AN ECONOMIC ANALYSIS OF CONTRACT FARMING IN MARIGOLD IN ERODE DISTRICT OF TAMIL NADU

By

A. ANBARASSAN B.Sc.,(Ag.)

I.D.No. 08-601-001

DEPARTMENT OF AGRICULTURAL ECONOMICS

CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES

TAMIL NADU AGRICULTURAL UNIVERSITY

COIMBATORE – 641 003

2010

AN ECONOMIC ANALYSIS OF CONTRACT FARMING IN MARIGOLD IN ERODE DISTRICT OF TAMIL NADU

Thesis submitted in part fulfillment of the requirement for the degree of

MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS

to the Tamil Nadu Agricultural University, Coimbatore – 641 003

By

A. ANBARASSAN

I.D.NO. 08-601-001

DEPARTMENT OF AGRICULTURAL ECONOMICS

CENTRE FOR AGRICULTURAL AND RURAL DEVELOPMENT STUDIES

AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE

TAMIL NADU AGRICULTURAL UNIVERSITY

COIMBATORE – 641 003

2010

CERTIFICATE

This is to certify that the thesis entitled **"AN ECONOMIC ANALYSIS OF CONTRACT FARMING IN MARIGOLD IN ERODE DISTRICT OF TAMIL NADU"** submitted in part fulfillment of the requirements for the degree of **MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS** to the Tamil Nadu Agricultural University, Coimbatore is a record of bonafide research work carried out by **Mr. A. ANBARASSAN** under my supervision and guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journal or magazine.

Place: Coimbatore **Dr. M.Chandrasekaran**

Date: (Chairman)

APPROVED BY

Chairman : **(Dr. M.Chandrasekaran)**

Members : (**Dr. D.Sureshkumar)**

: **(Dr. R.Sivasamy)**

Date : **External Examiner**

ACKNOWLEDGEMENT

*With endless pleasure, I wish to express my indebtedness and deep sense of gratitude to my beloved Guide and esteemed Chairman of the Advisory Committee, D**r.M.Chandrasekaran,** Professor, Department of Agricultural Economics for his expert guidance, untiring attention, sustained help and keen interest evinced throughout the course of this investigation and preparation of the thesis. I owe a great deal to him for his valuable criticism and constant encouragement.*

*Words are insufficient to express my deep sense of gratitude and sincere thanks to members of my Advisory Committee**, Dr**.**D.Sureshkumar,** Associate Professor, Department of Agricultural Economics and **Dr. R.Sivasamy** Professor and Head, Department of Remote Sensing and GIS, who have rendered, valuable suggestions, valuable criticism and guidance throughout my thesis.*

*I express my whole hearted thanks to **Dr. M. Chinnadurai,** Professor and Head, Department of Agricultural Economics, for creating a flexible high performance learning environment throughout my post graduate programme.*

*I take this opportunity to convey my sincere thanks to **Dr. T.R.Shanmugam, Dr. K. Mani**, **Dr. K. R. Ashok ,Dr. L.P.Swaminathan, Dr. R. Venkatram, Dr.S. Vardharaj, Dr.S. Muraligopal, Dr.C.Sekar** and **Dr.M. Thilagvathi,** PG.Coordinator. Further I wish to thank all the faculty of Department of Agricultural Economics for their guidance and suggestions.*

*Words are boundless to express my indebtedness and heartfelt thanks to **Ms.Sudha Narayanan,** Research Scholar (Cornell University,) USA for giving me a precious opportunity to carry out the thesis work with financial assistance under IFPRI-CORNELL-TNAU collaborative scheme.*

*I also extend my thanks to **interviewed villagers** for their patience and collaboration during field survey. Appreciation is also expressed to officials of **A.V.Thomas Groups**, for providing the needed information.*

I gratefully acknowledge the timely help and valuable suggestions extended by my friends ***karthick, Angappan, Sridhar, Madhu, Malar, Uma, Geetha, Meera, Rashmi, Meenakshi*** *and* ***Nalini*** *for their helpful hands whenever needed during the various phase of my college study.*

Words cannot express what I owe to my seniors ***Marimutthu, Ravi, Surendran****,* ***Kumaran, Sarathy, Thirumoorthy, Kanaga*** *and* ***Umagowri*** *for their constant inspiration and useful suggestions and help during my research work.*

My special thanks to my ever loving friends, ***kannan,, Anand, Lenin, Balu, Rao, Pandiyan, Muthu, Senthil, James, and Moorthy*** *for their constant help and moral support during the entire course of the study.*

My record of gratitude would be incomplete, if I fail to mention my most affectionate parents ***Mr. C.Ariputhiran*** *and* ***Mrs A. Sussila*** *my lovable brothers* ***Arulraja****,* ***Sankar,*** *my sister in law* ***Senthamizh*** *for their mellifluous love and prayer which brought me to witness this heyday. I am indebted greatly to them for everything that they had been to me.*

(ANBARASSAN.A.)

ABSTRACT

"AN ECONOMIC ANALYSIS OF CONTRACT FARMING IN MARIGOLD IN ERODE DISTRICT OF TAMIL NADU"

By
ANBARASSAN, A., B.Sc. (Ag.)

Degree : **MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS**

Chairman : **Dr. M.Chandrasekaran**
Professor
Department of Agricultural Economics
Tamil Nadu Agricultural University
Coimbatore - 641 003

2010

Contract farming is an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. Marigold is one of the most commonly grown flower crops used extensively as decorative plants, religious and social functions in different forms. It has gained importance amongst the growers and flower dealers on account of its easy cultivation and commercial uses. Considering the importance of contract farming in marigold, the present study has been undertaken with the following objectives; (1) to examine the cost and returns of the cultivation of marigold under contract farming vis-à-vis non contract farming in marigold, (2) to estimate the resource use efficiency in marigold cultivation under contract farming, (3) to analyze the factors that motivated the farmers for raising marigold crop under contract farming, (4) to find out the extent of uncertainty on yield and price in contract farming and non-contract farming and to identify the constraints, and (5) to suggest policy measures to promote contract farming for sustainable increase in production and income of marigold farmers.

In Erode district, the revenue villages having marigold under contract farming were listed out in liasion with the contracting firm A.V. Thomas Group. Subsequently, the revenue villages namely; Thiginarai from Thalavadi block and Kuthiyalathur from Sathyamangalam block were selected randomly. Contract farmers, Non- Contract farmers and Former Contract farmers numbering 60, 20 and 20, respectively constituting a total sample size of 100 were selected. The collected data were analysed by adopting average

and percentage analyses, Cobb- Douglas and Stochastic Frontier production functions, probit function and Garrett's scoring technique. The following findings and policy implications emerged from the study.

The average total cost of cultivation of marigold in contract farms was Rs.43756.77 per ha. The yield per hectare was 32.36 tonnes. Gross income was Rs. 89014.75 per ha and net income was Rs. 45257.98 per hectare. In the case of non-contract sample farmers the total cost of production of marigold was Rs.42745.46 per hectare, marginal lower than that incurred by contract growers. The yield per hectare was however, lower at 20.50 tonnes. Gross income was Rs. 75400.00 per ha and net income was Rs. 32694.54 per hectare, which was lower by Rs. 12,563.44.

The results of Cobb-Douglas production function would show that the inputs namely potassium, seed, irrigation, farm yard manure, plant protection chemicals, human labour and machine power were found to contribute significantly and positively to the yield. However the MVP/MFC ratios indicated the scope to increase the use of only nutrient potassium, seed, plant protection expenses, and machine power. The mean technical efficiency (MTE) of 99 per cent indicated that the participant marigold sample contract farmers were highly technically efficient, probably as a result of constant technical support given by the company's Agents in the field. The contract farmers thus, had less yield uncertainty than that of non-contract farmers. There was no price uncertainty in contract farmers whereas there was a high price uncertainty in the case of non-contract farmers.

Invariably, the contract farmers of all the companies in the study area revealed that the type of agreement between them and the company had been written and they were comfortable with the terms of agreement. All the sample farmers expressed satisfaction about supply marigold to them companies and were ready to cultivate marigold once again on contract basis.

The factors determining the participation of farmers in the contract farming were fixed price, experience in contract farming and total returns from marigold. The benefits of marigold cultivation under contract farming were assured buyer for the produce, no rejection of produce and the farm gate collection.

The major problems faced by contract farmers were low price for the produce, labour scarcity, and non provision of advance by the firm for growing marigold. In the case of non contract farming the major problem was rejection of the produce in the market followed by price fluctuation, poor quality inputs, labour scarcity, problems in transportation for marketing the produce and lack of technical advice in cultivating marigold.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

Contract farming refers to a system where a central processing or exporting unit purchases the harvests of independent farmers and the terms of the purchase are determined in advance through contracts. The terms of the contract vary and usually specify how much produce the contractor will buy and what price they will pay for it. The contractor frequently provides credit, inputs and technical advice. Contracting is fundamentally a way of allocating risk between producer and contractor; the farmer takes the risk of production and the latter the risk of marketing.

Eaton and Shepherd (2001) defined contract farming as an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices. The basis of such arrangements is a commitment on the part of the farmer to provide a specific commodity in quantities and at quality standards determined by the purchaser and a commitment on the part of the company to support the farmer's production and to purchase the commodity. The intensity of the contractual arrangement varies according to the depth and complexity of the provisions in each of the following three areas:

- Market provision: The grower and buyer agree to terms and conditions for the future sale and purchase of a crop or livestock product;
- Resource provision: In conjunction with the marketing arrangements the buyer agrees to supply selected inputs, including on occasions land preparation and technical advice;
- Management specifications: The grower agrees to follow recommended production methods, inputs regimes, and cultivation and harvesting specifications.

The contracting of crops has existed from time immemorial. In ancient Greece the practice was widespread, with specified percentages of particular crops being a means of rents and debts. During the first century, China also recorded various forms of sharecropping. In the United States as recently as the end of the nineteenth century, sharecropping agreements allowed for between one-third and one-half of the crop to be deducted for rent payment to the landowner. These practices were a form of serfdom and usually promoted

permanent farmer indebtedness. In the first decades of the twentieth century, formal farmer-corporate agreements were established in colonies controlled by European powers.

Contract farming has gained immense popularity with the farmers as it gives them a firm price (known prior to taking up the crop), assured sale and guaranteed payment. Well-managed contract farming is considered as an effective way to coordinate and promote production and marketing in agriculture. Nevertheless, it is essentially an agreement between unequal parties: companies, government bodies or individual entrepreneurs on the one hand and economically weaker farmers on the other.

Global Trends in Development of Contract Farming

Contract Farming emerged as an important phenomenon in the developed countries of the West during the 1950s and the 1960s. By 1980, about one-third of the total US farm output, and as much as 100 per cent of the poultry, meat, milk and certain vegetables, were produced under contracts (Little and Watts, 1994). Even in Tasmania island of Australia, by the mid-1990s, the potato production under contracts was high compared to 1950s (Fulton and Clark, 1990). On the other hand, private local firms, multinational companies, some international aid and lending agencies, etc., have been involved in these contract farming schemes (Glover 1994). Besides private and multinational enterprises, contract farming is also practiced by government agencies in many countries in different commodity sectors like tea production in Kenya, tobacco and livestock in Thailand, rubber in Malaysia, coconut in Indonesia, palm oil in Philippines, and seed in India (Nanda, 1995; White, 1997; Shiva and Crompton, 1998). The extent of contract farming in some of the countries are given in Table1.1.

Table 1.1.Contract Farming in Selected Countries of the World

Countries	**Percentage of area under Contract Farming**
USA (2001)	Sugar (96), Fruits (59), Cotton (52), Poultry (88), Pork (61)
Brazil (2004)	Poultry (70), Pork (40), Soybean (35)
Mosambique (2002)	Cotton (100), Tobacco (100)
Zambia (2006)	Cotton (100), Tobacco (100), Paprika (100)

Source: (www.relma.org)

In many parts of Africa, contract farming has proved effective in integrating small holders into commercial agriculture. All the cotton and tobacco produced in Mosambique was done through contract

farming. In Zambia, 100 per cent of paprika, tobacco and cotton are produced through this system. In Kenya contracted farmers produce 60 per cent of the tea and sugar and 100 per cent of the country's tobacco.

Origin and Scope of Contract Farming in India

The colonial period saw the introduction of cash crops such as tea, coffee, rubber, poppy and indigo in various parts of India. The introduction of Virginia tobacco in coastal Andhra Pradesh in the 1920s incorporating most elements of a fair contract farming system met with good farmer response. Public and private seed companies, which in the 1960s, had necessarily depended on individual farms under contract with them for multiplication of seeds since they did not won lands. Faced with an acute shortage of soft wood, Wimco, the country's sole mechanized match manufacturer, instituted an innovative farm forestry scheme for cultivation of matchwood in Punjab, Haryana and Uttar Pradesh. It met with a good farmer's success despite the trees being exotic to the region.

Contract farming was the choice for almost all food processing projects contemplated in the 1980s and 1990s. With market liberalization, globalization and expansion of agribusiness, there is a growing concern that the small and marginal farmers may find it difficult to compete in the market economy. There is continuous migration of small and marginal farmers to the urban areas, which is a consequence of growing economic challenges. In 1995, the World Bank had estimated that many people will migrate from the rural to the urban centers in India by the year 2010. The number of people migrating would be equal to twice the combined population of the United Kingdom, France and Germany. India has access to about 4.5 per cent of the present water and about 2 per cent of the total land resource in the total geography of the world, but is a home to about 17 per cent of world population. The pressure on land and water is very high and therefore to help the rural people and farmers there is a need to minimize cost of agriculture production, improve its quality and food safety through capacity building and technology transfer and provision of inputs such as planting materials and other critical inputs.

Contract farming could be one of the best solutions which may decrease the polarization of rich and poor and thus encourage the Indian farmers to compete with the very large, rich and highly subsidized western farmers. Also the contract farming system forms the most heartening part of the vision of the National Policy on Agriculture in India.

The Indian Experience in Contract Farming

Some of the major corporates, financial institutions, agri-input agencies and other organizations that have entered into contract farming in India are Pepsi for potato, green chilly and citrus fruits in Punjab, Green Agro Pack for gherkins in Karnataka, Reliance Agrotech for cashew, A.V. Thomas Group of Kochi for marigold in Andhra Pradesh and Tamil Nadu, Hindustan Lever Ltd., for chicory in Gujarat; basmati rice in Punjab, and dairy in Uttar Pradesh, Coimbatore Cots and Coatings Ltd., for cotton in Tamil Nadu, Ion Exchange Enviro Farm Ltd., for organic mango, banana, pineapple, pulses and vegetables in Maharashtra, Mittal Farms for medicinal plants and herbs in Gujarat, Sami Labs and Natural Remedies for medicinal plants in Karnataka, India/Tata Chemicals for wheat in Madya Pradesh; basmati rice and hyola in Punjab, Suguna Broilers chicken for broiler in Tamil Nadu, Chamundi Hatcheries for ostrich farming in Karnataka, Shri Bhumi Farms Pvt. Ltd for red bananas in Karnataka and Appachi Cotton Company and Super Spinning Mills for Cotton in Tamil Nadu.

Table 1.2 Contract Farming Initiatives in Tamil Nadu

Crop	**Company/Corporate**
Cotton	Super Spinning Mills, Coimbatore, Appachi Cotton Company, Pollachi.
Maize, Paddy	Bhuvi Care Pvt Ltd, Tirunelveli.
Marigold	A.V. Thomas Group, Chennai.
Poultry	Venkateshwara Hatcheries, Hosur, Sugana Broilers, Coimbatore.
Gherkin	Indian Agro Products (IAP)
Papaya	Senthil Papain, Coimbatore.
Seed production	Pioneer, Andhra Pradesh.

Significance

The stand point of contract farming advocate's is that it results in quantum increase in income and employment of farmers. It eliminates the risks of instability in production and enhances the yield levels. This will ultimately lead to the betterment of the local community involved in contract farming of marigold. Contract farming is expected to give the farmer, access to additional sources of capital, bring in new technology, and ensure a more certain, and a better price for his produce. Farmer gets exposed to world class agro-technology and there will be assured price and market for the produce. With mounting debt and soaring

input costs, contract farming seems to be one of the choices left open to the farmers. This is mainly because the company provides all the material including seeds as well as technical know-how and there is also a guarantee of purchase of the produce after harvest. In most cases, the minimum prices of the produce are fixed in advance.

Problems Focus

Particularly when growing new crops, farmers face the risks of both market failure and production problems. Inefficient management or marketing problems can mean that quotas are manipulated so that all contracted production is not purchased. Sponsoring companies may be unreliable or exploit a monopoly position. The staff of sponsoring organizations may be corrupt, particularly in the allocation of quotas, distribution of inputs or disbursing payment. Farmers may become indebted because of production problems and excessive advances.

Contracted farmers may face land constraints due to lack of security of tenure, thus jeopardizing sustainable long-term operations. Social and cultural constraints may affect farmers' ability to produce to match specifications. Poor management and lack of consultation with farmers may lead to farmer discontent. Farmers may sell outside the contract (extra-contractual marketing) thereby reducing factory processing throughput. Farmers may divert inputs supplied on credit to other purposes, there by reducing yields.

Contract farming is an emerging institution which may involve many stakeholders. Farmers motive is to get assured marketing arrangement, higher price and thereby higher income. There are many questions which arise, like are the farmers who entered into contract farming really benefit, if so at what cost? Is there any difference in resource use between contract and non-contract farming? What are the impacts and issues in contract farming? To find answers for such questions the present study was conducted by specifically looking at marigold contract farming in Erode district which started in the year 1994. A cursory discussion with the contract growers reveled some of the issues like waning company management contact with growers, gradually falling yield levels, increasing diversion of produce to the open market, lower price paid by the company, etc. In this context, the current study is take-up with the overall objective of assessing the efficiency of contract operations sustaining marigold cultivation.

Objectives

The specific objectives of the study are;

1. To examine input use and the cost and returns of the cultivation of marigold under contract farming vis-à-vis non contract farming
2. To estimate the resource use efficiency in marigold cultivation under contract farming,
3. To analyze the factors that motivated the farmers for raising marigold crop under contract farming.
4. To find out the extent of uncertainty on yield and price in contract farming and non-contract farming and to identify the constraints in marigold farming.
5. To suggest policies, approaches and programmes to promote contract farming for sustainable increase in production and income.

Hypotheses

In view of the issues on contract farming system and marigold cultivation, it was decided to study the advantage of cultivating marigold. The general observation on marigold cultivation made during pilot survey in the study region led to the following null hypotheses.

1. There is no difference in costs, returns and resource use efficiency of marigold cultivation between contract farming and non-contract farming.
2. There is uncertainty on yield and price in contract farming.
3. There are more constraints in marigold cultivation under contract farming.

Scope of the Study

The present study focuses on the nature of relationship between the farmers and the contracting firms. Thus, it would help the contracting companies to modify their strategies and rectify the problems in implementing the programme. The cost and returns in cultivation of marigold worked out in this study and the resource use efficiency estimated could be useful for the farmers to understand about the advantage of contract farming in enhancing farm income and it would be useful for bankers and policy makers in designing policies relating to financing marigold cultivation and also contract farming.

Limitations of the Study

The study is based on the primary data collected from sample farmers by personal interview. As the farmers did not maintain records of farm business, they had to give information from their memory and hence there is possibility for recall bias. However efforts were taken to minimize such bias through cross checking the data when collected. The conclusions drawn are applicable only to the area with similar institutions for contract farming as those of the study area and hence the results of this study are to be interpreted with the above limitation in view with particular reference to marigold cultivation.

Organization of the Thesis

The study is organized in the following chapters.

Chapter I : It includes, introduction, problem focus, hypotheses, objectives, scope and limitations of the present study.

Chapter II : In this chapter, a detailed review of important concepts used in the study along with a brief review of related past studies are presented.

Chapter III : It provides details on Sampling, units of measurement, methodology and tools of analysis used in the study are described.

Chapter IV : In this chapter, description of the study area showing the Agro-Climatic and Socio-Economic features and infrastructure facilities available in the study area are presented.

Chapter V : Results of the study are presented and discussed in this chapter along with the and inferences drawn.

Chapter VI : Summary and Conclusion and Policy suggestions are presented in this chapter.

CHAPTER II

CONCEPTS AND REVIEW

Review of related concepts and past studies will help in analyzing and understanding the current problem in proper prospective. In this chapter, definitions and concepts related to the present study, besides past studies are reviewed and presented under the following headings.

2.1. Review of Concepts

1. Contract
2. Contract farming
3. Cost and returns
4. Resource use efficiency
5. Technical efficiency
6. Factors influencing participation in contract farming using linear probit model
7. Constraints analysis using Garrett's scoring Technique

2.2. Review of the Past Studies

1. Contract
2. Contract farming
3. Cost and returns
4. Resource use efficiency
5. Technical efficiency
6. Factors determining Farmers Participation-use of linear probit model
7. Garrett's ranking technique

2.1.1. Contract

White (1997) opined that 'contract is a representation of a relationship rather than the relationship itself, and the divergence between the two may be crucial. According to him its implementation takes place in specific social and political context's.

Goodhue (2000**)** defined a contract to perform three functions. They are,

i. Coordinating the business relationship

ii. Motivating behaviour and performance

iii. Minimizing the transaction costs associated with doing business.

Eaton and Shepherd (2001) defined the system of contract as a partnership between agribusiness enterprises and farmers. The success of the contract requires a long-term commitment from both the parties.

