

Sl. No.	Name of crop	Returns (Rs./ ha)	Cost of Production (Rs./kg)	Benefit Cost Ratio
1	Bitter gourd	99216.25	211.24	2.01
2	Cowpea	70974.80	89.78	1.45
3	Snake gourd	108353.75	231.68	1.84

Constraints and Strategies in Vegetable Seed Production

With the entry of private players in the seed market, vegetable seed production has become highly competitive. Private traders and seed companies are found to enjoy a better market share in the seed market. Quality seed production is a highly specialized activity. Hence inadequacy of training and infrastructural facilities available to the farmers is a glaring constraint leading to huge losses. There are major problems in the distribution side also due to disparity in production resulting from high uncertainty of demand. Often prices received are not proportionate to the cost of production. High incidence of pests and diseases which force the farmers to dispose off the vegetables in the fresh form itself rather than keep it for seed purpose is another major constraint. Certain strategic interventions such as assessment of seed demand of each crop and corresponding varietal preferences in each area, formulation of separate Package of Practices recommendations for vegetables cultivated for seed purpose, provision of infrastructural facilities for storage and quality control and skill impartment in scientific agri-business management can help make vegetable seed production more economically attractive to the farmers.

CHAPTER 5
SUMMARY

The study on the Economic Analysis of Vegetable production in Kerala was undertaken in the three agro-climatic zones of Kerala viz. Northern, Central and Southern. The three districts of Malappuram, Palakkad and Thiruvananthapuram were selected to represent each of the agro-climatic zones. The important vegetable crops grown in these areas were analysed to arrive at the costs and returns of cultivation, marketing costs and margins and the constraints experienced in production and marketing. An analysis of the gender aspects of vegetable cultivation along with a study of the labour utilization pattern in the various operations were also conducted. The study was intended as a comparison between the traditional category of farmers and the vegetable farmers who undertake cultivation under the various vegetable improvement programmes implemented in the state such as VFPCK (Vegetable and Fruit Promotion Council of Keralam) and IVDP (Intensive Vegetable Development Programme). It was observed that at present the VFPCK undertakes major vegetable improvement programme under which farmers cultivate vegetables. Hence comparison of economic analysis was carried out between VFPCK category of farmers referred to as Category I and traditional category of farmers referred to as Category II.

It was revealed that among Category I, 59 percent of respondents were having agriculture as the only occupation whereas among Category II only 48 percent had agriculture as the only occupation. The average size of land holding for Category I farmers were found to be 1.25 hectares. Among the districts Palakkad had the highest average land holding size with 1.25 ha and 0.85 ha respectively in Category I and II while Thiruvananthapuram had the lowest holding size with 0.5 and 0.39 ha in Category I and II respectively. The major source of finance for Category I farmers were institutional agencies with 72 percent availing credit from this source whereas 61 percent depended on institutional agencies in the case of category II farmers. 70 percent of the farmers in category I obtained seeds from VFPCK, while in category II , the major source was private agencies or fellow farmers (63 percent).

The major input contributing towards cost of cultivation of cowpea was family labour incurring 30.64 percent and 33.90 percent of cost respectively in Category I and II. Relatively fewer amounts were being spent on plant protection measures especially among the Category II farmers and they make use of more family labour as compared to VFPCK group.

In the case of snakegourd cultivation, the major item of expenses was family labour contributing 34 and 36 percent respectively in Category I and II followed by manures (17 and 16 percent respectively in Category I and II). Another major item of expenditure is the cost of staking and panthalling. It was observed that at Cost A1, Category II was found to be better off for both the crops with a higher BC Ratio than Category I farmers. At Cost A1, Category I farmers had a BCR of 2.24 for cowpea whereas the Category II farmers had a BCR of 2.38. But it was observed that at Cost C3 the Category I topped over Category II with a BCR of 1.11 for cowpea and 1.09 for snakegourd. A comparison of returns for both the categories of farmers tell us that gross returns were found to be slightly higher for Category I at Rs. 110592 compared to the Category II where the gross returns came upto Rs. 105024 only in the cultivation of snakegourd and cowpea in the Southern Zone.