Paty (2005) defined contract as the commitment on the part of the farmer to provide a specific commodity in quantity and quality standards determined by the purchaser and a commitment on the part of the sponsor to support the farmer's production and to purchase the commodity. The intensity of the contractual arrangement varies according to the depth and complexity of the provisions in each of the three areas; viz., market provision, resource provision and management specifications.

Fraser (2005) explained that the contracts vary significantly in terms of style, content and purpose due to the complexity of real world. Contract also needs to deal with problems of adverse selection and moral hazard. Adverse selection is where one party is better informed than the other about the characteristics of what is being exchanged and is not verifiable after the contract has concluded. Moral hazard means that one party has imperfect knowledge concerning action or actions that the other party takes during the implementation of the contract.

In the present study, contract is defined as a commitment (written or oral) to provide seeds for marigold cultivation and technical backstopping by the industry and the cultivators to sell the entire quantity of harvested produce specifying a minimum range of 30 to 37 tonnes per hectare of the harvested produce to be collected by the company at the farm gate at specified interval and at a fixed price.

2.1.2. Contract Farming

Roy and Paul (1963) gave a broad definition of contract farming as those contractual agreements between farmers and companies whether oral or written specifying one or more conditions of production and/or marketing of an agricultural product.

Glover (1990) described contract farming as an institutional arrangement that combined the advantages of plantations (quality control, coordination of production and marketing) and of smallholder production (superior incentives, equity considerations).

Clapp and Roger (1988) stated that contract farming basically involves four things. They are: pre-agreed price, quality, quantity or acreage (minimum/maximum) and time. For individual farmers, the relationship it represents which is crucial as the divergence between the two may be vital in determining the development of contract farming as an institution.

Little and Watts (1994) provided a more comprehensive definition of contract farming. He defined it as a "form of vertical coordination between growers and buyer-processors that directly shape production designs through contractually specifying market obligations such as value; volume, quality and at time provide specific inputs and exercise some control at the point of production.

Kiresur *et al.,* (2002) described contract farming as a half way house between independent farm production and corporate/captive farming.

Martinez (2002) revealed that contract farming provided a means for reducing transaction costs associated with relationship-specific transactions, especially in regions of expanding production. Contracts could provide some safeguards to protect against opportunistic behavior and also facilitate reductions in costs, leaving more gains from trade to be distributed among producers and consumers.

Sukhpal Singh (2003) viewed contract farming as a system for the production and supply of agricultural and horticultural produce by farmers/primary producers under advance contracts, the essence of such arrangements being a commitment to provide an agricultural commodity of a type, at a specified time, price, and in specified quantity to a known buyer.

Mamilla (2005) defined contract farming as a half way house between independent farm production and corporate farming. It can be defined as an agreement between farmers and processing and/or marketing

firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices.

Paty (2005) billed contract farming to be a veritable instrument to address many of the traditional ills affecting the agriculture sector and the farmers; such as, fragmentation of land holdings, long chain of market intermediaries, ignorance about the requirements of the buyers, low farm mechanization, inadequacy of capital and distress sale and consequent heavy losses to farmers, etc. The farmer assumes the production risks, and the price risk is transferred to the company.

Garg (2005) stated that contract farming is being promoted in the recent three decades as an institutional innovation to improve agricultural performances in less developed countries, some times as a key element of rural development and/ or settlement projects. Contract farming can fill the gap between the capital starved farmers who cannot make major investment in land improvement technology or modern inputs and the capital rich Multi National Companies (MNCs).

Shrikant (2005) revealed that contract farming and forward markets are the most convenient and safer options, which not only have come to the rescue of the small and marginal farmers in terms of guaranteed income and capital investment but also to the nation as a whole, making it globally competitive. It can provide insurance against price volatility. Contract farming could be the best solution that may decrease the polarization of rich and poor and would also encourage the Indian farmers to compete with the very large, rich and highly (indirectly) subsidized western farmers.

Contract farming can serve as a mechanism to reduce the market and income risks faced by the farmers when diversifying from food crops to new commodities (World Bank, 2005).

In the present study, Contract farming is defined as an institutional innovation to deal with uncertainties in the market. Under the agreement, production risk remains with farmer while market risk is transferred to the company.

2.1.3. Cost and Returns

Economics of cultivation of crops would get greatly influenced by costs incurred and returns received. The costs and returns were differently conceived by different researchers to suit their studies. A brief review of concepts namely, costs and return is given below:

2.1.3.1. Cost

Dewett (1975) stated that fixed costs were those costs which would be paid even though production had stopped temporarily and would not vary with the level of output. It included rent for buildings, interest on capital invested in machineries and salaries of the permanently employed staff.

Patel and Bhatt (1997) proposed the following four components, viz., cost A1- the sum of all paid out cash expenditures, A2 the sum of cost A1 and cost of farmer's labour input, cost B the sum of cost A2, rental value of owned land and the imputed interest on working capital and cost C – sum of cost B and the imputed value of family labour.

Samuelson and Nordhans (1998) referred fixed costs as those costs which do not vary with the output in the short run. They were often called over head costs and were committed for rental, maintenance, depreciation, overheads, salaries, wages, etc.

Raju and Rao (1990) used six different costs namely cost A_1, A_2, B_1, B_2, C_1 and C_2. Cost A_1 included all actual expenses in cash and kind incurred in production. Cost A_2 is the sum of cost A_1 and rent paid for leased in land. Cost B_1 is the sum of cost A_1 and interest on value of owned capital including land. Cost B_2 is the sum of cost B_1, rental value of owned land and rent paid for leased in land (net of revenue of land). Cost C_1 is the sum of cost B_1 and imputed value of family labour. Cost C_2 is the sum of cost B_2 and imputed value of family labour.

Senthil Kumar (1991) used the cost concept with five components in his study on economics of production and marketing of Banana. It included cost A_1, the sum of the value of human labour, bullock power, value of manures and fertilizers, value of suckers, land revenue, plant protection chemicals, interest on working capital and the depreciation on investments; Cost A_2 is the sum of cost A_1 and the rent paid for leased in lands; Cost B_1 is the some of cost A_2 and the interest on fixed capital; Cost B_2 included cost B_1 and the rental value of owned land, while cost C included cost B_2 and the imputed value of family labour.

Varma and Agarwal (1992) defined variable costs as those costs which would vary proportionately with the increase or decrease in sales or output.

According to Mauyra *et al.,* (1996), the cost of production included the cost on production inputs like seed, manures, fertilizers, irrigation, plant protection chemicals, human labour and bullock power, rental

value of land at the prevailing market rate and overhead cost comprising of interest on working capital and fixed capital, repairs and depreciation.

Maheswarappa *et al.,* (1998) referred variable cost in terms of human labour, bullock power, tractor power, seed, manures and fertilizers, plant protection chemicals, irrigation, repair and maintenance cost and interest on working capital.

Madan and Varghese (2005) while studying cost of rabi crops in Rajasthan defined operational cost as sum of cost of hired human labour, family labour, bullock power, machine power, seed, farmyard manure, fertilizers, insecticides, irrigation charges and interest on working capital. Fixed cost was defined to include, cost of land revenue and taxes, depreciation on implements and buildings, rent paid for leased in land, rental value of owned land, interest on fixed investment and total cost as sum of operational cost and fixed cost.

Radha and Chowdary (2005) in their study of seed production in cotton crop classified the cost as cost A1, cost B1, cost B2, cost C1, cost C2 and cost C3. Cost A1 includes all the variable costs including interest on working capital (excluding cost of family labour). Cost B1 consists of cost A1 plus interest on value of owned fixed capital (other than land). Cost B2 consists of cost B1 plus rental value of owned land plus rent paid for leased in land. Cost C1 consists of cost B1 plus imputed value of family labour. Cost C2 includes cost B2 plus imputed value of family labour. Cost C3 includes cost C2 plus 10 per cent of cost C2 to account for the value of management input of the farmer.

For the present study, fixed cost is conceptualized as the sum of costs of land revenue, interest and depreciation on buildings, machineries, implements, tools and rental value of owned land and the variable cost comprises cost of seeds, human labour, bullock power and machinery charges, manures, fertilizers, plant protection chemicals and interest on working capital. The total cost is the sum of fixed cost and variable cost.

2.1.3.2. Returns

Tandon and Dhondyal (1971) defined net income as gross income minus total expenses on cost of seed, manures, irrigation charges, wages of hired labour and imputed value of family labour, depreciation, rent, interest on fixed and variable capital and marketing cost.

Mauyra (1996) pointed out that the net income would include the difference between cost of production and total value of the products.

Madan and Varghese (2005) while studying cost of cultivation of major rabi crops in Rajasthan defined gross returns as sum of value of main product and value of byproduct of crop and net income as gross income minus total cost.

Radha and Chowdry (2005) while studying the economics of seed production in cotton defined net income as gross income minus cost C3.

For the present study, gross income is defined as the total income received from sale of marigold crop and net income is conceptualized as the gross income minus total cost incurred for cultivation of marigold.

2.1.4. Resource Use Efficiency

Khusro (1964) measured the farm efficiency in terms of output per unit of single input or as output per unit of cost of all inputs.

Krishna (1964) compared the average yield per acre or average cost in different size groups of farms to measure efficiency of various sizes of holdings.

Salikram (1977) found that the marginal productivity of resource was more valid and most widely used by economists than average productivity. The marginal productivity is a measure of increase in total product with the addition of one unit of a particular resource above its mean level, while all other resources are kept constant at their mean level.

Johl and Kapur (1981) stated that the efficiency could be related to (a) operation of farm business as a whole, (b) any individual phase of the business line of production or enterprise, (c) the use of various factors of production or resource (land, labour, capital) or (d) to any single input (fertilizer, seeds, machines).

Sunandini *et al.* (1993) used marginal value product (MVP) to factor cost ratio as the measure of resource use efficiency. Equality of MVP to factor cost ratio indicates the optimum use efficiency of a particular input.

Balappa and Hugar (2001) stated that the resource use efficiency concept assumes importance in ascertaining whether the production at farm level could be increased profitably at an optimum level by reallocating the existing resources.

Dileep *et al.,* (2002) studied resource use efficiency based on the value of marginal productivity (VMP), which indicates the increase in the gross returns from the use of an additional unit of a given input

while keeping the level of other inputs constant. Resource use efficiency was studied by comparing VMPs of each resource with corresponding factor costs at which each resource could be procured.

Senthilkumar and Alagumani (2005) defined resource use efficiency as the ratio of marginal value product to marginal input cost.

In the present study, the marginal value product (MVP) to factor cost ratio was taken as the measure of resource use efficiency, beside the marginal productivity of the factor inputs.

2.1.5. Technical Efficiency

According to Kalirajan (1990), economic efficiency enlists technical efficiency whereby the greatest output could be obtained from any given set of inputs in a technical production function and price efficiency yields equality between the marginal value product and opportunity cost.

Jayaram *et al* (1992) referred technical efficiency as the maximum possible yield achievable with a given level of input use.

Kumbhakar (1994) defined the production frontier as the locus of maximum possible outputs for each level of input use. A producer is said to be technically efficient, if the observed output is maximum, given the input quantities, and a failure on the part of the farm to produce the frontier level of output, given the input quantities is attributed to technical inefficiency.

According to Shanmugam and Palanisami (1993), the measurement of economic efficiency included technical efficiency and price efficiency. Technical efficiency referred to the proper choice of production function among all these activities in use by farms. Price efficiency referred to the proper choice of input combinations. The issue of economic efficiency in agriculture has now been broadened from the earlier emphasis on price efficiency to consider technical efficiency also.

Kalirajan and Shand (1994) measured technical efficiency as the ratio of observed output to potential output. Although there is no a priori theoretical reasoning in the stochastic framework of measuring technical efficiency, the potential output is defined as the natural shift from the observed output.

Mythili and Shanmugam (2000) measured the farm level technical efficiency as the difference between potential and observed yields of crop, for a given technology and input levels.

Anupama *et. al*., (2005) defined technical efficiency is the ability of the farm to achieve the maximum possible output with available resources.

Goyal *et al.,* (2006) in their study regarding technical efficiency of rice farmers in Haryana state of India defined technical efficiency of a farm as the ability and willingness of the farm to obtain the maximum possible outcome with a specified endowment of input, given the technology and environmental conditions surrounding the farm.

For the present study, technical efficiency is defined as the degree to which the actual output of the production units approach the maximum attained at the levels of inputs used on the farm.

2.1.6. Factors Determining Farmers Participation in Contract Farming

According to Baker (2000) to estimate the participation probability, logit model with maximum likelihood method is often preferred due to the consistency of parameter estimation associated with the assumption that error term in the equation has a logistic distribution.

Jeyanthi (2002) employed probit model to estimate the influence of socio-economic variables on adoption of tissue culture banana.

Tefera and Melesse (2010) analyzed the determinants of factors that affect the adoption of coffee husk manure by using the standard Logistic adoption model.

Jabber *et al.,* (2007) analyzed alternative institutional arrangements for contract farming of poultry in Bangladesh and estimated the probability of participation in commercial poultry farming.

In the present study a linear probit model was used to identify the factors that determine the farmers participation in the contract farming.

2.1.7. Garrett's Ranking Technique

Sudalaimani (1991) adopted Garrett's ranking technique to rank the promotional activities on a marketing project in tissue culture cardamom plantlets and problems faced by the planters in the cultivation of cardamom.

Senthilkumar (1992) used Garret's ranking technique to rank the factors influencing the purchase of mushroom by the household consumers.

Vaseeharan (1997) employed the Garrett's scoring technique to analyse the problems in cultivation and marketing of periwinkle and senna.

Jayachandran (2002) used Garrett's ranking technique to rank the constraints involved in maize production. He found that inadequate transport facilities was the major problem faced by farmers , followed by distant location of regulated market, inadequate storage facilities, price fluctuation, etc.

Senthilnathan (2004) used Garret's ranking technique to rank the benefits due to watershed implementation like soil and water conservation, soil fertility improvement, cropping pattern, and increase in cropping intensity and ground water recharge.

Sudha (2005) employed Garrett's scoring technique to find the constraints involved in adoption of Integrated Pest Management (IPM) Technology. She found that high wage of labour as the major problem with the score of 75.65 followed by non availability of labour, time, lack of IPM inputs, lack of extension follow up practices, lack of proper training facilities, lack of confidence, complex practice, fragmented land holdings and lack of assured irrigation.

Ganaprakasam (2006) using Garrett's ranking technique found delay in input supply as the major problem faced in coleus contract followed by insufficient input supply, seasonal labour scarcity and high cost of labour, forced insurance, yield loss due to climate and lack of fixed price policy.

Athiyaman and Sekar (2007) used Garret's ranking technique to rank the reasons for labour migration, such as; family characteristics, drought, and change in cropping pattern, wage rates and nature the work.

In the present study Garret's ranking technique is used to rank the problems faced by farmers in cultivating marigold under contract and non-contract farming, benefits of contract farming and reasons for discontinuation by former contract farmers.

2.2. Review of Past Studies

2.2.1. Contract

Wilson (1986) stated that contracts require frequent and independent scrutiny so that they remain competitive both with similar contracts and with open market transactions. Wide publicity of contract terms

will help to stimulate competition. Vigorous bargaining cooperatives or other agricultural producer organizations are needed to negotiate equitable contracts.

Glover (1990) pointed out that contracts are generally signed at planting time and specify how much produce the company will buy and at what price. Often the company provides credit, inputs, farm machinery rentals, and technical advice. It always retains the right to reject substandard produce.

Haque (2000) observed that private processing firms in Andhra Pradesh were able to have contracts with the gherkin growing farmers by providing seeds, credit and other technical inputs for supplying gherkins which were processed and exported. The results indicated that the contract farming helped in increasing the yield and income of the farmers because of the availability of high quality seeds and assured market for the produce. It helped the company in getting adequate and assured supply of quality raw material for the processing unit at a pre-determined price.

Fraser (2003) studied the wineries of Australia who were altering or attempting to alter contractual arrangements in their favour as a means to receive higher rents from growers. He also found that many contracts were incomplete, leaving few terms and duties for future determination.

Phougat (2005) stated that contracts could provide farmers with access to a wide range of managerial, technical and extension advice that could otherwise be unavailable to the farmers. The farmers could even use the contract agreement as collateral to arrange for credit.

2.2.2. Contract Farming

According to Glover *et al.,* (1990), the farmers agreed that the contracting helped them to become better farmers, gave more reliable incomes, generated employment, especially for women, provided new skills of farming, and did away with patron-client relationship between the large and small producers.

Study by Korovkin (1992) revealed that contract farming tends to shift agricultural production in favour of export-oriented and cash crops at the cost of basic food crops. This can lead to higher food prices and may harm non-contracting small farmers and other poor sections of the society. Another fear raised is its tilt towards large farmers who are better able to meet contracting requirements.

According to Fulton and Clark (1996), found that the farmers under contract farming system felt that they had little bargaining power when compared with that of the company which they perceived benefited

more the company than the farmers, and they had become dependent on the firms for getting credit and other inputs.

Siddiqui and Kalim (1998) revealed that the over-exploitation of ground water, salination of soils, soil fertility decline and pollution are typical examples of environmental degradation due to contact farming.

Chand and Ramesh (1999) pointed out that the contracting has led to more and better employment opportunities for labourers, especially women. He further indicated that the labour intensity of potato and other vegetable crops cultivated through contract farming was much higher than that of the traditional crops.

Haque (1999) argued that in the wake of economic liberalization, the concept of contract farming in which national (or) international companies entered into contracts for marketing of agricultural produce and provide technologies and capital to contract farmers had gained importance. Contract farming helped in raising the yields and income of the farmers because of the high quality seeds and assured market for the produce provided by the company.

Kaur and Kaur (2000) studied that flower seed production under contract farming had emerged as one of the income and employment generating business in India especially Punjab and also in other countries.

Haque (2000) in his study found that the effect of contract farming on the crop yields and income of the farmers was found to be positive. But small farmers can effectively participate in contract farming and be benefited only when there are backward linkages in the form of assured supply of inputs of all kinds.

Sukhpal Singh (2000) found that though the Multi National Corporations, contracted with relatively large producers and their contracts were biased against the farmers, they had introduced quite a few new technologies which led to significant cost reduction and higher yields and consequently, higher incomes and more employment both for farmers and labourers. The successive technology transfer was possible due to the effective extension and market provision by the Multi National Corporations in the contracted crop (tomato).

Eaton and Shepherd (2001) concluded that the farmers are benefited from contract farming as a result of enhanced profits due to improved access to markets, credit and technology, better management of risk, improved family employment and indirectly empowerment of women and development of a successful commercial culture.

Asokhan and Singh (2003) revealed that the major risk in contract farming is that the farmer enters into a new type of production relation without the information about the company, the crop and techniques. The actual yield may not be the same as the yield promised. The company's ability to honor the commitment may fail due to poor planning, processing or marketing, etc. Farmers are the ultimate losers, though it is not their own fault. The sharing of transaction cost is the crux of contract farming, but the degree of sharing depends on the bargaining power, availability of alternatives and the access to information.

Satish (2003) studied the experiences of the existing contract farming system with Multi National Companies (MNCs) and the local initiatives to examine the outcome of the system. He concluded that agreements specify the buy back arrangements of harvested crop of good quality at the agreed price, but they are one sided and biased in favour of companies. There is no compensation even under conditions of crop failure due to natural calamities and there is no separate independent agency to monitor the quality of produce.

Rangi and Sidhu (2002) conducted an empirical study on contract farming in Punjab during 1998-99 which revealed that the per acre comparison of gross returns clearly indicated that tomato crop had an edge over other crops mainly due to assured price contract farming system. The gross return of contract tomato crop was to the extent of about Rs.28000 per acre in comparison to Rs.9500 for wheat, Rs.11000 for paddy and Rs.8100 for Potato.

Khare (2005) opined that food processors can minimize their overhead costs per unit of production by operating their plants at or near full capacity as contracting gives assured and stable raw material supplies from farms. In addition to raising the incomes of the growers, contract farming may also create positive multiplier effect for employment, infrastructure development and market development in the local economy.

Simmons *et al*., (2005) viewed contract farming as an integral part of market liberalization and agricultural transformation bringing together a curious combination of Multi National Corporations (MNCs) and small land holders.

2.2.3. Cost and Returns

Dileep *et al.,* (2002) reported that the cost incurred, yield and gross return obtained by the contract farmers were almost double that of the non-contract farmers in tomato. Among various categories of farmers, large contract farmers obtained higher net returns, followed by small and medium ones.

Tripathi (2005) found that the cost of potato cultivation was 17 to 24 percent higher under contract farming over various costs than that under non-contract system and this was mainly due to high investments on seeds, fertilizers and machine power in the former category. Gross income has been Rs. 99,753 per ha in the contract farms as against Rs. 41.572 per ha in non-contract farming system.

Nalini *et al.,* (2008) reported that the cost of production in potato included cost on production inputs like seed tuber, manures and fertilizers, irrigation, owned and hired machinery, labour charges and interest on working capital.

Ram Singh and Abhey Singh (2008) calculated the gross return based on the actual prices received by the growers. Net returns were obtained by deducing the respective cost from gross returns.

Smitha *et al.,* (2008) in his study included only the number of flowers produced and sale prices realized by the growers to calculate the gross returns, net returns per hectare of anthurium flower cultivation.

2.2.4. Resource Use Efficiency

Sirohi and Gangwar (1968) studied the economic optima in resource allocation for irrigated and unirrigated lands. The study revealed that when the irrigable land was fully utilized, its marginal value productivity remained lower than that of the unirrigated land.

Muralidharan (1987) studied the resource use efficiency in rice production in Kerala employing the Cobb-Douglas production function. The value of adjusted R^2 was 0.84 indicating that 84 per cent of the variation in yield of paddy was explained by the estimated production function. The coefficients of land and human labour were positive and significant at one per cent probability level.

Bhat (1988) examined the resource use efficiency in apple cultivation in Jammu and Kashmir State through the use of Cobb-Douglas production function model. The results indicated that the returns to scale were greater than one on small and large farms and the expenditure on human labour led to higher returns on small and medium orchards.

Thakar *et al.,* (1990) examined the effect of different resources on various crop productions in tribal farms of Himachal Pradesh and found that only human labour was significant in the production of barley and

in the case of potato and wheat, irrigation alone was found to be significant. The elasticity co-efficient of labour did not differ significantly among marginal, small and large farms.

Vishweshwar (1994) employed Cobb-Douglas type of production function to measure the efficiency of inputs used in the production of cotton by IPM and non-IPM adopted farmers in Malaprabha command area in Karnataka. The study indicated that the ratio of MVP to MFC for land was greater than one, while it was less than one for labour. It was negative for seeds, fertilizers and pesticides in conventional farmers. In case of IPM adopted farmers, the MVP to MFC ratio for land, labour and seeds were greater than one and it was negative for fertilizers.

Nagaraj *et al.,* (1996) evaluated the economics of maize-sunflower farming system in different size groups of farmers in Tungabhadra command area, and concluded that the variation in gross returns explained by variables included in the production function analyses was to the extent of 89.49 per cent and 99.03 per cent in maize and sunflower respectively. The resource use efficiency indicated that land, manures and fertilizers together had maximum influence on gross returns of maize followed by sunflower, and more specifically land was the single most factor that greatly influenced the gross returns.

Ganesh (2000) analyzed resource use efficiency for mixed farming systems in Gazani lands of Karnataka. Results of the study indicated that about 98 per cent of the total variation in gross income was explained by the variables included in the production function. The resources like fish fingerlings, manure and labour had a significant effect on the gross returns.

Krishna *et al.,* (2004) studied the resource use efficiency in paddy by using Cobb-Douglas production function. He reported that coefficient of multiple determination was 0.74,0.81,0.67 for small, medium and large farms which indicates that 74,81,67 percent variation in yield was explained by the selected independent variables such as land, tractor, power, human labour, seeds, manures and fertilizers, plant protection, chemicals and area under the crop.

Thakre *et al.*, (2005) used the Cobb-Douglas production function to work out the resource use efficiency and concluded that the regression coefficients of area, seed and bullock power were significant while those of human labour, manures and fertilizers and irrigation were non-significant in turmeric cultivation.

Grover and Singh (2007) reported that cost on human labour and cost on plant protection measures were significant at 5 per cent level on large farms and at 1 per cent level on small farms using Cobb- Douglas type of function in sesame cultivation.

Rupasena *et al.,* (2008) used Cobb-Douglas production function to evaluate the resource use efficiency in rice cultivation. They found that to obtain optimum yield levels, the farmer must reduce the expenditure on fertilizer and labour and should increase the seed rate.

Smitha *et al.,* (2008), used Cobb-Douglas production function to study the resource use efficiency in anthurium cultivation and concluded that the influence of use of plant protection chemicals was significant in organized sector and fertilizer was significant in unorganized sector at one per cent level.

2.2.5. Technical Efficiency

Xiao sang and Jeffrey (1998) used stochastic production function and cost frontier to derive technical, allocative and economic efficiencies of Chinese conventional rice and they indicated that the technical efficiency varied widely (varying from 46.50 to 96.70 per cent) across the sample farms and it was time invariant. The mean technical efficiency was computed as 82.00 per cent, which indicated that on an average, the realized output could be increased by 18.00 per cent without additional resources.

Hazarika and Subramanian (1999) analysed the technical efficiency of the Tea Industry in Assam using the stochastic frontier production function model. It was found that 29.40 per cent of the total farms that operated large farms (estates) belonged to the most efficient category (96.00 to 99.00 per cent) and 8.80 per cent of the farms were in the least efficient category (64.00 to 70.00 per cent). It was also observed that farm specific technical efficiency varied from 0.64 to 0.99 with mean technical efficiency of 0.88.

Anupama *et al.,* (2005) studied technical efficiency in maize production in Madhya Pradesh. They found that even though a majority of the farmers cultivate improved maize cultivar, the overall technology adoption by them has been poor. This may be due to the inability of a majority of farmers to follow the recommended package of practices for the improved cultivars because of high cost involved in their adoption and lack of infrastructure facilities. They concluded that the economic efficiency of maize growers in the state of Madhya Pradesh can be improved by increasing the adoption level of the improved package of practices.

Goyal *et al.,* (2006) studied the technical efficiency of paddy farmers in Haryana state of Indi. A translog stochastic frontier production function was used for the analysis of unbalanced panel data for three years for paddy farmers. The technical efficiency showed wide variation across sample farms ranging from 0.24 to 0.99 in the last study period. The mean technical efficiency declined from 0.80 in first year to 0.72 in the last year, which indicates that average technical efficiency regressed/deteriorated through years in paddy production. Thus, the study indicates that there is a scope to improve the productivity of the crop with the given level of inputs use and technology.

Bhende and Kalirajan (2007) studied "technical efficiency of major food and cash crops in Karnataka (India)". The analysis of technical efficiency indicated that there was a considerable scope to improve the productivity levels of both food and cash crops with existing level of input use and available technology. The average efficiency levels of growing rice ranged from 79 per cent on marginal farms to 86 per cent on semi-medium and medium farms.

Duraisamy (2007) in his study used Stochastic Frontier Production function (MLE method) to study the technical efficiency in the production of crops. The mean technical efficiency levels of kharif paddy, rabi paddy, sugarcane, banana, maize and sorghum were 66.61 per cent, 72.68 per cent, 74.76 per cent, 74.27 per cent, 66.97 per cent and 74.32 percent, respectively.

Surender Singh (2007) attempted to examine the farm specific technical efficiency of wheat cultivation in Haryana using stochastic frontier approach. The estimates of technical efficiency indicated a high degree of inefficiency in the production of wheat. The technical inefficiency worked out to be 27 per cent at the aggregate level and 25 per cent, 27 per cent and 26 per cent for small-, medium-and large-size farms, respectively.

Sharma *et al.,* (2008) used the stochastic frontier production function model for cross sectional data. The analysis of cross sectional data has revealed inefficiency in terms of input application. The mean technical efficiency had revealed that a considerable portion of frontier output is left untapped and, it was 35-42 per cent in maize, 44-50 per cent in paddy and 61-67 per cent in wheat.

Jyoti *et al.,* (2008) estimated technical efficiency of paddy crop in Jammu district using stochastic frontier production function. The results showed that the minimum technical efficiency was 10 per cent and

the mean technical efficiency was 37 per cent. Maximum number of farms came under the category of 25-45 per cent technical efficiency.

Abate Bakele *et al.,* (2009) in their study employed stochastic frontier production to study the effect of technical efficiency on farm size in wheat production. The result revealed that large farmers were technically more efficient than small farmers with the mean technical efficiency of 0.84 and 0.76 respectively.

2.2.6. Factors Determining Farmers Participation

Study by Jeyanthi (2002) revealed that the area under banana was found to have negative and significant, gross income from banana and bunch weight had positive and significant influence on tissue culture banana adoption.

Anjugam and Ramasamy (2007) analyzed the factors determining the participation of women in the microfinance Programme. They concluded that the age of women, caste, value of productive assets other than land, households having indebtedness prior to group formation and the presence of other micro credit programmes were the most significant factors influencing the women's participation in the microfinance programme.

Tefera and Melesse (2010) analyzed the determinants of factors that affect the adoption of coffee husk manure by using the standard Logistic adoption model. It revealed that gender of household , education level, farm size, distance from home to nearby coffee processing plant, socio-economic status, labour availability measured in men equivalent units institutional support and number of contacts with development agent significantly influenced the adoption of coffee husk manure.

2.2.7. Garrett's Ranking Technique

Vaseeharan (1997) found that inadequate rainfall and non-availability of labour were the major problems in cultivation of senna. As regards marketing, high transportation cost, price fluctuations were the major problems. The major problems in production and marketing of periwinkle at various stages were inadequate rainfall, shortage of labour, high cost of transport, lack of competition in the market due to less number of traders and low demand of the produce.

Maiti *et al.*, (2000) found that lack of awareness, inadequate investments in research and development and manufacture, export dissonance, lack of quality and standardization norms and lack of adequate marketing and trade information were the major constraints in the cultivation of medicinal plants by the growers.

Study by Prabhakar (2000) revealed that lack of agencies to supply good quality seed, non availability of labour in time and insufficient research in medicinal plants based intercropping system, lack of processing industries, lack of proper marketing channel, lack of fixed price policy of the government were the constraints expressed by 60-70 per cent of the respondents.

Ajit Kumar Singh (2001) used Garrett's technique to identify problems in contract farming reported that problems in contract farming were high cost of transportation, delay in payment, vulnerability of crop failure and deduction in price due to poor quality.

Jayachandran (2002) using the Garrett's Ranking Technique analysed the constraints expressed by maize growers, inadequate transport facility was the major problem faced by farmers with a mean score of 61.40 per cent, followed by distant location of regulated market, inadequate storage facilities, price fluctuation, etc.

Study by Bhuse and Ghule (2002) revealed that lack of proper agro-technology, lack of standard source of planting materials, limited research work on propagation of medicinal plants, farm mechanization, processing, quality control and marketing were the constraints faced by the medicinal plant growers.

Sundar (2002) in his study found that the main constraints in the cultivation of *Gloriosa superpa* were wide price fluctuation, lack of skilled labour, large investment on seed tubers and erection of *panthal* and certain allergic problems to human beings.

Saravanan and Gowda (2003) observed that disappointing technology transfer, problems in supplying timely and quality farm inputs, market gluts and lack of infrastructure development, lack of appropriate government policy support and challenges posed by World Trade Organization were the major problems of contract farming.

Dhanahalya and Shiyani (2006) revealed the pest, disease, adverse soils, water scarcity/drought, agronomical and socio-economic conditions were the production constraints faced by the cotton cultivators.

Grover and Singh (2007) studied that constraint faced by sesame growers were biotic (diseases, insect/ Pest and weeds), abiotic such as input availability constraints (seed, irrigation, fertilizers, insecticides, pesticides, labour, machinery, credits), environmental constraints (drought, rain, temperature, frost) and marketing constraints (information related to price, and its variability, storage losses, cost on transport).

Balasubramanian and Eswaran (2008) studied that the problem of cotton cultivators were non availability godown facilities, getting remunerative price, forced sale, more transport cost and unregulated weighing in Virudhunagar district of Tamil Nadu.

Naphade and Tingre (2008) stated that lack of market information, high market commission and lack of appropriate grader were the constraints faced by the guava growers.

Nalani et al., (2008), identified the major constraints faced by farmers in potato cultivation as lack of quality seed, inadequate irrigation facility, uncertainty in potato prices, costly potato inputs, shortage of labour and lack of latest know- how of potato cultivation.

Rama Rao *et al.,* (2008) expressed the constraints faced by farmers in marketing of sorghum as high transport cost, high commission charges, low price in the market, lack of buyer, improper payment, improper weighing, and storage problem.

CHAPTER III

DESIGN OF THE STUDY

In order to achieve the various objectives of the study, an appropriate methodology which describes sampling design, data collection and specification of the empirical model and tools of analysis is necessary. Hence, in this chapter, description of the methodology followed in the present study is detailed under the following headings.

3.1. Selection of the study area

3.2. Sampling design and data sources

3.3. Collection of data

3.4. Tools of analysis

3.1. Selection of the Study Area

Marigold occupies an area of 826 hectare in Tamil Nadu. It is predominantly cultivated in districts namely, Dindigul, Erode, Salem, Theni, Thiruchirapalli, and Virudhunagar in Tamil Nadu. Marigold is however produced largely under contract farming in Erode district. Hence, the study on economics of the marigold cultivation under contract farming has been taken up in Erode district.

3.2.1. Sampling Procedure

In Erode district, the revenue villages having marigold under contract farming were listed out in liasion with the contracting firm. Subsequently, the revenue villages namely; Thiginarai from Thalavadi block and Kuthiyalathur from Sathyamangalam block were selected randomly. The distribution of sample farmers under the categories namely, Contract farmers, Non- Contract farmers and Former Contract farmers numbering 100 is given in Table 3.1.

Table 3.1 Distribution of Sample Farmers in the Selected Villages

Sl.No	Name of blocks	Name of the Revenue village	Contract Farmers	Non contract farmers	Former contract farmers	Total
I	Thalavadi	Thiginarai	30	10	10	50
II	Sathyamangalam	Kuthiyalathur	30	10	10	50
Total			60	20	20	100

3.2.2. Study Period

The agricultural year 2008-2009 was fixed as the reference period for the study. The primary data were collected during the months of December 2009 and January, 2010.

3.3. Collection of Data

Both primary and secondary data were collected for the study. The primary data were collected from the sample farmers through personal interview method. Based on the physical, cultural and socio-economic environment of farming in the study areas, interview schedule was designed, pre-tested and finalized. Information on family composition, size of the holding, cropping pattern, extent of use of credit facility by the selected farmers, livestock particulars, input use, cost and returns of contract crop, reasons for former contract farmers discontinuing cultivation of marigold, contractual arrangements and problems faced by the farmers as well as the company in executing the contractual agreements were obtained.

3.4. Analytical Framework

3.4.1. Measurements of Variables

Cost of Cultivation

The total cost of cultivation included fixed and variable costs.

3.4.1.1. Fixed Cost

The fixed cost comprised of rental value of land, interest on owned fixed assets, and depreciation of owned fixed assets like farm buildings, irrigation structures, farm machinery, and land revenue. The interest for fixed capital was calculated at the rate of 12 per cent per annum.

3.4.1.2. Variable Cost

Variable cost included material costs and labour cost.

Material Cost

It included value of farm yard manure, seeds, manures, fertilizers, and plant protection chemicals (whether owned or purchased) evaluated at actual price paid.

Human Labour

Labour cost was measured in man days for the purpose of standardizing the work units of male and female labour. In this study one woman labour day was equivated to 0.5 man day based on the basis of the wage rate prevailing in the study area. On an average, the daily wage rate for male and female workers was Rs.160, and Rs.80, respectively. Family labour and hired labour were treated alike and the family labour was evaluated at wage rates paid to hired labour.

Machine Power and Bullock power

The cost of machine power and bullock power was computed at the prevailing custom hire charges. Thus, the owned and hired machine or bullock power was considered to be same.

Interest on Working Capital

Interest for short term credit i.e., seven per cent per annum was charged on working capital.

Depreciation

The depreciation was worked out using the Straight Line method.

3.4.2. Tools of Analysis

3.4.2.1. Conventional Analysis

The conventional methods of analysis viz., percentages, averages and frequency tables were carried out to estimate the level distribution of agro-socio-economic variables such as age, sex, education, experience in farming, land holding pattern, cropping pattern, livestock particulars, and extent of use of credit facility, input use, cost and returns etc., of the sample farm households.

3.4.2.2. Functional Analysis

In order to estimate the magnitude of influence of the identified variables over the specified dependent variables, functional analyses were performed separately for the respondent groups of contract farmers and non contract farmers.

3.4.2.2.1. Resource Use Efficiency

Production Function

In the production process, the average production is a simple measure of relationship between the output and input. But, to know the efficiency of the resources used in a farm, it is necessary to know the marginal product rather than the average product. In the present study, the production function approach was used to identify and evaluate the factors influencing the production of marigold in the case of contract farmers.

The production function that examines the relationship between the output and all inputs together in agriculture has the following important objectives (i) to estimate the production elasticities and the marginal physical product to study the efficiency of resources used and (ii) to study the returns to scale. The estimated values of regression coefficients were tested for statistical significance with help of‘t’ test at five per cent and one per cent levels of significance. The ‘f’ test was conducted to assess the validity of the model.

The Cobb-Douglas type of production function was found to be the most appropriate form to explain the relationship between various inputs and the yield. The Cobb-Douglas form of production function is specified as follows:

$$Y = a\, X_1^{b1} . X_2^{b2} . X_3^{b3} . X_4^{b4} . X_5^{b5} . X_6^{b6} . X_7^{b7} . X_8^{b8} . X_9^{b9} U$$

Where,

Y = Yield of marigold (quintals /ha.)

X_1 = Farm yard manure (tonnes/ha)

X_2 = Quantity of Nitrogenous fertilizer (kg./ha.)

X_3 = Quantity of Phosphorus fertilizer (kg./ha)

X_4 = Quantity of Potassium fertilizer (kg./ha)

X_5 = Seed (grams/ha)

X_6 = Expenditure on plant protection chemicals (Rs/ha)

X_7 = Machine power (tractor hours/ha)

X_8 = No. of irrigation

X_9 = Human labour (man days/ha)

U = Error term

Estimation Procedure

The Ordinary Least Square (OLS) method was used for estimating the parameters associated with different independent variables. The estimable form of the Cobb-Douglas production function is formally expressed as follows.

$$\mathbf{\ln Y = \ln a + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 \ln X_7 + \beta_8 \ln X_8 + \beta_9 \ln X_9 + U}$$

The resource use efficency could be worked out based on the marginal value productivity(MVP), which indicates the increase in the gross return from the use of an additional unit of a given input while keeping the level of other inputs constant.

Resource use efficiency = MVP / MFC

The marginal value product (MVP) of the i-th input factor was measured by using the formula:

$$MVP_j = \beta_j \frac{\bar{Y}}{\bar{X}_j} P_y$$

Where,

MVP_j -Marginal value product of 'j^{th} product

$\bar{Y}$ - Geometric mean level of output

$\bar{X}_j$ - Geometric mean of input 'j'

β_j - Estimated co-efficient of elasticities for j^{th} input

P_y - Price of marigold flower (Rs /tonnes).

3.4.2.2.2. Technical Efficiency

In the present study, the efficiency of marigold production under contract farming was determined using the stochastic frontier production function.

Stochastic Frontier

The key factor of the stochastic production frontier is that the disturbance term is composed of two parts. One is symmetric and the other one sided. The symmetric component captures the random effects outside the control of the decision maker including the stochastical noise contained in every empirical relationship (such as poor input performance, bad weather, input supply breakdown, etc.,) and the one sided component that captures deviations from the frontier due to inefficiency.

The following equation denotes the production frontier in the matrix form;

$$Q_i = Q\,(X_{ki},\beta)\, e^{\sum I} \text{ ----------} \quad (1) \qquad i = 1, 2\ldots..n \quad k = 1, 2\ldots\ldots k$$

Where,

Q_i ; Output of the i^{th} farm

X_{ki} ; Vector of K inputs of the i^{th} farm

β ; Vector of parameters to be estimated and

$\sum i$; Farm specific error term.

The stochastic frontier is called a 'composed model' because the error term is composed of two independent elements, namely

$$\sum i = V_i - U_i \qquad i = 1, 2\ldots.n$$

The term V_i is the symmetric component that permits random variations in output due to factors like weather and plant diseases. It is assumed to be identically and independently distributed as $V_i \approx N(0, \sigma^2_v)$. A one sided component ($U_i > 0$) reflects technical efficiency relative to the stochastic frontier $Q_i = Q(X_{ki,}\beta)e^{vi}$. Thus, $U_i = 0$ for any farm lying on the frontier, while $U_i > 0$ for any farm lying below the frontier. Hence, expression U_i represents the amount by which the frontier exceeds realized output. Assuming that U_i identically and independently of U is half-normal, this U_i takes the value zero when the farm produces on its outer-bounded production function (realizing all the technical efficiency potential) and is less than zero when the farm produces below its outer-bounded production function (not realizing fully its technical efficiency potential). This might happen due to number of factors such as; risk aversion, self-satisfaction, information problems, etc., which may prevent the farm from achieving its full potential.

The Density function can be written as,

$$fu_{(ui)} = \frac{1}{\sigma u \sqrt{1/2\pi}} \exp\left(-1/2 \frac{u_i^2}{\sigma^2 u}\right) \text{ if } Ui>0$$

$$= 0, \quad \text{otherwise}$$

It follows that: $\sigma^2 = V(E\sigma^2) = \sigma^2 V + \sigma^2 U$

Further defining $\lambda = \sigma u / \sigma v$ (i.e.) ratio of one sided error term to symmetric error term.

The Cobb-Douglas functional form is generally preferred for assessing technical efficiency because of its well-known advantages. Its purpose is to show what output of a given product will be achieved by efficient combination of factors. In principle, confining the analysis to this functional form can be sometime restrictive. However, it is possible to estimate the stochastic frontier using Maximum Likelihood Estimation Method.

Aigner *et al* (1977) suggested that Maximum Likelihood Estimates (MLE) of the parameters of model could be obtained in terms of parameterization.

$$\sigma^2 = \sigma_v^2 + \sigma_u^2$$

$$\lambda = \sigma_v / \sigma_u$$

One advantage of estimating the frontier function is that it is possible to find out whether the deviation of yield from frontier yield is mainly because of not using best practice techniques by the farmers or is due to external random factors. Thus, one can say whether the differences between actual yield obtained and frontier yield, if any, has occurred accidentally or not.

$$\sigma^2 = \sigma_v^2 + \sigma_u^2 \text{ and}$$

$$\gamma = \sigma_v^2 / \sigma_u^2 \ [\ 0 \leq \gamma \geq 1]$$

γ is an indicator of relative variability of U_i and V_i that differentiates the actual yield from the frontier. The parameter γ tending to one indicates that the farmers yield is different from the increasing feasible yield mainly because he did not use best practice or technique. When γ tends to zero, it indicates that the farmer's yield is different from the frontier yield mainly because of either statistical error or external factors not included in the model. In the present study, MLE Method is used to estimate the farm technical efficiency (as used by Olsen *et al*. (1980), Aigner (1997), Kutaula (1993) and Arindam Banik (1994).