In the Northern zone, for bittergourd, manures and hired labour constitute the major share of explicit input costs in the cultivation of cowpea under both systems of vegetable cultivation. The imputed value of family labour constituted 39 percent and 41 percent of the total cost for Category I and II respondents respectively. The next major item of expenditure is on staking and panthalling material and seeds constitute the least expensive item. Comparing the input-output relationship of cowpea among the two categories of farmers it was found that though explicit costs are high for Category I, implicit costs are higher for Category II respondents. The gross returns were high for Category I as compared to the Category II in the cultivation of both cowpea and bittergourd. In the case of both cowpea and bittergourd the Category II respondents spent more on implicit inputs whereas the Category I respondents were observed to spent more on explicit inputs. For cowpea, the BC Ratios at different costs ranged from 2.08 to 0.94 for Category I and 2.17 to 0.93 for Category II. Though the BCR at Cost AI was found to be higher for Category II farmers, the BCR at Cost C3 was higher for Category I respondents.

In the Central Zone, Tomato and bittergourd were selected as crops for which analysis was carried out. The total cost for tomato at Cost C was found to be Rs. 109748 for Category I respondents and Rs. 110420 for Category II respondents. Expenses on hired labour and manure in both the categories of farmers in tomato cultivation were found to contribute the maximum towards explicit costs on inputs. In the case of bittergourd, it was found that the total cost C3 was Rs. 115229 for Category I respondents and Rs. 112171 for Category II respondents. Following the expenses on hired labour which was found to be the major item of explicit expenditure in both categories at 21 percent of the total cost, staking and panthalling material constituted a major item of expenditure in both categories of cultivators at 10 percent of the total expenses. For tomato, the BCR analysis brought out that Category I farmers found the cultivation profitable at Cost A1 and Cost C3. For Category II farmers the crop was found to have a BCR of 1.88 at Cost A1 and 1.01 at Cost C3. In the case of bittergourd, the BCR was found to range from 2.78 to 1.56 for Category I respondents. For Category II respondents, the values ranged from 2.68 to 1.50.

The analysis of labour utilization pattern in Palakkad district revealed that of the total labour use, the largest share of labour was spent on land preparation (which amounted to 17.88 percent of the total labour employed in tomato cultivation). It was established that land preparation was the operation which required the maximum of hired labour which amounted to 7.25 percent of the total labour use. Staking was another major activity in which hired labour was employed. Weeding and harvesting used absolutely no hired labour whereas there was nominal use of hired labour in fertilizer application and irrigation. It was found that women labour was mostly employed in harvesting operation. It is also worthwhile noting that harvesting was the operation which took up no share of hired labour at all.

Labour use in bittergourd for the district of Malappuram was found to be more for the operations of land preparation (15.61 percent) and harvesting (13.64 percent). Sowing took up the least labour share of 3.36 percent.

The analysis brought to light that 85.97 percent of the labour used in the cultivation of bittergourd was family labour. 14.03 percent of labour was hired. In the family labour utilization, harvesting and land preparation was found to take up the major share of the total labour used for cultivation. It was found that women labour was mostly employed in harvesting and weeding operations. No women labour at all was employed in land

preparation and irrigation. Staking also took up nominal women labour of 0.79 percent of the total labour used.

For cowpea crop in the district of Thiruvananthapuram, it was noticed that land preparation and staking were the major items of labour use. The largest share of labour was spent on land preparation which used up 15.62 percent of the total labour employed in cowpea cultivation.