In the present study, the following assumptions were made while specifying a stochastic frontier. The frontier is stochastic in nature due to factors beyond human control and symmetrically distributed error term is present. It is responsible to capture the effects of outside random effects observed and measurement error on the dependent variable and other statistical noise. Variations in the technical efficiency of individual farms are due to factors completely under the control of farmers.

The model for the present study has been specified as follows:

$$\ln Y = \ln a + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 \ln X_7 + \beta_8 \ln X_8 + \beta_9 \ln X_9 + U$$

Y = Yield of marigold (quintals /ha.)

X_1 = Farm yard manure (tonnes/ha)

X_2 = Quantity of Nitrogenous fertilizer (kg./ha.)

X_3 = Quantity of Phosphorus fertilizer (kg./ha)

X_4 = Quantity of Potassium fertilizer (kg./ha)

X_5 = Seed (grams/ha)

X_6 = Expenditure on plant protection chemicals (Rs/ha)

X_7 = Machine power (tractor hours/ha)

X_8 = No. of irrigation

X_9 = Human labour (man days/ha)

U = Error term

3.4.2.3. Probit Model

Probit analysis is based on the concept of cumulative normal distribution. The estimated model that emerges from cumulative normal distribution function is popularly known as probit model, sometimes it is also known as the normit model. The probit model is based on utility theory or rational choice perspective on behaviour (Gujarathi, 2005).In the present study, probit model was used to estimate the probability that a given household will participate in a contract-farming scheme.

Probit analysis can be used to estimate the effects of one or more independent variables on a dichotomous dependent variable. The qualitative dependent variable assumes only two values viz., 0 and 1.

In this model, it is assumed that the factors that influencing participation in contract farming depended on the variables such as; economic and non-economic factors. Based on the past studies, the independent variables were selected. The important variables such as education, age, experience, area under marigold

production (Contract), fixed price for marigold and gross income were included in the present analysis to identify the factors influencing the farmers to participate in contract farming.

It is assumed that the decision of i^{th} farmer to participate in contract farming or not depended on an Unobservable Utility Index I_i (also known as latent variable), that is determined by one or more explanatory variables. In general, the index I_i is expressed as follows;

$$\mathbf{I_i = f\,(X) + u_i}$$

Where X is a vector of explanatory variables

Now it is reasonable to assume that for each farmer there is a critical index (I_i*). If I_i exceeds I_i*, the farmer participates in contract farming, otherwise he will not participate. I_i and I_i* are not observable. But using normal distribution with same mean and variance, it is possible to estimate the parameters and also to get some information about unobservable index.

The probability of farmer's decisions that I_i* is less than zero or equal to I_i can be computed from standard normal cumulative distribution function as follows.

$$\mathbf{P_i = P(Y=1/X) = P\,(I_i^* \leq I_i) = F\,(I_i)}$$

$$= \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{Ii} e^{\frac{-t^2}{2}}\,\mathbf{dt}$$

t is a Standard normal variable, i.e., t ~ N (0,1).

The probability arrived is highly non- linear. To make it linear, the inverse of the normal cumulative distribution function is taken.

$$\mathbf{I_i = F^{-1}(I_i) = F^{-1}\,(P_i)}$$

F^{-1} is the inverse of the normal cumulative distribution function. Once the index I_i is estimated, the estimation of β_i parameters is a relatively straight forward one. The unobservable utility index I_i is known as normal equivalent deviate (n.e.d) or simply normit. If the n.e.d or I_i is negative then, $P_i < 0.5$. In practice the number 5 is added to the n.e.d and the result is called probit.

Probit = n.e.d +5

$= I_i + 5$

Based on the past study reviewed the variables in this probit function has made.

The model used in this study is given below.

$$\mathbf{I_i = \beta_1 + \beta_2\,(EDN) + \beta_3\,(GINCOME) + \beta_4\,(AREA) + \beta_5\,(AGE) + \beta_6\,(EXP) + \beta_7(FIX) + e}$$

Where,

I_i = Y =1, if the farmer participates in contract farming

0, if the farmer does not participate in contract farming (non-contract)

EDN - Educational status of the farmer indicated by grades *viz,*

Illiterate-1; Primary -2; Secondary-3, College -4.

GINCOME - Gross income from marigold (Rs/ha).

AREA - Farm size (ha)

AGE - Age of the head of the household (years)

EXP - Experience of head of the household in cultivation of marigold (years)

FIX - Fixed price for the produce (Dummy: 1 if fixed price and 0 if price varied)

β_2 and β_6 - Coefficients of independent variables

β_1 - Intercept

3.4.2.4. Uncertainty Ratio

Uncertainty refers to future events where the parameters of probability distribution cannot be determined empirically or quantitatively (Dileep *et al.,* 2002). This ratio varies between zero (complete certainty about yield/price) and one (complete uncertainty about yield/price).

The Yield Uncertainty Ratio (YUR) and Price Uncertainty Ratio (PUR) were calculated as follows:

$$YUR = \frac{Y_{AHPY} - Y_{ALPY}}{Y_{AMPEY}}$$

Where,

YUR = Yield Uncertainty Ratio

Y_{AHPY} = Average Highest Probable Yield

Y_{ALPY} = Average Lowest Probable Yield

Y_{AMPEY} = Average Most Probable Expected Yield

$$PUR = \frac{P_{AHPEP} - P_{ALPEP}}{P_{AMPEP}}$$

Where,

PUR = Price Uncertainty Ratio

P_{AHPEP} = Average Highest Probable Expected price

P_{ALPEP} = Average Lowest Probable Expected Price

P_{AMPEP} = Average Most Probable Expected price

3.4.2.5. Garrett's Ranking Technique

To identify the major problems faced by the farmers in contract farming, Garrett's scoring technique was employed. Ranks assigned to the constraints by the farmers were converted into scores using percentage for each of the assigned rank with the following formula:

$$\textbf{Percent position} = \frac{\mathbf{100\ (R_{ij} - 0.5)}}{\mathbf{N_j}}$$

Where,

R_{ij} = Rank assigned to the i th constraint by the j th individual

N_j = Number of constraints ranked by j th individual

Using the table developed by Garrett, mean of the scores was arrived. Highest mean score was ranked first. According to the mean score, problems were listed in the descending order.

CHAPTER IV

DESCRIPTION OF THE STUDY AREA

A proper perspective of the study region covering description of geographical features such as location, climate, land use pattern and agro socio-economic features such as agriculture, population and literacy is absolutely essential to have a better understanding of the results of the study and in turn to draw meaningful conclusions. These are presented in the following sections.

4.1 Location

Erode district was bifurcated from the erstwhile Coimbatore district on 02.10.1971. Erode district lies between $10^0$36" and $11^0$58" North Latitude and between $76^0$49" and $77^0$58" East Longitude. The total geographical area of the district is 5714 sq.kms. It is bounded mostly by Karnataka State and also River Palar covers a long distance. To the East lies a Namakkal and Karur district. Dindigal district is its immediate neighbour to the South and on the West, it has Coimbatore and Nilgiri districts, as its boundaries. Thus, Erode district is essentially a land-locked area having no sea-cost of its own. The region comprised in the district can be portrayed as a long undulating plain gently sloping towards the river Cauvery in the south-east. The three major tributaries of river Cauvery viz. Bhavani, Noyyal and Amaravathy drain the long stretch of mountains in the north. A part of the eastern boundary of the district is formed by the river Cauvery, entering the district from Salem and flowing in a southernly direction.

4.2 Revenue Divisions

The Erode district has only two revenue divisions namely Erode and Gobichettipalayam. The district comprises of five taluks, fourteen blocks and

375 Revenue Villages. Table 4.1 furnishes the administrative set up including list of taluks and blocks in Erode district.

Table 4.1 Sample Taluks and Blocks in Erode District

S.No.	Taluks	Blocks
1.	Erode	1.Erode 2.Modakurichi 3.Kodumudi
2.	Perundurai	4.Perundurai 5.Chennimalai
3.	Gobichettipalayam	6. Gobichettipalayam 7. Nambiyur 8.Thukkanaikenpalayam
4.	Bhavani	9. Bhavani, 10.Anthiyur 11. Ammapettai
5.	Sathyamangalam	12. Sathyamangalam 13. Bhavanisagar 14. Thalavadi

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

4.3 Climate Conditions

The temperature in Erode district ranges from 18.9° C to 35.3° C. The normal rainfall in Erode district is 711.4 mm. Erode district receives the highest amount of rainfall (323.50 mm) during the North East Monsoon. The South West Monsoon supplies 213.10 mm of average rainfall. It receives very less rainfall during winter and summer seasons.

The season-wise rainfall details in Erode district are given in Table 4.2.

From the Table 4.3, it could be concluded that the receipt of rainfall in 2007-08 was more during North East Monsoon (NEM) when compared to that of South West Monsoon (SWM) in Sathyamangalam block, Thalavadi block and Erode district as is the case with normal rainfall. The average annual rainfall recorded was 893.5 mm in Erode district and this was greater than that of Sathyamangalam block (752.60 mm), but lesser than of Thalavadi block (1080.10 mm). The normal rainfall in Erode district (711.4 mm), Sathyamangalam block (669.20) and Thalavadi block (789.70) was lesser than that of Tamil Nadu state's

normal rainfall (959 mm). This indicates that the study region receives rainfall lesser than that of the state average.

4.4 Demographic Pattern

The following Table 4.4 shows the details about the categories of population in Erode district and Sathyamangalam and Thalavadi blocks.

Table 4.4. Demographic Pattern of Sathyamangalam Block, Thalavadi Block & Erode District (2001 census)

(Numbers)

S. No.	Particulars	Sathyamangalam Block	Thalavadi Block	Erode District
1	Male	70663 (50.75)	26637 (50.09)	1309278 (50.72)
2	Female	68585 (49.25)	26537 (49.90)	1272222 (49.28)
Total		**139248 (100)**	**53174 (100)**	**2581500 (100)**
3	Rural	82826 (59.48)	53174 (100.00)	1387537 (53.75)
4	Urban	56492 (40.52)	0 (0.00)	1193963 (46.25)
5	**No. of literates**			
(i)	Male	41874 (59.26)	13621 (51.14)	877907 (67.05)
(ii)	Female	29583 (43.13)	8952 (33.73)	634048 (49.84)
	Total	**71457 (51.32)**	**22573 (42.45)**	**1511955 (58.57)**
6	Density / sq.km	141	56	316

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

The total population in Erode district was 2581500 according to 2000-01 census. Out of this the male population accounted for 50.72 per cent and female population accounted for 49.28 per cent. The density of population happened to be 316 persons per square kilometer.

The total population in Sathyamangalam block and Thalavadi block was 139248 and 53174, respectively. Out of this, male population accounted for 50.75 and 50.09 per cent, and female population accounted for 49.25 and 49.90 per cent in Sathyamangalam block and Thalavadi block, respectively. The density of population happened to be 141 and 56 persons per square kilometer in these two blocks, respectively and these were far below the district average of 316. But of the total population, 53.75 per cent in rural areas and 46.25 per cent in urban areas of Erode district. However, in Sathyamangalam block, 59.48 per cent were living in rural areas and only 40.52 per cent of the population were living in urban areas. In Thalavadi block, 100 per cent population were living in rural areas.

The overall literacy rate in the district was 58.57 per cent. Of the males, 67.05 per cent were literates, whereas the female literacy rate was relatively less at 49.84 per cent. Literacy level of Sathyamangalam block and Thalavadi block was found to be much lesser at 51.32 per cent and 42.45 per cent, respectively.

4.5 Occupational Status

Of the total population, workers constituted 55.56 per cent, 55.86 per cent and 54.42 per cent in Erode district, Sathyamangalam block and Thalavadi block, respectively indicating the dominance of work force. Of the total workers, main workers with regular work constituted 91.88 per cent, 87.50 per cent and 59.78 per cent, whereas marginal workers with irregular employment accounted for 8.12 per cent, 12.50 per cent and 40.22 per cent in Erode district, Sathyamangalam block and Thalavadi block, respectively. This indicates the vulnerability of the unorganized work force in Thalavadi block.

Of the total work force 48.18 per cent of the workers were cultivators and agricultural labourers in Erode district, while in Sathyamangalam block, they constituted 55.71 per cent of the total work force it was 48.83 per cent in Thalavadi block. Therefore, it could be concluded that around half of the work force were directly depending on agriculture in the study area. In the case of Thalavadi block, the marginal workers constituted 40.22 per cent reflecting the backwardness, poverty and the need for attention.

Table 4.5. Occupational Pattern of Erode District and Sathyamangalam & Thalavadi Blocks (2001 census)

(Numbers)

Sl.No	Particulars	Sathyamangalam Block	Thalavadi Block	Erode District
1	Total Workers	77782 (55.86)	28935 (54.42)	1434405 (55.56)
	Total Non- workers	61466 (44.14)	24239 (45.58)	1147095 (44.44)
	Total Population	139248 (100.00)	53174 (100.00)	2581500 (100.00)
2	Total main workers	68061 (87.50)	17297 (59.78)	1317991 (91.88)
i	Cultivators	16196 (20.82)	7871 (27.20)	280072 (19.53)
ii	Agrl. Labours	27141 (34.89)	6258 (21.63)	411010 (28.65)
iii	Household Industry	4368 (5.62)	526 (1.82)	68201 (4.75)
iv	Other Workers	20356 (26.17)	2642 (9.13)	558708 (38.95)
3	Marginal Workers	9721 (12.50)	11638 (40.22)	116414 (8.12)
	Total Workers (2+3)	**77782 (100.00)**	**28935 (100.00)**	**1434405 (100.00)**

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

4.6 Rivers and Irrigation

Bhavani and Cauvery are the main rivers of the district. The Bhavanisagar main canal along with the above mentioned rivers provide for assured irrigation in the district. Bhavani is more or less a perennial river fed mostly by the South-West monsoon. North-East monsoon also supplement its water flow. This river runs for over hundred miles through Erode District traversing through Bhavani and Gobichettipalayam blocks. It feeds the Bhavanisagar reservoir which takes an easterly course flowing through Gobichettipalayam block, Sathyamangalam and Bhavani blocks before ultimately joining river Cauvery on the Salem district border. The area irrigated by various sources in Erode district is given in Table 4.6.

Table 4. 6. Source wise Area under Irrigation in Erode District in 2007-08

Sl.No	Source of Water	Number	Area irrigated (ha)			
			Gross	Percentage to the total	Net	Percentage to the total
1	Govt. Canals	13	97091	50.33	87961	50.32
2	Tanks	847	282	0.15	263	0.15
3	Wells	117936	73733	38.22	66373	37.97
4	Bore Wells	9520	18010	9.33	16489	9.43
5	Other sources	7	3802	1.97	3702	2.12
5	**Total**		**192918**	**100.00**	**174788**	**100.00**

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

The Net area irrigated in Erode district during 2007-08 was 174788 ha. Net irrigated area by Government Canals constituted highest proportion in Erode District with 50.32 per cent followed by wells (37.97 per cent), bore wells (9.43 per cent), tanks (0.15 per cent) and other sources (2.12 per cent).

4.7 Soil Classification

Soil type and its fertility are the important factors deciding crop productivities. Hence, the soil types prevalent in Erode district are presented in Table 4.7.

The soils of the district are mostly red sand and gravel with moderate amounts of red-loam and occasional black loam tracts. Vast stretches of the upland regions are mostly gravelly. Red-loam occurs mostly in land under Kalingarayan canal and in beds of tanks in Erode taluk and to a lesser extent in the valleys in Perundurai and Bhavani blocks.

Table 4.7. Soil Classification of Erode District (2007-08)

Sl.No.	Type of Soil	Places in the District (Taluks)
1	Red Loam	Gobichettipalayam and Sathyamangalam
2	Lateritic Soil	Bhavani, Sathyamangalam
5	Red Sandy Soil	Erode, Perundurai, Bhavani

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

Soils of Bhavani, Erode, and Perundurai blocks are chiefly gravelly, stony and sandy of the red variety. Soils of Gobichettipalayam and Sathyamangalam blocks are mostly of the red sandy variety. Red loam is prevalent mostly in Gobichettipalayam and Perundurai blocks.

4.8 Land Use Pattern

A study on land use pattern would be more useful in understanding the magnitude of agriculture and other major uses of land in the study area. The details of land use pattern are given in Table 4.8 and discussed below.

It could be seen from the table 4.8, that the total geographical area of Erode district happened to be 816191 hectares. The net area sown accounted for only 35.55 per cent of the total geographical area. The area under forest is very large accounting for 28.03 per cent of total geographical area. The area under land put to non- agricultural use is 81795 hectares with a significantly large share of 10.02 per cent, indicating a relatively larger area utilized for non-agricultural purposes. The current fallows and other fallows also occupied a significant 12.58 per cent and 12.57 per cent, respectively indicating the scope for improving the area under agriculture to a considerable extend more than 60

per cent. The area sown more than once was only 2.23 per cent, implying only a little over 100 per cent cropping intensity.

Table 4.8 Land Use Pattern in Erode District 2007-08

Sl.No	Particulars	Area in Hectare	percentage
I	Total Geographical Area	**816191**	**100.00**
1	Forest	228749	28.03
2	Barren and Uncultivable	7006	0.86
3	Land put to Non –Agricultural use	81795	10.02
4	Cultivable waste	1736	0.21
5	Permanent Pastures and other Grazing Land	219	0.03
6	Land Under Miscellaneous Tree Crops and Groves not included in	1273	0.16
7	Current Fallows	102663	12.58
8	Other Fallows Land	102565	12.57
9	Net Area sown	290185	35.55
10	Total Cropped Area	308400	37.79
II	Area sown more than once	18215	2.23
III	Gross cropped area	326615	40.02

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

4.9 Land Holding Pattern

The details furnished in the table 4.9, would show that around 60 per cent of the total area was owned by around 25 per cent of the farmers having more than two hectares. The average area owned by them worked out to close to 4 hectares, whereas the average area of marginal and small farmers worked out to be only around 0.51 to 0.56 ha and 1.4 to 1.5 ha, respectively, indicating a highly skewed distribution of land.

Table 4.9. Land Holdings Pattern in Erode District, Sathyamangalam Block and Thalavadi Block (2001)

Particulars		Marginal (< 1.00)	Small (1.01–2.00)	Large (> 2.01)	Total
Erode district	Numbers	136960	79586	74759	291305
	Per cent	47.02	27.32	25.66	100.00
	Operated area (ha)	70658.69	114925.93	296991.05	482575.67
	Per cent	14.64	23.81	61.55	100.00
Sathyamangalam Block	Numbers	5515	4812	3506	13833
	Per cent	39.87	34.79	25.35	100.00
	Operated area (ha)	3062.27	7185.58	13684.61	23932.46
	Per cent	12.80	30.02	57.18	100.00
Thalavadi Block	Numbers	4767	3888	3003	11658
	Per cent	40.89	33.35	25.76	100.00
	Operated area (ha)	2679.22	5856.78	11929.9	20465.90
	Per cent	13.09	28.62	58.29	100.00

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

4.10 Cropping Season for Major Crops in Erode District

Generally, in Erode district, the cropping season starts from May-June, depending on the onset of monsoon. The cropping seasons for major crops are furnished in Appendix 1.

Most of the traditional crops were photosensitive and thus, the sowing time is the most important factor affecting the crop productivity. The traditional crops were sown during *Aadi pattam* (July-August) and commercial crops were sown in *Thai pattam* (January-February). Sugarcane and turmeric planting were taken up during Dec-Nov and May-Jan, respectively.

4.11 Cropping Pattern in Erode District.

Major crops grown in the district are paddy, sugarcane, banana, groundnut and millets. Now, cultivation of fodder crops is becoming popular in Erode district. Important crops raised during 2007-2008 and their composition are given Table 4.1.

Table 4.10. Cropping pattern in Erode District

S.No.	Crop	Gross cropped area in hectares	Percentage
A	**Cereals and millets**	**65955**	**20.19**
1	Paddy	38360	11.74
2	Sorghum	746	0.23
3	Cumbu	458	0.14
4	Ragi	5907	1.81
5	Maize	20473	6.27
6	Others	11	0.00
B	**Pulses**	**14810**	**4.53**
7	Red gram	860	0.26
8	Black gram	1266	0.39
9	Green gram	2568	0.79
10	Horse gram	6825	2.09
11	Cowpea	2223	0.68
12	Avarai	724	0.22
13	Other pulses	344	0.12
C	**Spices and condiments**	**9521**	**2.92**
D	**Sugar crops**	**41928**	**12.84**
E	**Fruits**	**12877**	**3.94**
F	**Vegetables**	**14631**	**4.48**
G	**Fiber crops**	**1987**	**0.61**
H	**Oilseed crops**	**71967**	**22.03**
I	**Fodder crops**	**66676**	**20.41**
J	**Flowers**	**1347**	**0.41**
K	**Other crops**	**24916**	**7.63**
	Gross cropped area	**326615**	**100.00**

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

It could be seen from the table 4.10, that area under cereals occupied 20.19 per cent of Gross Cropped Area (GCA) and paddy alone accounted for 11.74 per cent followed by maize (6.27 per cent), ragi (1.81 per cent), sorghum (0.23 per cent) and cumbu (0.14 per cent).

Among pulses horse gram and green gram are the major pulses which accounted for 2.09 per cent and 0.79 per cent of GCA, respectively. Spices and condiments occupied 2.92 per cent of GCA; sugar crops occupied 12.84 per cent followed by fruits (3.94 per cent), vegetables (4.48 per cent) and fiber crops (0.61 per cent). Oil seeds accounted for 22.03 per cent of GCA. Fodder crops occupied 20.41 per cent of GCA and flowers accounted for 0.41 per cent. Other crops accounted for 7.63 per cent of the gross cropped area in the district.

4.12 Livestock Population

Animal husbandry and agriculture are the twin occupations, which from time immemorial have played a significant role in improving the rural economy. Livestock rearing is a viable proposition, both as full-time and part-time occupation, and it provides assured income and ensures better utilization of human resources.

Table 4.11. Livestock Population of Erode District, Sathyamangalam and Thalavadi Blocks

(Numbers)

Sl.No	Particulars	Sathyamangalam Block	Thalavadi Block	Erode
1	Cattle	33301 (35.18)	41736 (53.75)	398572 (23.49)
2	Buffalos	8337 (8.81)	4075 (5.25)	230004 (13.55)
3	Sheep	37022 (39.12)	15443 (19.89)	506015 (29.82)
4	Goats	15988 (16.89)	16388 (21.11)	562270 (33.14)
	Total livestock	94648 (100.00)	77642 (100.00)	1696861 (100.00)
5	Poultry	35323	65700	5183676

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

It is a major source of self-employment to a substantial number of rural population, many of whom are women, who play a major role in the care and management of livestock. Livestock population in Erode district, Sathyamangalam block and Thalavadi block are furnished in Table 4.11.

From the table, it could be inferred that the district is rich in goat and poultry population. The high cattle population would support and or enhance the livelihood of the people in the study area. Among livestock, goat population is maximum in Erode district (33.14 per cent) followed by sheep (29.82 per cent), cattle (23.49 per cent) and buffalos(13.55 per cent). Among livestock in Sathyamangalam block, sheep population accounted for a maximum of 39.12 per cent followed by cattle (35.18 per cent), whereas in Thalavadi block, cattle population was the highest with 53.75 per cent followed by goats (21.11 per cent). Poultry birds' population in Erode district, Sathyamangalam block and Thalavadi block was reported as 5183676, 35323 and 65700, respectively.

There were 709 milk producers' co-op societies functioning in the district. The district had three milk chilling plants, 10 Veterinary Hospitals, 68 Veterinary Dispensaries and 90 Veterinary Sub Centers. Apart from these, four Mobile Veterinary Dispensaries were also functioning in the district.

4.13 Agricultural Machinery and Implements

The usage of machinery and implements would indicate the extent of mechanization and it also plays vital role in adoption of new technologies and income generation from farm activities. Hence, the details on number of machinery and implements in Erode district, Sathyamangalam block and Thalavadi block are furnished in Table 4.12.

From the table, it could be inferred that in Erode district, two thirds of the wells have been energized either by electric motor or oil engines, beside close to 4000 tractors catering to the needs of the farmers in Erode district. Presence of sugarcane crushers and oil grains also indicate activity diversification in agriculture.

Table 4.12 Machinery and Implements of Erode District Sathyamangalam Block and Thalavadi Block

(in Numbers)

Sl. No	Particulars	Sathyamangalam Block	Thalavadi Block	Erode
1.	Plough			
	Wooden	5520	4850	76956
	Iron	860	2100	21534
	Total	6380	6950	98490
2.	Water Pumps			
	i. Oil Engine	21	30	19381
	ii. Electric	5795	2265	65957
	Total	5816	2295	85338
3.	Tractors			
	i. Government	6	0	22
	ii. Private	145	130	3936
	Total	151	130	3958
4.	Sugarcane Crusher			
	i. Electric Power	6	0	687
	ii. Oil Engine	0	0	93
	Total	6	0	780
5.	Oil Ghanis	8	0	17

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

4.14 Financial Institutions

The details of financial institutions in Erode district are furnished in Table 4.13. It could be seen from the table that the district had predominantly Commercial banks including private banks numbering 330 (60.65 per cent) followed by Primary Agriculture Co-operative Banks (PACBs) numbering 225 (41 per cent). This indicates better access to institutional finance in the study area.

Table 4.13 Finance Institutions Present in Erode District

(Numbers)

S.No	Particulars	Erode	Percentage
1	Commercial Banks	257	47.24
2.	Private Banks	73	13.41
2	Primary Agricultural Co-operative Banks	225	41.36
3	Primary Agriculture and Rural Development Bank	12	2.20
4	Total	544	100.00

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

4.15 Sericulture

Mulberry was cultivated in about 1940 hectare in Erode district. Two government silk worm production centers are functioning in Erode district which cater to the demand of sericulture farmers of the district. Cross Bred Disease Free Layer (DFL) Production has increased from 4.11 lakh to 13.34 lakh during 2006-07. Erode District is alone in Tamil Nadu has 12 private Chawki Rearing Centers (CRC) functioning successfully. Mobile cocoon market such as the one is Gobichettipalayam and a regular market at Thalavadi are functioning successfully.

4.16 Industrial Development in Erode District

Erode district is bestowed with strong industrial base. The district is having many categories of industries ranging from large scale to small scale and cottage industries. The number of different categories of industries is furnished in Table 4.14

The district has high concentration of power loom and handloom weaving, rice milling and edible oil expelling units. The other industries are tanneries, chemical and plastic products, paper products, Basic Metal Products industries, etc. The solid and liquid wastes discharged by these industries had led to severe pollution of soil, surface and ground water beside affecting human and animal health.

Table 4.14 Industries in Erode District

S.No	Particulars	Number of industry	Percentage to total
1.	Large Scale Industries	2	0.15
2.	Medium Scale Industries	95	7.29
3.	Small Scale Industries	865	66.33
4.	Cottage Industries	302	23.16
5.	New Factories	40	3.07
	Total	1304	100.00

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

The textile and food processing sectors dominate the industrial map of Erode district. Cotton textile is the leading industrial sector in this district followed by food processing sector. There are 457 cotton textile units and 437 food processing units, with a share of 37.2 per cent 35.6 per cent respectively, in the total number of industrial units in the district.

4.17 Agri Business and Marketing Facilities

For marketing of vegetables, Uzhavar santhais were established at Erode, Gobichettipalayam and Sathyamangalam. On normal days, 12 tons of vegetables arrived at Uzhavar santhai at Erode and 8 tons in other 3 markets. Besides, storage facilities are available in the Cooperative Marketing Societies and the Market Committee.

Table 4.15. Storage Facilities in Erode District

S.No	Name of the Agency	Stored goods
1	Food Corporation of India	Turmeric, Paddy, Cumbu, Ragi, Lab lab, Samai, Cotton, Tamarind, Sorghum, Jaggary, Castor, Gingelly, kodo millet, Red gram and Horse gram
2	Tamil Nadu Warehousing Corporation Ltd	
3	Tamil Nadu Civil Supplies Corporation Ltd	
4	Erode District Central Cooperative Marketing Society	
5	Erode Market Committee	
6	Tamil Nadu State Marketing Cooperation	

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

4.18 Transport and Road Facilities

From Table 4.16, it is seen that there is a well developed network of surface transport system.

Table 4.16.Transport and Communication in Erode District

(Km)

S.No.	Particulars	Road length
1.	National high ways	116.00
2.	State high ways	509.600
3.	Corporation and municipality road	1406.6
4.	Panchayat union and Panchayat road	6094.930
5.	Town Panchayat and Townships road	2171.810
6.	Major district roads	293.6
7.	Other district roads	2790.940
8.	Others (forest roads)	81.400

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

The roads are almost surfaced roads constructed by cement, concrete and black topped. Erode is well connected with Tamil Nadu State Capital Chennai by road as well as by rail.

Erode district has 345 post offices and 120 telephone exchanges, fax, e-mail / internet facilities, libraries, cinema theatres and places of worship. The infrastructure facilities in Erode district are well established, which make the transportation of agricultural produce and manufactured goods an easy task.

4.19. Self Help Groups

There are 11863 Women SHG's and 683 Men SHG's in Erode district. Women under Mahalir Thittam were linked with Bank Credit. A large number of Women SHGs were formed and engaged in savings and various other economic and social activities resulting in overall well being of the women in rural areas.

4.20. Education

Higher levels of literacy helps in transfer of latest technologies easier to enhance crop production. Hence, the details of number of educational institutions are furnished in Table 4.17.

Table 4.17. Educational Institutions in Erode District, Sathyamangalam Block and Thalavadi Block in 2005-06

(Numbers)

Sl.No.	Particulars	Sathyamangalam Block	Thalavadi Block	Erode district
1.	Arts and science colleges	1	0	22
2.	Medical college	0	0	1
3.	Engineering colleges	1	0	8
4.	Pre-primary schools	6	1	2,344
5.	Primary schools	53	45	1,533
6.	Middle schools	14	17	335
7.	High schools	8	2	158
8.	Higher secondary schools	10	4	186
9.	Teacher training institute	1	0	15
Total		94	69	4,602

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

4.21 Agricultural Research Institution

An agricultural research station is functioning from 1955 adjacent to Bhavanisagar dam, 15 km away from Sathyamangalam in Erode district on Sathyamangalam-Mettupalayam road (SH 15). The station is now known as Agricultural Research Station, Bhavanisagar. The station is been contributing mainly to help the farmers of Erode and nearby districts by producing and supplying quality seeds in cereals, pulses, oilseeds, spices-especially turmeric, vegetable crops like tomato, chilies, guards, moringa, etc. Apart from this, the

farmers are given hands on training on hybrid rice seed production and many farmers are involved in participatory seed production programmes.

The water management scheme operating in this station, train the farmers in efficient usage of water by adopting different management technologies. Intensive research is also going on in groundnut to evolve high yielding groundnut varieties. The plant clinic centre operating in the station gives periodic counseling to the farmers about the effective and timely usage of pesticides and gives remedies to the problems arising out of biotic stresses. BSR 1 amla developed in this station multiplied in larger scale and distributed to farmers.

CHAPTER V

RESULTS AND DISCUSSION

The primary data collected with respect to the stated objectives of the study were analyzed. The results, discussion and inferences are presented in this chapter under the followings sub headings.

5.1. General Characteristics of Sample Farmers
5.2. Input Use and Cost and Returns of Marigold Cultivation

5.3. Resource Use Efficiency

5.4. Extent of Uncertainty on Yield and Price in Contract Farming and Non-Contract Farming

5.5. Factors Affecting Adoption of Contact Farming in Marigold

5.6. Contractual Arrangements between Farmers and the Company in the Study Area

5.7. Constraints and Problems in Contract Farming

5.1. General Characteristics of the Respondents

The general characteristics of the sample marigold farmers include age, sex, farming experience, family details, educational status of the head of the households and other related farm and family details.

5.1.1. Family Composition of the Selected Farm Households

The details on composition of adults, children and the gender composition of the sample households are presented in Table.5.1. An analysis of results could reveal that out of the total number of contract farm family members, 81.25 per cent were adults and 18.45 per cent were children. Male adult members constituted 56.25 per cent and 25 per cent of were adult female. In the case non contract farmers 77.34 per cent were adult and

22.66 per cent were children. The male adult members constituted 45.31 per cent and 32.03 per cent were adult female. Among the former contract farmers 77.27 per cent were adult and children accounted for 22.73 per cent. The adult male members constituted 50 per cent and 27.27 per cent were adult female.

Table 5.1 Family Composition of the Selected Farm Households

(Numbers)

Sl.No	Particulars	Contract Farmer	Non-contract Farmer	Former contract Farmer	Total
1	Adults	260 (81.25)	99 (77.34)	85 (77.27)	444 (79.57)
	Male	180 (56.25)	58 (45.31)	55 (50.00)	293 (52.51)
	Female	80 (25.00)	41 (32.03)	30 (27.27)	151 (27.06)
2	Children	60 (18.75)	29 (22.66)	25 (22.73)	114 (20.43)
3	Average family size	5.33	6.4	5.5	5.74
	Total	320 (100.00)	128 (100.00)	110 (100.00)	558 (100.00)

(Numbers in parentheses indicate percentages to respective total)

Overall, 79.57 per cent of the total family members were adult and 20.43 per cent were children. Among the adults, percentage of male was comparatively higher at 52.51 per cent as compared to female at 27.06 per cent. The average family size was 5.33, 6.4 and 5.5 in the above three categories, respectively.

5.1.2. Age of Heads of Farm Households in the Study Region

The results furnished in the table 5.2 would show that about 60 per cent of the contract farm heads of the households were in the age group of above 40 years followed by the former contract farmers with 55 per cent and non contract farmers with 30 per cent. Contract farmer with less than 40 years of age accounted for 40 per cent while it was 70 per cent among non-contract farmers and 45 per cent in the case of former contract farmer. This result clearly indicated that relatively old farmers were largely involved in contract farming but in the case non contract farming participation of young farmers was high.

Table 5.2. Age of the Heads of Sample Farm Households

(Numbers)

Sl. No	Age (Years)	Contract Farmer	Non- Contract Farmer	Former Contract Farmer	Total
1	≤30	10 (16.67)	5 (25.00)	2 (10.00)	17 (17.00)
2	31-40	14 (23.33)	9 (45.00)	7 (35.00)	30 (30.00)
3	41-50	16 (26.67)	2 (10.00)	5 (25.00)	23 (23.00)
4	≥50	20 (33.33)	4 (20.00)	6 (30.00)	30 (30.00)
	Total	60 (100.00)	20 (100.00)	20 (100.00)	100 (100.00)

(Numbers in parentheses indicate percentages to respective total)

5.1.3. Sex of Heads of Sample Households

The details presented in table 5.3 would indicate that 86.67 per cent of the heads of sample households were male farmers in contract farming whereas 95 per cent of the heads of households were male farmers in non-contract farming while 90 per cent of the heads of households were male farmers among the former contract farmers.

Table 5.3. Sex of Heads of Sample Households

(Numbers)

Sl.No	Sex	Contract Farmer	Non- Contract Farmer	Former Contract Farmer	Total
1	Male	52 (86.67)	19 (95.00)	18 (90.00)	89 (89.00)
2	Female	8 (13.33)	1 (5.00)	2 (10.00)	11 (11.00)
	Total	60 (100.00)	20 (100.00)	20 (100.00)	100 (100.00)

(Numbers in parentheses indicate percentages to respective total)

All categories put together 89 per cent of heads of sample households were male farmers and only 11 per cent of heads of households were female farmers.

5.1.4. Experience of the Heads of the Sample Households in Marigold Cultivation

The experiences of the heads of the sample households in marigold cultivation are presented in Table.5.4. The results would show that among the marigold contract farmers, 91.66 per cent of the farmers had experience of ten to fifteen years in marigold cultivation followed by 5 per cent with an experience of five to ten years and 3.33 per cent with an experience of less than 5 years. The pattern was different for the non-contract farming respondents where, the heads of households having an experience of five to ten years in marigold cultivation constituted 60 per cent while 20 per cent had an experience of less than 5 years followed by 16 per cent with an experience of five to ten years. The results revealed that the contract farmers had more experience in marigold cultivation than non-contract farmers and former contract farmers.

Table 5.4. Experience of the Sample Respondents in Marigold Cultivation

(Numbers)

Sl.No	Experience with marigold (Years)	Contract farmer	Non contract farmer	Former contract farmer
1	≤5	2 (3.33)	4 (20.00)	5 (20.00)
2	5-10	3 (5.00)	13 (64.00)	15 (60.00)
3	10-15	55 (91.66)	3 (16.00)	5 (20.00)
	Total	60 (100.00)	20 (100)	20 (100)

(Numbers in parentheses indicate percentages to respective total)

5.1.5. Educational Status of Heads of Sample Households

The literacy levels of heads of households are presented in Table 5.5. It could be seen that 41.67 per cent, 20 per cent and 25 per cent of contract, non-contract and former contract marigold farmers respectively were illiterates. Overall, it was 34 per cent. The primary level educated heads of households constituted 18.33 per cent, 25 per cent and 15 per cent in the case of contract, non-contract and former contract marigold farmers. The Upper primary class level educated farmers constituted 11.67 per cent in contract marigold farming, and 25 per cent in non-contract marigold farming while they constituted 20 per cent among former contract farmers. The High school level educated farmers constituted 15 per cent in contract marigold farming and non-contract marigold farming while 10 per cent former contract farmers came under this category. The higher secondary level educated heads of households constituted 6.67 per cent, 5 per cent and 10 per cent under these three groups respectively.

Table.5.5. Educational Status of Heads of Sample Households

(Numbers)

Sl. No	Educational Status	Contract Farmer	Non- Contract Farmer	Former Contract Farmer	Total
1	Illiterate	25 (41.67)	4 (20.00)	5 (25.00)	34 (34.00)
2	Primary (Upto 5^{th})	11 (18.33)	5 (25.00)	3 (15.00)	19 19.00)
3	Upper primary class ($6\text{-}8^{th}$)	7 (11.67)	5 (25.00)	4 (20.00)	16 (16.00)
4	High school ($9 - 10^{th}$)	9 (15.00)	3 (15.00)	2 (10.00)	14 (14.00)
5	Higher secondary	4 (6.67)	1 (5.00)	2 (10.00)	7 (7.00)
6	Collegiate	4 (6.67)	2 (10.00)	4 (20.00)	10 (10.00)
	Total	60 (100.00)	20 (100.00)	20 (100.00)	100 (100.00)

(Numbers in parentheses indicate percentages to respective total)

Similarly, the college level educated farmers constituted 6.67 per cent in contract marigold farming, 10 per cent in non contract marigold farming and 20 per cent among former contract farming respectively. Out of the pooled sample, 34 per cent were illiterates, 19 per cent had primary level of education, 16 per cent went up to upper primary class, 14 per cent had high school education, 7 per cent had higher secondary education and 10 per cent were educated up to college level. Thus, after the illiterates, marigold growers with education up to high school level constituted collectively 49 per cent, indicating their status of being illiterates to the modest level of education.

5.1.6. Land Holding Pattern of Sample Farms

The land holding pattern of the sample farmers was analyzed and the results presented in Table 5.6. For the marigold contract farmers, the results showed that
48.34 per cent of the contract farmers had an area of more than two hectares followed by 33.33 per cent with an area of one to two hectares and 18.33 per cent with an area of less than one hectare.

Table 5.6. Distribution of Farms According to Land Holdings

(Numbers)

Sl. No	Land Holding (Ha)	Contract Farmer	Non- Contract Farmer	Former Contract Farmer	Total
1	≤1	11 (18.33)	2 (10.00)	4 (20.00)	17 (17.00)
2	1-2	20 (33.33)	9 (45.00)	6 (30.00)	35 (35.00)
3	2-4	9 (15.00)	5 (25.00)	6 (30.00)	20 (20.00)
4	≥ 4	20 (33.33)	4 (20.00)	4 (20.00)	28 (28.00)
5	Average farm size	2.26	2.32	1.73	2.10
	Total	60 (100.00)	20 (100.00)	20 (100.00)	100 (100.00)

(Numbers in parentheses indicate percentages to respective total)

In the case of non-contract farmers, 45 per cent each had an area of more than two hectares and one to two hectares and only 10.00 per cent had an area of less than one hectare.

In case of former contract farmer, 50 per cent of the farmers were with an area of more than two hectares followed by 30 per cent with an area of one to two hectares and 20 per cent with an area of less than one hectare. For all the farmers 17 per cent of the sample households had less than one hectare, 35 per cent had an area of one to two hectares and 48 per cent had more than two hectares. The average farm size was 2.26, 2.32, and 1.73 ha for these three categories of farmers, respectively.

5.1.7. Area Cultivated and Irrigated in the Sample Farms by Different Sources

The details on Area cultivated and irrigated in the sample farms are presented in Table 5.7. It would reveal that the net sown area (NSA) among the contract, former contract and non-contract farmers were 2.23 hectares, 2.02 hectares, and 1.70 hectares, respectively. The gross cropped area (GCA) among the contract, non-contract and former contract farmers was 2.54 hectares, 2.32 hectares, and 1.86 hectares, respectively.

Table.5.7. Area Cultivated and Irrigated in the Sample Farms

Sample farms	Area cultivated (hectare)		Area irrigated (hectare)		Cropping intensity (Per cent)	Irrigation intensity (Per cent)
	GCA	NSA	GIA	NIA		
Contract farmers	2.54	2.23	2.26	1.83	113.75	123.44
Former contract farmers	2.32	2.02	2.15	1.65	114.85	130.30
Non- contract farmers	1.86	1.70	1.73	1.20	109.71	143.90

Note: GCA = Gross Cropped Area

NSA = Net Sown Area

GIA = Gross Irrigated Area

NIA = Net Irrigated Area

In case of the irrigation intensity the net irrigated area (NIA) among the contract, non-contract and former contract farmers were 1.83 hectares, 1.65 hectares, and 1.20 hectares respectively. The gross irrigated area (GIA) among the contract, former contract and non-contract farmers was 2.26 hectares, 2.15 hectares,

and 1.86 hectares respectively. The cropping intensity worked out to 113.75, 114.85, and 109.71 respectively. The irrigation intensity worked out to 123.44, 130.30, and 143.90 respectively. It could be inferred that even while the average farm size remained relatively higher, the irrigation intensity was relatively lower in contract farm households

5.1.8. Assets Owned by Sample Farms

The compositions of assets of the sample farms are presented in Table 5.8. For the marigold contract farmers, the results showed that well formed the major part of the fixed asset and accounted for 46.43 per cent followed by sprayers, power tillers, electric motor/oil engine, and tractor which accounted for 21.43, 11.91, 10.71 and 9.52, respectively.