The Producer -VFPCK Market -Wholesaler –Retailer- consumer chain is the most frequently used chain in the case of farmers cultivating vegetables under the VFPCK scheme. It was also noticed that during the lean seasons the marketing goes back to the channel of Producer –Commission agent -Wholesaler –Retailer- consumer chain. The Producer - Commission agent -Wholesaler –Retailer- consumer chain is the most frequently used chain in the case of farmers cultivating vegetables in the traditional way. The comparison between VFPCK and traditional category of farmers in the marketing of tomato bring out clearly that VFPCK farmers obtain a greater share of the marketing margin (46 percent) as compared to the traditional category (44 percent). In the case of bittergourd the net price received by the producer as expressed as the share in consumer's rupee amounts to 51.88 percent for VFPCK farmers and 48.75 percent in the case of traditional category of farmers. The share of the producer in consumer's rupee in the cultivation of snakegourd amounts to 51.18 percent for VFPCK farmers and 47.06 percent in the case of traditional category of farmers. Cowpea cultivation was found to be more profitable from the point of view of marketing margins especially for the VFPCK farmer who was found to receive a share of 66.80 percent in the consumer's rupee. The traditional farmer on the other hand was found to receive a share of 62.40 percent in the consumer's rupee.

It was found that lack of irrigation water was the most important constraint in Category I with a total score of 790 followed by incidence of pests and diseases scoring a total of 731. . It was found that incidence of pests and diseases was the most important constraint in Category II with a total score of 834 followed by lack of irrigation water scoring a total of 757. The VFPCK Respondents indicated the lack of storage facilities as the major constraint in marketing followed by the low demand during peak harvest season. The traditional group of cultivators also identified the lack of storage facilities as the major

constraint. The high transportation costs and high rate of brokerage were the next major constraints for this category of farmers.

Several Panchayats in the District of Palakkad in the Central zone have entered into vegetable seed production under VFPCK. Manuring, *Panthalling*, harvesting and seed processing expenditures were found to occupy the dominant share of expenditure in almost all vegetable crops grown for seed purpose. High incidence of pests and diseases which force the farmers to dispose off the vegetables in the fresh form itself rather than keep it for seed purpose was identified as a major constraint in vegetable seed production.

CHAPTER 6
CONCLUSIONS

The study on the Economic Analysis of Vegetable Production in Kerala State undertaken in the time period of 2002-05 compared the economics of Vegetable production among two categories of farmers viz. VFPCK farmers and traditional farmers in the three agro-climatic zones of the state. The study revealed that the VFPCK farmers spent more on explicit items of input such as fertilizers and plant protection chemicals compared to the traditional farmers. It was also observed that the traditional farmers spent more on implicit inputs such as family labour. Therefore the cost of cultivation at Cost A1 was found to be high for VFPCK farmers though at Cost C3 the costs were higher for Traditional farmers. A comparative analysis of profitability of vegetable cultivation based on benefit cost ratios revealed that VFPCK farmers fared better due to the marketing setup managed by the self help groups in the producing areas. However only a marginal advantage could be gained, as many of these markets are not performing effectively in the areas.

CHAPTER 7
FUTURE LINE OF ACTION

During the initial stages of the VFPCK programme the yield response was found to be very high due to the application of higher dose of chemical fertilizers and plant protection chemicals. But later yield was reduced due to low soil response, higher pest and disease incidence and low organic regeneration of the soil. Moreover most of the VFPCK cultivation was on leased in land and such farmers would not apply organic manure in sufficient quantities, which may have resulted in low fertilizer response during later years of the project. Hence there is an increasing need and scope for the promotion of organic farming ventures by VFPCK.

In the marketing phase of production also there seems to be a problem of inability to attract wholesalers as most of the markets are situated in inaccessible and interior localities. Moreover VFPCK markets are localized and not connected to each other. This necessitates the wholesaler to visit a number of markets for bulk purchase of a single commodity. This calls for a system of centralized marketing system so that surplus production in one area can be transported to areas of high demand. There is an urgent need for the integration of marketing activities of VFPCK at the state level through a well-connected market network.

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