Table .5.8. Assets Owned by Sample Farms

(Numbers)

Sl.No	Particulars (Numbers)	Contract farmers	Non-contract farmers	Former contract farmers	Total
1.	Tractor	9 (10.71)	2 (6.91)	3 (11.54)	14 (10.07)
2.	Power tiller	8 (9.52)	4 (13.79)	5 (19.23)	17 (12.23)
3.	Wells	39 (46.43)	15 (51.72)	12 (46.15)	66 (47.48)
4.	Electric motor/ Oil engine	10 (11.91)	5 (17.24)	4 (15.39)	19 (13.69)
5.	Sprayers	18 (21.43)	3 (10.34)	2 (7.69)	23 (16.54)
Total		84 (100.00)	29 (100.00)	26 (100.00)	139 (100.00)

(Numbers in parentheses indicate percentages to respective total)

In the case of non-contract farmers, wells accounted for 51.72 per cent followed by electric motor/oil engine, power tillers, sprayers, and tractor which accounted for 17.24, 13.79, 10.34 and 6.91 per cent, respectively. Among the former contract farmers wells accounted for 46.15 per cent followed by power

tillers, electric motor/oil engine, tractor and sprayers, with 19.23, 15.39, 11.53 and 7.69 per cent, respectively. Hence, it could be concluded from the table that, well formed the major part of the total assets owned by the sample farms as it accounted for 47.48 per cent followed by sprayers, electric motor/oil engine, power tillers, and tractor with 16.54 per cent, 13.69 per cent, 12.23, and 10.07 per cent, respectively.

5.1.9. Livestock Owned by the Sample Farms

Livestock is an important source of income for farm families. Adding livestock to cropping system significantly reduces the risks associated with farm income. Further, it provides employment especially self-employment to a substantial number of rural and urban population. Hence the details of livestock population in the sample farms are presented in Table 5.9.

Table.5.9. Livestock Particulars in the Sample Farms

(Numbers)

Sl.No	Livestock Particulars	Contract Farmers	Non-Contract Farmers	Former contract Farmers	Total
1	Bullock	35 (11.40)	8 (10.39)	7 (16.28)	50 (11.71)
2	Cows	101 (32.90)	23 (29.87)	11 (25.58)	135 (31.61)
3	Buffaloes	62 (20.20)	27 (35.07)	15 (34.88)	104 (24.36)
4	Goat	50 (16.28)	8 (10.39)	4 (9.30)	62 (14.52)
5	Sheep	22 (7.17)	4 (5.19)	1 (2.33)	27 (6.32)
6	Poultry	37 (12.05)	7 (9.09)	5 (11.63)	49 (11.48)
	Total	307 (100.00)	77 (100.00)	43 (100.00)	427 (100.00)

(Numbers in parentheses indicate percentages to respective total)

It is evident from the table 5.9 that number of bullocks constituted only 11.71 per cent of all live stock owned. Cows and buffaloes formed the highest proportion in livestock as it accounted for 31.69 and 24.36 per cent followed by sheep and goat which together accounted for 20.83 per cent to the total livestock. Proportion of poultry formed 11.48 per cent to the total livestock. Hence it could

be concluded from the table that cows and buffaloes were the major livestock possessed by farmers in the study area accounting for close to 56 per cent.

5.1.10. Cropping Pattern of Sample Farms

The cropping pattern of the sample farms is presented in Table 5.10. The results could reveal that contract farms had marginally higher area under marigold with a percentage share of 29.30, followed by non contract farms with 25.22 per cent. The percentage share of maize area was higher in former contract farms with 34.62 per cent followed by contract farms (15.88 per cent) and non contract farms (3.48 per cent). Regarding ragi, former contract farmers had more area than other farms with 9.22 per cent, followed by contract farms with 1.37 per cent. Beans covered 11.52 per cent of total cropped area in contract farms followed by former contract farms with 6.05 per cent. Regarding turmeric, former contract farms had more area than other farms with 19.30 per cent, followed by non contract farms with 13.91 per cent and contract farms with 10.60 per cent. Onion crop occupied more area in contract farms (7.17 per cent) than former contract farms (6.62 per cent).

With respect to sugarcane, former contract farms had more area than other category of farms with 10.95 per cent in the total area cropped, followed by contract farms with 8.08 per cent and non contract farms with 1.45 per cent. As regards banana, non contract farmers had more area than other farms with 15.07 per cent in the total area cropped, followed by former contract farms with 9.22 per cent and contract farms with 6.33 per cent.

Tobacco and jasmine were cultivated in non contract farms with an area of 6.96 per cent and 26.09 per cent, respectively. Other crops such as sunflower, groundnut were cultivated by the sample contract farmers, which accounted for 9.83 per cent followed by 7.82 per cent of the GCA in non contract farms and 4.03 per cent in former contract farms.

The analysis revealed that marigold (23.52 per cent) was the important crop in the sample farms followed by maize (16.93 per cent), turmeric (12.68 per cent), beans (8.59 per cent), banana (8.34 per cent), sugarcane (7.44 per cent), and onion (5.84 per cent). Other crops accounted for only negligible share to the total cropped area.

Table.5.10.Cropping Pattern in the Sample Farms

(hectares)

Sl.No	Crops	Contract Farmer	Non-contract Farmer	Former contract Farmer	Total
1	Maize	51.75 (15.78)	3.00 (3.48)	30.05 (34.62)	84.80 (16.93)
2	Ragi	4.5 (1.37)	0.00 (0.00)	8.00 (9.22)	12.50 (2.50)
3	Beans	37.75 (11.52)	0.00 (0.00)	5.25 (6.05)	43.00 (8.59)
4	Marigold	96.05 (29.30)	21.75 (25.22)	0.00 (0.00)	117.80 (23.52)
5	Jasmine	0.00 (0.00)	22.50 (26.09)	0.00 (0.00)	22.50 (4.49)
6	Turmeric	34.75 (10.60)	12.00 (13.91)	16.75 (19.30)	63.50 (12.68)
7	Onion	23.50 (7.17)	0.00 (0.00)	5.75 (6.62)	29.25 (5.84)
8	Sugarcane	26.50 (8.08)	1.25 (1.45)	9.50 (10.95)	37.25 (7.44)
9	Banana	20.75 (6.33)	13.00 (15.07)	8.00 (9.22)	41.75 (8.34)
10	Tobacco	0.00 (0.00)	6.00 (6.96)	0.00 (0.00)	6.00 (1.20)
11	Others	32.25 (9.84)	6.75 (7.82)	3.5 (4.03)	42.5 (8.48)
	Total	327.8 (100.00)	86.25 (100.00)	86.8 (100.00)	500.85 (100.00)

(Numbers in parentheses indicate percentages to respective total)

5.1.11. Extent of Use of Credit Facilities by the Sample Farms

The results presented in table.5.11. would show that 76.66 per cent of the contract farmers availed institutional credit. In case of the non-contract farmers, 50 per cent availed the credit facilities from money lenders. Among the former contract farmers, 46.66 per cent of the sample households availed credit from banks and 85.00 per cent of them availed institutional credit. Thus, it could be inferred that majority of the sample farmers who were contract growers or former contract growers could get institutional finance.

Table.5.11. Extent of Use of Credit Facility by the Selected Farms

(Numbers)

Sl.No	Institution	Contract Farms	Non-Contract Farms	Former contract farms	Total
1.	Commercial banks	28 (46.66)	8 (40.0)	10 (50.00)	46 (46.00)
2.	Cooperatives	18 (30.00)	2 (10.0)	7 (35.00)	27 (27.00)
3.	Money lenders	14 (23.33)	10 (50.0)	3 (15.00)	27 (27.00)
	Total	60 (100.0)	20 (100.0)	20 (100.0)	100 (100.0)

(Numbers in parentheses indicate percentages to respective total)

5.2. Input Use and Cost of Cultivation of Marigold in Sample Farms

The use of inputs per hectare by the sample contract and non-contract farmers in marigold cultivation was worked out and the results are given in Table 5.12.

5.2.1. Input Use

The results of analysis of input use are presented in Table 5.12. On an average the quantity of inputs applied by the contract farmers per hectare was; human labour 88.97 man days, machine hour 8.08 hours, seeds 200.26 grams, N, P, and K, 154.29 kg, 67.97 kg, and 22.36 kg, respectively and manures 27.94 tonnes.

In the case non-contract farmers, human labour used was 100.01 man days, machine hour 12.50 hours, seeds 211.72grams, fertilizer nutrients such as; N, P and K 146.64 kg, 76.14 kg, and 57.79 kg, respectively and manures 19 tonnes per hectare. Thus, it could be seen that there was difference in the inputs used by the contract and non-contract farmers in marigold cultivation.

Table 5.12. Use of Inputs by Sample Farmers in Marigold Cultivation

(per hectare)

Sl.No	Particulars	Non-Contract farming	Contract farming
1	Human labour (Man days)	100.01	88.97
2	Machine power (hrs)	12.50	8.08
3	Seed (grams)	211.72	200.265
4	N (kg)	146.64	154.29
5	P (kg)	76.14	67.97
6	K (kg)	57.79	22.36
7	FYM (tonnes)	19.00	27.94

5.2.2. Variable Cost

It could be observed from the Table.5.13 that the average variable cost of the sample contract farms was Rs.36100.79 per hectare. Of the total variable cost, human labour accounted for the highest proportion of 34.50 per cent (including machine power with 7.83 per cent, it accounted for 42.33 per cent) followed by FYM which accounted for 27.09 per cent, fertilizers with 16.20 per cent and seed with 9.99 per cent. Plant protection chemicals and interest on working capital accounted for only 2.11 and 2.28 per cent of the total variable cost.

Table.5.13.Variable Cost of Cultivation of Marigold in Sample Farms

(Rs. per hectare)

Sl.No	Particulars	Contract Farm (Rs)	Non-Contract Farms (Rs)
1	Human labour	12455.80 (34.50)	13875.40 (40.01)
2	Machine labour\Animal labour	2828.00 (7.83)	4375.00 (12.61)
3	Seed	3604.77 (9.99)	4405.83 (12.70)
4	Fertilizers	5850.08 (16.20)	4031.83 (11.63)
5	FYM	9779.00 (27.09)	6650.00 (19.18)
6	PPC	760.00 (2.11)	550.00 (1.59)
7	Interest on working@7%	823.14 (2.28)	790.72 (2.28)
	Total variable cost	36100.79 (100.00)	34678.78 (100.00)

(Numbers in parentheses indicate percentage to respective total)

In the case of the sample non-contract farms, the average variable cost was Rs.34678.78 per hectare. Of the total variable cost, human labour accounted for the highest proportion with 40.01per cent (including machine power with 12.61 per cent, it accounted for 52.62 per cent) followed by FYM which accounted for 19.18 per cent, seed with 12.70 per cent and fertilizers with 11.63 percent. Other variable costs such as, plant protection chemicals, and interest on working capital accounted for 1.59 and 2.28 of the total variable cost.

Thus, it could be concluded that the human labour, manures and fertilizers were the major items of expenses for both the sample contract and non contract farmers in marigold cultivation in the study area. Seeds accounted for around 10-12 per cent of average variable cost.

5.2.3. Fixed Cost

The fixed cost imputed/incurred by the sample farmers in marigold cultivation was worked out and the results given in Table 5.14. From the table, it could be observed that the total fixed cost worked out to Rs.7655.97 per ha. Rental value for land had major share in fixed cost accounting for about 86.72 per cent while land revenue, depreciation on equipment, and interest on fixed capital constituted 4.00 per cent, 5.44 per cent and 3.84 per cent, respectively.

Table.5.14. Fixed Cost of Marigold Cultivation in Sample Farms

(Rs. per hectare)

Sl.No	Particulars	Contract farming(Rs)	Non-contract farming(Rs)
1	Rental value of the land	6639.00 (86.72)	7000.00 (85.68)
2	Land revenue	306.21 (4.00)	250.21 (3.06)
3	Depreciation	416.30 (5.44)	605.26 (7.41)
4	Interest on fixed capital @12%	294.46 (3.84)	314.21 (3.85)
	Total fixed cost	7655.97 (100.00)	8169.68 (100.00)

(Numbers in parentheses indicate percentages to respective total)

In the case of non-contract sample farmers the fixed cost worked out to Rs. 8169.68 per ha. Rental value for land had a major share in fixed cost accounting for about 85.68 per cent while land revenue, depreciation on equipment, and interest on fixed capital constituted 3.06 per cent, 7.41 per cent and 3.85 per cent, respectively.

5.2.4. Costs and Returns in Marigold Cultivation

The results of analysis of the costs and returns for the sample contract and non- contract farmers in marigold cultivation are given in Table 5.15.

It could be seen from table that the total cost of production of marigold in contract farm was Rs.43756.76 per hectare. The share of variable cost and fixed cost to the total cost of cultivation was 82.50 per cent and 17.50 per cent respectively. Gross income from marigold cultivation in contract farms was Rs. 89014.75 per ha and net income was Rs. 45257.98 per ha. Cost of production per kg was Rs. 1.35, whereas the return per kg was Rs. 2.75 and the net returns per kg was Rs. 1.39.

Table.5.15. Costs and Returns of Marigold Cultivation in Sample Farms

(Rs. per hectare)

Sl.No	Particulars	Sample contract farm Amount (Rs)	Sample non contract farm Amount (Rs)
1	Total fixed cost/ ha	7655.97 (17.49)	8169.68 (19.07)
2	Total variable cost/ha	36100.79 (82.50)	34698.78 (80.93)
3	Total cost of cultivation/ha	43756.76 (100.00)	42848.46 (100.00)
4	Average yield (tonnes/ ha)	32.37	20.50*
5	Gross income	89014.75	75400.00
6	Net income	45257.98	32551.54
7	Cost of production / kg	1.35	2.09
8	Returns/kg	2.75	3.67**
9	Net returns/kg	1.39	1.58

(Numbers in parentheses indicate percentages to respective total)

Note:

* = On average the wastage (reject)/ hectare from non-contract farmers was 12.00 tonnes

** = The average price alternatively realized was Rs.8/kg for the 8.50 tonnes sold per hectare.

In case of non-contract sample farmers the total cost of production of marigold was Rs.42848.46 per ha. The share of variable cost and fixed cost to the total cost of cultivation was 80.93 per cent and 19.07 per cent. Gross income was

Rs. 75400.00 per ha and net income was Rs. 32551.54 per ha. Cost of production per kg was Rs. 2.09, whereas the return per kg was Rs. 3.67 and the net returns per kg was Rs. 1.59. Thus, it could be concluded though the cost of cultivation was more or less same, there was considerable difference in yield (yield lower by 36.60 per cent for non-contract growers) and the quantity ultimately sold in the market by the non-contract growers was only 8.50 tonnes which was 73.74 per cent lower when compared to the yield of contract growers. However the average price actually obtained by non-contract growers was Rs.8 per kg which was helpful in compensating the yield loss and the huge amount of rejection, which was 12 tonnes per hectare. Ultimately the net income obtained by non-contract grower was lower by Rs. 12563.14 per hectare. The cost of production per kg was also relatively higher by Rs.0.73 (higher by 54.07 per cent). Inspite of the fact that for the non-contract growers the average price realization worked out to be relatively higher at Rs.3.68/kg, the contract growers ultimately ended up earning higher net income as a result of higher yield and non-rejection of the produce, even when the cost of cultivation remained marginally higher.

5.3. Resource Use Efficiency

5.3.1. Resource Use Efficiency of Marigold Cultivation in Sample Contract Farms

Cobb-Douglas type production function was fitted for finding the efficiency of the resources used by the farmers in sample contract farms based on the 'F' stastic.
The variables included were, farm yard manure in tonnes per hectare, Nitrogen, phosphorus and potash fertilizer nutrients measured in kg per hectare, seeds measured in grams per hectare, plant protection chemicals in terms of rupee per hectare, machine power used measured in machine hours per hectare (animal power used also converted into machine power based on hire rate) and number of irrigation per crop season and labour measured in man days per hectare. The details of results of zero order correlation matrix are presented in Table 5.16 and the results of estimated Cobb-Douglas production function of marigold cultivation in sample contract farms are presented in Table 5.17.

5.3.2. Zero Order Pair wise Correlation Matrix

The estimated correlations are presented in the Table 5.16. It could be seen from the table that the correlation between the yield and nitrogen, phosphorus, potash, machine power use and human labour were positive and ranged between 0.50 and 0.84. Whereas, the correlation between yield and fym, plant protection chemicals and irrigation happened to be less than 0.50 and ranged between 0.10 and 0.47. The correlation between yield and seed was the least at 0.10. With the exception of the N, P, and K nutrients, the correlation among other independent variables (among these and with N,P and k nutrients) ranged only between -0.008 and 0.54 implying absence of multicollinerarity.

Table 5.17. Resource Use Efficiency of Marigold Cultivation in Sample Contract Farms- Results of OLS Regression (Log-Log model)

Sl.No	Variables	Regression Co-efficient	Standard Error	P-value	t- Statistic
1	Intercept	0.017765	0.551609	0.974436	0.032206
2	FYM (kg./ha.)	0.067049**	0.030029	0.030066	2.232851
3	Nitrogen (kg./ha.)	0.063285	0.047949	0.192904	1.319826
4	Phosphorus (kg./ha)	0.045268	0.053046	0.397515	0.853385
5	Potassium (kg./ha)	0.14036***	0.043539	0.00223	3.22376
6	Seed (g/ha)	0.15895***	0.062581	0.014241	2.539937
7	Plant Protection Chemicals (Rs/ha.)	0.090014**	0.043286	0.042715	2.079541
8	Machine hours	0.068561**	0.033651	0.04692	2.037394
9	Number of Irrigation	0.170695***	0.068168	0.015587	2.504028
10	Labour (man days)	0.082301*	0.054192	0.13514	1.518687

Note:

Number of observations = 60
R Square = 0.80
Adjusted R square =0.77
F – Value = 23.44
*** - Significant at one percent level
**- Significant at five percent level
*- Significant at fifteen percent level

It could be seen from the Table 5.17 that the coefficient of multiple determination (adjusted R^2) was 0.77 which indicated that the production function model could explain 77 per cent of the variation in the yield as influenced by the explanatory variables included in the model. The higher significant 'F' value at 23.44 implied the goodness of fit.

The inputs namely potassium, seeds, and irrigation had a positive and significant influence at one per cent level indicating that one per cent increase in use of potassium, seeds, and irrigation would result in an increase of yield by 0.14, 0.15 and 0.17 per cent from the geometric mean level. Similarly, farm yard manure, plant protection chemicals and machine hours had at positive and significant influence at five per cent level indicating that one per cent increase in use of farm yard manure, plant protection chemicals and machine power would result in an increase of yield by 0.06, 0.09 and 0.06 per cent. The use of human labour had a significant influence at 15 per cent level indicating that one per cent increase in use of human labour would result in an increase of yield by 0.08 per cent. The sum of coefficients at 0.85 would indicate the decreasing returns to scale. The variables namely N and P though had larger coefficients, still these were non-significant.

5.3.3. Technical Efficiency of Marigold in Sample Contract Farms

The technical efficiency of the sample farms in the production of marigold in sample contract farms was worked out by adopting Maximum Likely-hood estimation (MLE) method using Stochastic Frontier Production function. The stochastic frontier production function model specified by Battese and Coelli (1995) was used to estimate technical efficiency of marigold in the sample farms selected for the study.

A computer program FRONTIER version 4.1 developed by Tim Coelli, Centre for Efficiency and Productivity Analysis, University of New England, Austria, was used for the estimation of Stochastic Frontier Production Function. The estimated stochastic frontier production function for marigold in Erode district by using maximum likelihood method is furnished in Table 5.18.

It could be observed from the table that the mean technical efficiency (MTE) was 99 per cent. It is evident from the analysis that the participant marigold sample contract farmers are highly technically efficient. It might be due to the regular monitoring, adequate and timely guidance provided by the field staff starting of the contract firm from the nursery preparation to the harvesting stage.

Table 5.18 Technical Efficiency of Marigold cultivation in Sample Contract Farms

Sl. No.	Variables	Regression coefficient	t-ratio
1.	Intercept	0.017	0.033
2.	FYM (Kg./ha.)	0.067**	2.22
3.	Nitrogen (Kg./ha.)	0.063	1.36
4.	Phosphorus (kg./ha)	0.045	0.87
5.	Potassium (kg./ha)	0.140***	3.25
6.	Seed (g/ha)	0.15***	2.74
7.	Plant Protection Chemicals (Rs/ha.)	0.090**	2.11
8.	Machine hours	0.068**	2.12
9.	Number of irrigation	0.170***	2.60
10.	Labour (man days)	0.082*	1.61
11.	Sigma-square (σ^2)	0.004	3.88
12.	Gamma (γ)	0.0008	3.36
13.	Mean technical efficiency (%)	99	

5.3.4. Economic Efficiency in Use of Inputs in Cultivation of Marigold by Contract Farmers

To evaluate the economic efficiency of resource use, marginal value productivity (MVPs) for the significant explanatory variables were worked out and compared with the unit cost of the respective resource (MFC). Thus the MVP was worked out for inputs such as farm yard manure, potash, seeds, plant protection chemicals, machine power, and human labour.

It could be seen from the table 5.19 that the ratio between MVP and MFC of potassium, seeds, plant protection chemicals, and machine hours were more than one. It indicated that the use of these resources are at sub optimum level and there exists a possibility for enhancing the yield by increasing the use of these inputs from the current level. The ratios were less than one at 0.61 and 0.51 for farm yard manure and human labour indicating overuse of these inputs and the need for reduction.

Table 5.19 Economic Efficiency in Use of Inputs in Cultivation of Marigold by Contract Farmers

Variables	Regression coefficient	MPP	MVP (Rs.)	MFC (Rs.)	MVP ------ MFC
FYM	0.067049	0.077662	213.57	350	0.61
Potassium	0.14036	0.204154	561.42	15	37.42
Seed	0.158953	25.72575	70745.81	18000	3.93
Plant Protection Chemicals	0.090014	10.42267	10.42267	1	10.42
Machine power	0.068561	0.277406	762.8675	350	2.17
Human labour	0.082301	0.0299	82.34	160	0.51

5.4.1. Price Expectation in the Sample Farms

The price expectations in marigold farming by the sample farmers are presented in Table.5.20. The results showed that among the marigold contract farmers, 58.33 per cent reported price expectation in the range of Rs.5 to 7.5 per kg, followed by 25 per cent reporting expectation of more than Rs.7.5 per kg followed by 16.67 per cent expecting price in the range of Rs.2.75 to 5.00.

In case of the non-contract farmers, 80.00 per cent of the farmers expected the price to be more than Rs.7.5 followed by 20 per cent expecting between Rs.5.00 to 7.50. Among the former contract farmers also, 50.00 per cent expected a price in the range of Rs.5.00 to 7.50 per kg followed by 30.00 per cent expecting more than Rs. 7.50 and 10.00 per cent expecting between Rs.2.75 and Rs.5.00. Thus, it could be concluded that price expectations from the non-contract farmers happened to be very high than contact farmers. This was due to fact that even when the produce was affected by rain, pest and disease or poor quality, all the produce was procured by the firm in contract farming where as in non-contract farming only fresh, good quality produce was only procured in the open market. However, in the case of either present contract growers, most farmers had a moderate expectation of Rs.5.00 to 7.50 per kg as the buyer is known and as all the flowers were purchased.

Table 5.20. Price Expectation among the Sample Marigold Growers

(Numbers)

Sl.No	Price (Rs)	Contract farmer	Non contract farmer	Former contract farmer	Total
1	2.75-5	10 (16.67)	0 (00.00)	4 (20.00)	14 (14.00)
2	5-7.5	35 (58.33)	4 (20.00)	10 (50.00)	49 (49.00)
3	>7.5	15 (25.00)	16 (80.00)	6 (30.00)	37 (37.00)
	Total	60 (100.00)	20 (100)	20 (100)	100 (100)

(Numbers in parentheses indicate percentage to respective total)

5.4.2. Yield Uncertainty Ratios of Marigold Sample Farms

The yield uncertainty ratios for marigold in sample farms are presented in Table.5.21. It could be seen from the table that the yield uncertainty was lower in the case of contract farmers, which was 0.57. In the case of non-contract farmers, it was comparatively higher at 0.70.

Table 5.21. Yield Uncertainty Ratios of Marigold Cultivation in Sample Farms

(tonnes/hectare)

Sl. No	Particulars	Highest Probable Yield	Most Probable Yield	Lowest Probable Yield	Yield Uncertainty Ratio
1.	Contract Farm	43.74	34.02	24.30	0.57
2.	Non-Contract farm	31.59	20.65	17.01	0.70

Thus, the contract farmers had less yield uncertainty than that of non-contract farmers, which was due to steady technical guidance by the field executives of the processing firm.

5.4.3. Price Uncertainty Ratios of Marigold Sample Farms

The price uncertainty ratios for marigold cultivation for the sample farms are presented in Table.5.22. In the case of contract farmers there was no price uncertainty due to fixed procurement price paid by the firm. In the case of non- contract farmers, the price uncertainty ratio was high at 1.62. Thus, it could be concluded that there was no price uncertainties in contract farmers whereas there was high price uncertainties in the case of non-contract farmers.

Table 5.22. Price Uncertainty Ratios of Marigold Sample Farms

(Rs/kg)

Sl.No	Particulars	Highest Probable price	Most Probable price	Lowest Probable price	Price Uncertainty ratio
1.	Contract framers	2.75	2.75	2.75	0.00
2.	Non-Contract farmers	18	8	5	1.62

5.5. Factors Determining the Participation of Farmers in the Contract Farming – Results of Probit Model

The factors determining the participation of farmers in the contract farming were analysed using Probit Function. Data were analysed using the package Limdep 7.0 and the results presented in Table 5.23.

Table 5.23 Factors Determining the Participation of Farmers in the Contract Farming – Results of Probit Model

Sl. No	Variables	Regression Co-efficient	Standard Error	'P'value	't'satistic
1.	Intercept	-0.900723	0.837523	0.2822	-1.075
2.	Age of head of household	-0.015941	0.017076	0.3505	-0.934
3.	Education level of head of household	0.003590	0.043195	0.9338	0.083
4.	Total land holdings(ha)	-0.003329	0.118056	0.9775	0.028
5.	Experience in contract farming	0.075568**	0.044087	0.0888	1.702
6.	Total returns from marigold	0.000012**	0.000006	0.0752	1.779
7.	Fixed price	0.743489***	0.359532	0.0386	2.068

Note:

Number of Observations = 80

R Square = 0.24

Adujusted R^2 = 0.18

*** = Significant at one percent level

** = Significant at five percent level

The results of the Probit model indicated that fixed price, experience in contract farming and total returns from marigold were the most significant factors

influencing the farmers participation in contract farming. As the total returns from marigold increased by one per cent, the probability of participation of farmers in contract farming increased by 0.000012 per cent and if the experience of farmers increased by one percent, the probability of participation increased by 0.075568 per cent. However, when fixed price for the produce would increase by one per cent, the probability of participation of farmers in contract farming would increase by 0.743489 per cent.

5.6. Contractual Arrangements

The various aspects relating to contract cultivation of marigold such as; prevailing arrangements, farmers attitude towards the crop, field staff, and the company were analysed and the results were presented in the Table 5.24.

It could be observed that 53.33 per cent of the contract sample farmers were introduced to the crop by the company staff and 35 per cent by friends and relatives. Only 11.67 per cent of the farmers took up the marigold cultivation after knowing its advantages through neighboring farmers.

In the case of former contract sample farmers, 85.23 per cent of the contract sample farmers were introduced to the crop by the company staff and 14.77 per cent by friends and relatives. Invariably, all the farmers in the all villages of the study revealed that the type of agreement between them and the company was written.

The frequency of field visits by the staff of the company varied as 58.34 per cent of the farmers reported visit by the field staff once in a week, 23.33 per cent reported of visits twice a week, 18.33 per cent reported visits once in fifteen days. In case of former contract farmers 76.67 per cent reported visits by the field staff once in a week, 15.00 per cent reported visits twice a week, 3.3 per cent of the farmers reported visits once in two days. It could be inferred that mostly the field staff visited the contract growers once in a week and the frequency had seen to increase to twice a week in recent years to a considerable number of farms.

Table 5.24. Nature of Contract Reported by Contract Farmers and the Former Contract Farmers with the firm in the Study Area

S.No	Particulars	Contract farmer	Former contract farmer
1.	Total samples (Numbers)	60	20
2.	Introduced to the crop by		
	Company staff	53.33	85.23
	Fellow farmers	11.67	14.77
	Friends and relatives	35.00	0.00
	Others	0.00	0.00
3.	Types of agreement		
	Written	100.00	100.00
	Oral	0.00	0.00
4.	Frequency of field visits by field officers		
	Daily	0.00	0.00
	Once in 2days	3.00	3.33
	Twice in week	23.33	15.00
	Once in a week	58.34	76.67
	Once in 15 days	15.00	5.00
5.	Satisfaction with company		
	Satisfied	96.67	100.00
	Unsatisfied	3.33	0.00
6.	Interested to contract again		
	Yes	78.25	16.24
	No	21.75	83.67
7.	Successive marigold crop on		
	Same piece of land	26.33	20.00
	Other areas	83.67	80.00
8.	Successive marigold crop with same contractor or new contractor		
	Old	100.00	100.00
	New	0.00	0.00

Among the contract farmers, 96.67 per cent reported satisfaction with the terms of agreement, whereas only 3.33 per cent of the farmers were not satisfied with the terms of agreement. In the case of

former contract farmers 100.00 per cent of the farmers reported satisfaction with the terms of agreement but they stopped contact mainly due to low price for their produce.

More than 78.25 per cent of the contract farmers were interested to contract again whereas 21.75 per cent of them did not express interests to contract again, as most of these farms were located in remote areas and agents do not visit frequently these farms and also delay in disbursal of money by the Agents.

However, among former contract farmers, 83.76 per cent were interested to contract again whereas, only 16.24 per cent of them were not interested to contract again. Further, most of the farmers (82 per cent) indicated that they were willing to grow marigold again, if the company increases the purchase price to Rs 5/kg.

More than 83.67 per cent of the contract farmers would grow a different crop in the same plot where marigold crop was cultivated. However, 16.33 per cent of them would grow the marigold crop in the same piece of land season after season. In case of the former contract farmers more than 80.00 per cent of the farmers would grow a different crop in the same plot where marigold crop was cultivated. However, 20.00 per cent of farmers would grow the marigold crop in the same piece of land. All the sample farmers mentioned that in the case of contract again, they would contract to the same company not a new company.

There fore, it could be inferred that over years, farmers participating in contract cultivation of marigold without efforts of the company seemed to increase, most or all the farmers were satisfied with terms of contract, and majority of them wanted to continue the contract cultivation, that too with the same company. Regular visits by the Agents and timely disbursal of sale realization beside increase in contract price will encourage the rest of the farmers also to continue contract cultivation. The farmers reported no adverse effect to succeeding crop, however no one cultivated marigold again in the immediate next season in the same piece of land. Either they raised a different crop or left the land fallow.

5.7.1. Benefits in Contract Farming of Marigold

The benefits of marigold cultivation under contract farming were ranked by the sample farmers using Garrett's ranking technique and the details presented in Table 5.25.

Table.5.25. Benefits in Contract Farming of Marigold

S.No.	Problems	Garrett's score	Rank
1	Assured buyer	73.77	I
2	No rejection of produce	61.34	II
3	Farm gate collection	58.37	III
4	Timely payment	45.20	IV
5	Pre fixed price	37.61	V
6	Technical advice availability	33.74	VI

It could be seen from the table that the major benefits were assured buyer for the produce, no rejection of produce which would indicate that though there was damage and poor quality of produce, all the produce were procured by the firm, and the farm gate collection. Other benefits were timely payment, pre fixed price, and technical advice availability for growing marigold.

5.7.2. Problems in Contract Cultivation of Marigold

The problems faced by contract farmers in contract farming were ranked by Garrett's ranking technique and are presented in Table 5.26.

In the order of the Garrett score ranking, the problems encounted by the contract growers were low price for the produce, followed by labour scarcity during the peak season (mainly harvesting time), harvesting the produce which is staggered over a period of 8-9 weeks, and non provision of advance by the firm for growing marigold.

Table 5.26. Problems in Contract Cultivation of Marigold

S.No.	Problems	Garrett's score	Rank
1	Low price for the produce	63.73	I
2	Non availability of labour	54.98	II
3	Problem in harvesting the produce	46.30	III
4	No advance provided by the firm	37.53	V

5.7.3. Problems in Non Contract Cultivation of Marigold

The problems in cultivating marigold under non contract farming are listed out in Table 5.27. In the order of the Garrett score ranking, rejection of the produce in the market topped the list of problems. It was due to the fact that in open market only good quality and fresh flowers were procured. This was followed by price fluctuation, poor quality inputs and labour scarcity during the peak season (mainly harvesting time). The other problems reported were marketing, particularly transport to carry the produce to the market place and lack of technical advice in cultivating marigold. This would imply that the problems were few in contract cultivation compared non-contract cultivation of marigold.

Table.5.27. Problems in Non Contract Cultivation of Marigold

Sl.No.	Problems	Garrett's score	Rank
1	Rejection of the produce	60.19	I
2	Price fluctuation	58.56	II
3	Poor quality of inputs	53.27	III
4	Non availability of labour	50.14	IV
5	Marketing the produce	48.68	V
6	Lack of technical advice	47.31	VI

5.7.4. Proportion of Contract Crop Diverted to Open Market by Sample Farms

The Proportion of contract crop diverted to open market by sample farms growing marigold are presented in Table.5.28.

The results presented in table 5.28 showed that among the marigold contract farmers, 41.66 per cent diverted 16-20 per cent of the produce to open market
followed by 21.67 per cent of the farmers diverting 21-25 per cent of their produce,
16.67 per cent diverting six to ten per cent of their produce, 11.67 per cent diverting
11-15 per cent of their produce followed by 8.33 per cent diverting more than twenty five per cent of the produce. Among former contract-growers, diversion of produce ranged between 5 and 25 per cent and most growers (50 per cent) diverted only 5-10 per cent of the produce followed by 25.00 per cent of the farmers diverting 11-15 per cent of their produce, 15.00 per cent diverting 21-25 per cent of their produce and 10.00 per cent diverting16-20 per cent of their produce.

Table 5.28. Proportion of Contract Crop Diverted to Open Market by Sample Farms

Sl.No	Percentage of produce diverted	No.of Contract farmers diverting produce	No.of Former contract farmer who diverted produce	Total
1	5-10	10 (16.67)	10 (50.00)	20 (25.00)
2	11-15	7 (11.67)	5 (25.00)	12 (15.00)
3	16-20	25 (41.66)	2 (10.00)	27 (33.75)
4	21-25	13 (21.67)	3 (15.00)	16 (20.00)
5	>25	5 (8.33)	0 (0.00)	5 (6.25)
	Total	60 (100.00)	20 (100.00)	80 (100.00)

(Numbers in parentheses indicate percentages to respective total)

On an average the contact farmers diverted 20.45 per cent of their produce to open market. In the case of former contract farmers 11.75 per cent of their produce alone was diverted to open market. It is inferred that progressively larger quantities are diverted to open market probably due to continued lower price paid by the firm and falling yield levels.

5.7.5. Reasons for Former Contract Farmers Discontinuing Contract Cultivation of Marigold

The reason for former contract farmers stopping contract cultivation was analyzed using Garrett's ranking technique and the details presented in Table 5.29.

The most important reason given by the former contract farmers for discontinuing cultivation of marigold on contract was low price for the produce followed by labour shortage and declining profit as a result of increasing cost of cultivation and continued low price. Absence of financial assistance by the firm, the company not offering contract as a result of farmers doing malpractice by adding sand in the produce to increase the weight in yield and diverting some of the produce to open market and risk of exploitation by intermediary (agents) by delaying the payment to farmer and diversion of seed. Thus, it could be inferred that the payment should be made directly by the company to the farmer as against the current practice of paying through the Agent besides enhancing price. The price increased from Rs.1.25 per kg some 15 years back to only Rs.2.75 per kg, even while the market price ranged between Rs.5.00 and Rs.8.00 and the yield has been declining from an average of 40 tonnes/hectare earlier to 32 tonnes/hectare currently.

Table 5.29. Reasons for Former Contract Farmers Discontinuing Contract Cultivation of Marigold

Sl.No.	Problems	Garrett's score	Rank
1	Low price for the produce	66.20	I
2	Labour shortage	55.70	II
3	Declining profits	51.45	III
4	Non provision of advance by firm	46.90	IV
5	Company did not offer contract as a result of produce diversion / malpractices	35.26	V
6	Risk of exploitation of intermediary(Agent)	28.53	VI

CHAPTER VI

SUMMARY AND CONCLUSION

In this chapter, a brief report of work undertaken and the results obtained are summarized along with the conclusions and policy options.

A study was undertaken with an overall objective to make an economic analysis of contract farming in marigold in Erode district of Tamil Nadu. The specific objectives a were; (1) to examine the cost and returns of the cultivation of marigold under contract farming vis-à-vis non contract farming in marigold, (2) to estimate the resource use efficiency and technical efficiency in marigold cultivation under contract farming, (3) to analyze the factors that motivated the farmers for raising marigold crop under Contract Farming, (4) to find out the extent of uncertainty on yield and price in contract farming and non-contract farming and to identify the constraints in these faming, and (5) to suggest policy measures to promote contract farming for sustainable increase in production and income of marigold farmers.

Sampling

In Erode district, the revenue villages having marigold under contract farming were listed out in liasion with the contracting firm. Subsequently, the revenue villages namely; Thiginarai from Thalavadi block and Kuthiyalathur from Sathyamangalam block were selected randomly. Contract farmers, Non-Contract farmers and Former Contract farmers numbering 60, 20 and 20, respectively constituting a total sample size of 100 were selected.

Both primary and secondary data were collected for the study. The primary data required for the study were collected through personal interview method with the help of a comprehensive interview schedule. The data collected were tabulated, processed and subjected to statistical analysis.

Family Composition of the Selected Farm Households

Overall, 79.57 per cent of the total family members were adult and 20.43 per cent were children. Among the adults, percentage of male was comparatively higher at 52.51 per cent as compared to female at 27.06 per cent. The average family size was 5.33, 6.4 and 5.5 respectively, in the three categories namely contract, non-contract, and former contract growers of marigold.

Age of the Heads of the Sample Farm Households

The result would show that about 60 per cent of the heads of the contract farm heads of the households were in the age group of above 40 years followed by the former contract farmers with 55 per cent and non contract farmers with 30 per cent

Sex of Heads of Sample Households

For all the three categories put together, 89 per cent of heads of sample households were male farmers and only 11 per cent of heads of households were female farmers.

Experience of the Sample Respondents in Marigold Cultivation

The number of sample marginal farmers with 10-15 years of experience was the highest and accounted for 91.66 per cent in contract farming while in non-contract farming and former contract farming sample households the heads of households having an experience of 5-10 years accounted for 60 per cent.

Educational Status of Heads of Sample Farm Households

In the pooled sample, 34 per cent of the heads of households were illiterate, 19 per cent had primary level of education, 16 per cent had upper primary level of education, 14 per cent had high school education, 7 per cent had higher secondary education and 10 per cent were educated upto college level.

Land Holding Pattern of Sample Farms

The average farm size for contract, non-contract, and former contract farms, was 2.26, 2.32, and 1.73 hectares, respectively.

Cropping Intensity and Irrigation Intensity in the Sample Farms

The cropping intensity was highest in former contract farms with 114.85 per cent followed by contract farms with 113.75 per cent and non-contract farms with 109.71 per cent. The irrigation intensity was the highest in non contract farmers with 143.90 per cent followed by former contract farms with 130.30 per cent and contract farms with 123.44 per cent.

Asset Owned by Sample Farms

Well formed the major part of the total assets owned by the sample farms as it accounted for 47.48, followed by sprayers, electric motor/oil engine, power tillers, and tractor with 16.54 per cent, 13.69 per cent, 12.23, and 10.07 per cent, respectively.

Cows and buffaloes formed the highest proportion in livestock and accounted for 31.69 and 24.35 per cent followed by sheep and goat which together accounted for 20.83 per cent and poultry formed 11.47 per cent to the total livestock. Number of bullocks constituted only 11.70 per cent of all livestock owned.

Cropping Pattern of Sample Farms

Marigold (23.52 per cent) was the important crop in the sample farms followed by maize (16.93 per cent), turmeric (12.68 per cent), beans (8.59 per cent), banana (8.34 per cent), sugarcane (7.44 per cent), and onion (5.84 per cent). Other crops accounted for only negligible share to the total cropped area.

Extent of Use of Credit Facilities by the Selected Farms

Among contract farmers show 76.66 per cent avail institutional credit. In case of the non-contract farmers, 50 per cent availed the credit facilities from money lenders. Among the former contract farmers, 46.66 per cent availed credit from banks and totally 85.00 per cent of the farmers availed institutional credit.

Use of Inputs by Sample Farmers

On an average the quantity of inputs applied by the contract farmers per hectare was; human labour 88.97 man days, machine power 8.08 hours, seeds 200.26 grams, N, P, and K, 154.29 kg, 67.97 kg, and 22.36 kg, respectively and manures 27.94 tonnes. In the case non-contract farmers, human labour used was 100.01 man days, machine hour 12.50 hours, seeds 211.72 grams, fertilizer nutrients such as; N, P and K 146.64 kg, 76.14 kg, and 57.79 kg, respectively and manures 19 tonnes per hectare.

Variable Cost in Cultivation of Marigold in Sample Farms

The average variable cost of the sample contract farmers was Rs.36100.79 per hectare. Of the total variable cost, human labour accounted for the highest proportion of 34.50 per cent (including machine power with 7.83 per cent, it accounted for 42.33 per cent) followed by FYM, seeds, and fertilizers with 27.09 per cent, 16.20 per cent and 9.99 per cent, respectively. Plant protection chemicals and interest on working capital accounted for only 2.11 and 2.28 per cent of the total variable cost.

In the case of the sample non-contract farmers, the average variable cost was Rs.34678.78 per hectare. Of the total variable cost, human labour accounted for the highest proportion with 40.01per cent (including machine power with 12.61 per cent, it accounted for 52.62 per cent) followed by FYM, seeds and fertilizers with 19.18 per cent, 12.70 per cent with 11.63 per cent, respectively. Other variable costs such as; plant protection chemicals, and interest on working capital accounted for 1.59 and 2.28 of the total variable cost.

Fixed Cost in Cultivation of Marigold in Sample Farms

The total fixed cost worked out to 7655.97 per ha. Rental value for land had major share in fixed cost accounting for about 86.72 per cent while land revenue, depreciation on equipment, and interest on fixed capital constituted 4.00 per cent, 5.44 per cent and 3.84 per cent, respectively. In the case of non-contract sample farmers, the fixed cost worked out to Rs.8169.68 per ha. Rental value for land had a major share in fixed cost accounting for 85.68 per cent while land revenue, depreciation on equipment, and interest on fixed capital constituted 3.06 per cent, 7.41 per cent and 3.85 per cent, respectively.

Cost and Returns of Marigold Cultivation in Sample Farms

The average total cost of cultivation of marigold in contract farms was Rs.43756.76 per ha. The share of variable cost and fixed cost to the total cost of cultivation was 82.50 per cent and 17.50 per cent, respectively. Gross income from marigold cultivation in contract farms was Rs.89014.75 per ha and net income
was Rs.45257.98 per ha. The yield per hectare was 32.36 tonnes. Cost of production per kg was Rs.1.35, whereas the return per kg was Rs.2.75 and the net returns per kg was Rs.1.39.

In the case of non-contract sample farmers the total cost of production of marigold was Rs.42848.46 per ha. The share of variable cost and fixed cost to the total cost of cultivation was 80.83 per cent and 19.07 per cent. The yield per hectare was 20.50 tonnes. Gross income was Rs.75400.00 per ha and net income was Rs.32551.54 per ha. Cost of production per kg was Rs.2.09, whereas the return per kg was Rs.3.68 and the net return per kg was Rs.1.58. Thus, it could be concluded though the cost of cultivation was more or less same, there was considerable difference in yield (yield lower by 36.60 per cent for non-contract growers) and the quantity ultimately sold in the market by the non-contract growers was only 8.50 tonnes which was 73.74 per cent lower when compared to the yield of contract growers. However the average price actually obtained by

non-contract growers was Rs.8 per kg which was helpful in compensating the yield loss and the huge amount of rejection, which was 12 tonnes per hectare. Ultimately the net income obtained by non-contract grower was lower by Rs.12563.14 per hectare. The cost of production per kg was also relatively higher by Rs.0.73 (higher by 54.07 per cent).

Resource Use Efficiency of Marigold Cultivation in Sample Contract Farms

The production function analysis would show that the inputs namely potassium, seeds, and irrigation had a positive and significant influence at one per cent level indicating that one per cent increase in use of potassium, seed, and irrigation would result in an increase of yield by 0.14, 0.15 and 0.17 per cent from the geometric mean level. Similarly, farm yard manure, plant protection chemicals and machine hours had at positive and significant influence at five per cent level indicating that one per cent increase in use of farm yard manure, plant protection chemicals and machine hours would result in an increase of yield by 0.06, 0.09 and 0.06 per cent. The use of human labour had a significant influence at 15 per cent level indicating that one per cent increase in use of human labour would result in an increase of yield by 0.08 per cent. The sum of coefficients at 0.85 would indicate the decreasing returns to scale. The variables namely N and P though had larger coefficients, still these were non-significant.

Technical Efficiency of Marigold Cultivation in Sample Contract Farms

The technical efficiency of the sample farms in the production of marigold in sample contract farms could reveal that the mean technical efficiency (MTE) was 99 per cent. It is evident from the analysis that the participant marigold sample contract farmers are highly technically efficient. It might be due to the regular monitoring, adequate and timely guidance provided by the field staff of the contract firm from the nursery preparation to the harvesting stage.

Economic Efficiency in Use of Inputs in Cultivation of Marigold by Contract Farmers

The ratio between MVP and MFC of fertilizer nutrient potassium, seeds, plant protection chemicals, and machine hours were more than one. It indicated that the use of these resources are at sub optimum level and there exists a possibility for enhancing the yield by increasing the use of these inputs from the current level. The ratios were less than one at 0.61 and 0.51 for farm yard manure and human labour indicating over use of these inputs and the need for reduction.

Price Expectation in the Sample Farms

The results showed that among the marigold contract farmers, 58.33 per cent expected price in the range of Rs.5 to 7.5 per kg, followed by 25 per cent reporting expectation of more than Rs.7.5 per kg followed by 16.66 per cent expecting in the range of Rs.2.75 to 5.00 per kg.

In case of the non-contract farmers, 80.00 per cent of the farmers expected the price to be more than Rs.7.5 followed by 20 per cent expecting Rs.5 to 7.5. Among the former contract farmers also, the most (50 per cent) expected a price was Rs.5 to 7.5 per kg followed by 30.00 per cent expecting more than Rs.7.50 and 10.00 per cent expecting between Rs.2.75 and Rs.5.00 per kg.

Yield Uncertainty Ratios of Marigold Sample Farms

The yield uncertainty ratio for marigold in sample farms was lower in the case of contract farmers, which was 0.57. In the case of non-contract farmers, it was comparatively higher at 0.70.

Price Uncertainty Ratios of Marigold Sample Farms

The price uncertainty ratio of marigold for the contract farm was zero due to fixed procurement price paid by the firm and there was no room for higher or lower price expectations. In the case of non- contract farmers, the price uncertainty ratio was high at 1.62.

Reasons for Former Contract Farmer Discontinuing Contract Cultivation of Marigold

The most important reason given by the former contract farmers for discontinuing cultivation of marigold on contract was low price for the produce followed by labour shortage and declining profit due to poor yield and continued low price. Other reasons were, absences of financial assistance by firm, the company not offering contract as a result of farmers doing malpractice by adding sand in the produce to increase the weight in yield and diverting some of the produce to open market and risk of exploitation by intermediary (agents) by delaying the payment to farmer and diversion of seed.

Proportion of Contract Crop Diverted to Open Market by Sample Farms

On an average the contact farmers diverted 20.45 per cent of their produce to open market. In the case of former contract farmers 11.75 per cent of their produce was diverted to open market.

Factors Determining the Participation of Farmers in the Contract Farming

The most significant factors influencing the farmers participation in contract farming happened to be fixed price, experience in contract farming and total returns from marigold cultivation. As the total returns from marigold increased by one per cent, the probability of participation of farmers in contract farming increased by 0.0000046 per cent and if the experience of farmers is increased by one percent, the probability of participation is increased by 0.022573 per cent. Similarly, when fixed price for the produce increased by one per cent, the probability of participation of farmers in contract farming is increased by 0.22573per cent.

Contractual Arrangements

It could be observed that 53.33 per cent of the contract sample farmers were introduced to the crop by the company staff and 35 per cent by friends and relatives. Only 11.67 per cent of the farmers took up the crop cultivation after knowing its advantages through neighboring farmers. In the case of former contract sample farmers 85.23 per cent of the contract sample farmers were introduced to the crop by the company staff and 14.77 per cent by friends and relatives. Invariably, all the farmers in the all villages of the study revealed that the type of agreement between them and the company was written.

Among the contract sample farmers, 58.34 per cent of the farmers were visited by the field staff once in a week, 23.33 per cent of the farmers were visited twice a week, 18.33 per cent of the farmers were visited once in fifteen. In the case of former contract farmers 76.67 per cent of the farmers were visited by the field staff once in a week, 15.00 per cent of the farmers were visited twice a week, 8.33 per cent of the farmers were visited once in fifteen days.

Among the contract farmers, 96.67 per cent were satisfied with the terms of agreement, whereas only 3.33 per cent of the farmers expressed non-satisfaction. In the case of former contract farmers, 100.00 per cent of the farmers were satisfied with the terms of agreement but they stopped contact mainly due to low price for their produce. Further, most of the farmers (82 per cent) indicated that they were willing to grow marigold again, if the company increases the purchase price to Rs 5/kg.

Benefits in Contract Farming

The benefits of marigold cultivation under contract farming were assured buyer for the produce, no rejection of produce and the farm gate collection of the produce by the firm. Other benefits were timely payment, pre fixed price, and technical advice availability for growing marigold.

Problems in Contract Cultivation of Marigold

The problems encounted by the contract growers were low price for the produce, labour scarcity during the peak season (mainly harvesting time), harvesting the produce which is staged over a period of 8-9 weeks and non provision of advance by the firm for growing marigold.

Problems in Non Contract Cultivation of Marigold

In the order of the Garrett score ranking, rejection of the produce in the market topped the list of problems. It was due to the fact that in open market only good quality and fresh flowers were procured. This was followed by price fluctuation, poor quality inputs and labour scarcity during the peak season (mainly harvesting time). The other problems reported were marketing, particularly transport to carry the produce to the market place and lack of technical advice in cultivating marigold.

CONCLUSIONS

The following conclusions could be drawn from the discussion of the results.

1. Human labour, manures and fertilizers were the major items of expenses for both the sample contract and non contract farmers in marigold cultivation in the study area. Seeds accounted for around 10-12 per cent of average variable cost.
2. The cost of cultivation of marigold per hectare under contract farms was higher than that of non-contract farms. However, the cost of production per kg was relatively lower in contract farms as a result of higher yield and absence of rejection.
3. The contract farms realized higher net profit of Rs.45257.98 per hectare than the non-contract farms at Rs.32694.54 per hectare. This was inspite of the fact that the actual price realized was only Rs.2.75 per kg in contract farms as compared to Rs.8.00 per kg realized in non-contract farms as a result of huge reduction of 12 tonnes per hectare.
4. The inputs namely potassium, seed, and irrigation, farm yard manure, plant protection chemicals, human labour and machine power were found to contribute significantly and positively to the yield. However the MVP/MFC ratios indicated the scope to increase the use of only nutrient potassium, seed, plant protection expenses, and machine power.

5. The mean technical efficiency (MTE) of 99 per cent would indicate that the participant marigold sample contract farmers were highly technically efficient.

6. The price expectations from most of the non-contract farmers at greater than Rs.7.50 per kg. happened to be very high than most contact farmers, expectation between Rs.5.00 and Rs.7.50 per kg.

7. The contract farmers had less yield uncertainty than that of non-contract farmers, which was due to steady technical guidance by the field executives of the processing firm.

8. There was no price uncertainty in contract farmers whereas there was a high price uncertainty in the case of non-contract farmers.

9. The contact farmers diverted larger quantities of their produce to open market probably due to continued lower price paid by the firm and falling yield levels.

10. The most important reason given by the former contract farmers for discontinuing cultivation of marigold on contract was low price for the produce followed by labour shortage and declining profit due to declining yield.

11. About 53.33 per cent of the contract farmers and 85.23 per cent of former contract farmers were introduced to the crop by the company staff, implying in recent years more farmers would take-up contract cultivation without effort from the company.

12. Type of agreement between farmers and the company was written and almost all contract farmers did not have any problem with terms of contract. More than 67 per cent of the farms were visited once in a week by the field staff and more than 89 per cent of the farmers were satisfied with the company and all of them reported if they contract cultivation they would do so with the present company only indicating the loyalty.

13. The factors determining the participation of farmers in the contract farming were fixed price, experience in contract farming and total returns from marigold.

14. The benefits of marigold cultivation under contract farming were assured buyer for the produce, no rejection of produce which indicates that though there was damage and poor quality of produce, all the produce were procured by the firm, and the farm gate collection.

15. The major problems faced by contract farmers were low price for the produce, labour scarcity, and non provision of advance by the firm for growing marigold.

16. The problems in cultivating marigold under non contract farming were rejection of the produce in the market followed by price fluctuation, poor quality inputs and labour scarcity, problems in transportation for marketing, the produce and lack of technical advice in cultivating marigold.

17. The results also disproved the following null hypotheses;

    i. There is no difference in costs, returns and resource use efficiency of marigold cultivation between contract farming and non-contract farming.

    ii. There is uncertainty on yield and price in contract farming.

    iii. There are more constraints in marigold cultivation under contract farming; there by establishing the usefulness of contract farming in marigold

Policy Suggestions

1. The study revealed that the yield has come down from an average of 40 tonnes pre hectare at the time of introduction in 1994 of contract farming in marigold in the study area to 32.36 tonnes per hectare currently (in a span of 16 years). It warrants reviewing the cultivation practices, type of seed used, level of fertilizers and pesticides used and go for adoption of integrated cultivation practices to sustain yield levels. The contracting company can work with organizations like Tamil Nadu Agricultural University and the department of Horticulture and plantation crops on this.

2. The suggestion of resource-use-efficiency revealed the need to cut the use of farm yard manure and increase the use of seed, potash, and plant protection chemicals to increase the yield and increase the income. Encouraging farmers to go for soil test based application of farm yard manure and fertilizer nutrients will go a long way in ensuring correct use of these inputs which will help in reducing cost, increasing yield response, reduce chemical induced pollution if any. The company can work with farmers on one hand and organizations like Tamil Nadu Agriculture University and department of horticulture and plantation crops on the other hand.

3. The company can review the purchase price policy and revise the procurement price or introduction an incentive system fixing a minimum quantity to be supplied from a hectare and pay an additional sum to the quantity over and above the minimum specified which will help not only to discourage the farmers

to divert produce to open market, but also to put in better management efforts to obtain higher yield that will also help the company with increase in supply of raw material.

4. The farmers were complaining about diversion of seed and also delay in payment which are done through the Agents. The farmers have also indicated that the company people do not at all meet the growers. In this regard, the growers in each of the village can be organized in line with the self help groups mode and the most active or industrious person among the growers can be designated as a local coordinator to discharge the functions of the Agent who can also be appropriately paid. The company management representative can meet and address the group members in a village level meeting informing them of the seed and other input requirement and the efforts of the company to help growers. The management representative can also address the groups once or twice during harvest phase emphasizing the need to supply all the quantity to the firm. This will enhance the enthusiasm and efforts of the growers leading to higher yield and supply to the firm, reduction in malpractices such as seed diversion by Agents and produce diversion by growers. The company can facilitate the farmers to open an account in a commercial bank and transfer the money directly to the growers account which will solve the problem of delayed payment by the Agents.

5. The farmers also reported the problem of itching and allergic reaction and peeling of skin in fingers and hand as a result of the hair like structures present in the plants and flower stalk. The company can provide or sell required number of gloves with long hand based on need to registered growers. This will not cost much, but will help them to avoid the allergic reactions. The company can provide gloves to the growers and agricultural workers.

The company can look at the set of five suggestions given and draw a package of approache/system so as to enhance sustainable increase in contract cultivation of marigold. More so, contracting also imply a commitment on the part of the company and growers. Therefore periodical interaction by the company Management with Grower Groups (once organized) will help to build a lasting relationship.

Table 4.2. Season-wise Rainfall in Erode District during 1998-99 to 2007-08

(mm)

S.No	Year	South West Monsoon (June-Sep)		North East Monsoon (Oct-Dec)		Winter (Jan-Feb)		Summer (Mar-May)		Total	
		Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual	Normal	Actual
1.	1998-99	183.40	289.70	307.60	323.70	21.50	0.00	147.6	151.60	660.10	765.10
2.	1999-00	183.40	99.80	307.60	493.80	21.50	39.70	147.6	81.90	660.10	715.20
3.	2000-01	183.40	308.60	307.60	243.30	21.50	17.48	147.6	117.70	660.10	687.08
4.	2001-02	183.40	160.30	307.60	294.10	21.50	2.10	147.6	81.20	660.10	537.70
5.	2002-03	183.40	113.90	307.60	317.40	21.50	2.10	147.6	134.80	660.10	568.20
6.	2003-04	213.10	136.10	323.50	347.20	20.70	1.80	154.1	326.70	711.40	811.80
7.	2004-05	213.10	203.10	323.50	290.00	20.70	31.60	154.1	274.90	711.40	799.60
8.	2005-06	213.10	244.40	323.50	640.20	20.70	7.90	154.1	129.50	711.40	1022.00
9.	2006-07	213.10	174.50	323.50	386.20	20.70	0.60	154.1	66.40	711.40	627.70
10.	2007-08	213.10	203.90	323.50	446.70	20.70	27.00	154.1	215.90	711.40	893.50

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

Table 4.3. Comparison of Season wise Rainfall of Sathyamangalam Block, Thalavadi Block, Erode District and Tamil Nadu -2007-08

(mm)

Sl.No	Season	Sathyamangalam Block		Thalavadi Block		Erode District		Tamil Nadu	
		Normal	Actual*	Normal	Actual*	Normal	Actual*	Normal	Actual*
1	South-West Monsoon	217.10 (32.44)	208.60 (27.71)	304.70 (38.58)	364.20 (33.71)	213.1 (29.95)	203.9 (22.82)	332.9 (34.73)	308.5 (23.60)
2	North-East Monsoon	244.30 (36.51)	366.00 (48.60)	346.30 (43.80)	386.50 (35.78)	323.5 (45.49)	446.7 (49.99)	459.2 (47.91)	828.8 (63.51)
3	Winter	156.40 (23.37)	27.00 (3.58)	108.50 (13.73)	18.00 (1.66)	20.7 (2.90)	27.0 (3.02)	36.8 (3.89)	15.9 (1.23)
4	Hot-Weather	51.40 (7.68)	151.00 (20.6)	30.20 (3.83)	308.70 (28.58)	154.1 (21.66)	215.9 ()	129.6 (13.53)	150.7 (11.58)
	Total	669.20 (100.00)	752.60 (100.00)	789.70 (100.00)	1080.10 (100.00)	711.4 (100.00)	893.5 (100.00)	958.80 (100.00)	1340.10 (100.00)

Source: Assistant Director of Economics and Statistics, Erode (2007-08)

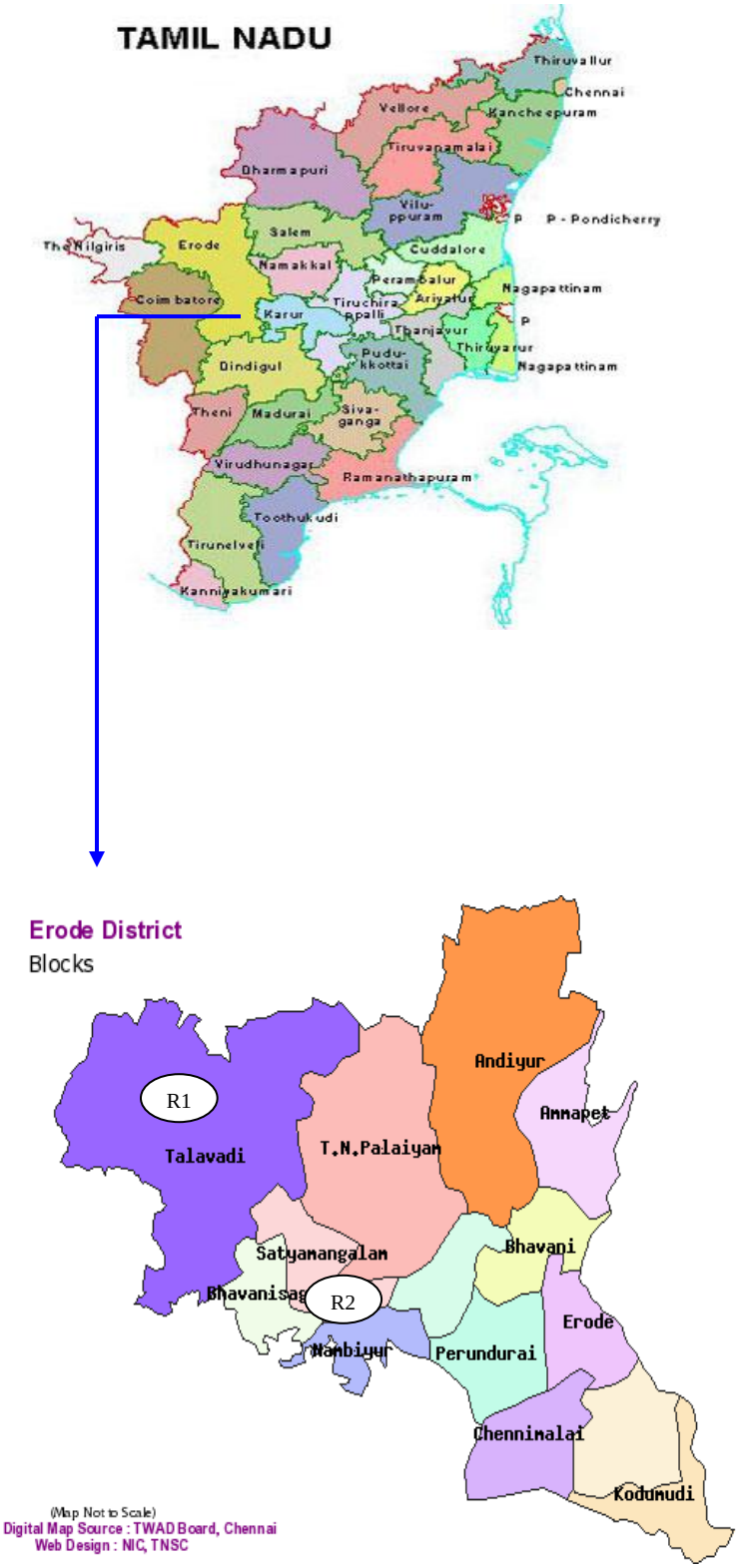
(Numbers in the parentheses indicate percentage to total)

* Actual rainfall of 2007-08

Table.5.16. Zero Order Pair wise Correlation Matrix

	Yield (ton/ha)	**FYM ton/hac**	**N(kg)**	**P(kg)**	**K(kg)**	**Seed(g)**	**PPC(Rs)**	**Mac (hrs)**	**Irrigation (numbers)**	**Labour (mandays)**
Yield(ton/ha)	1									
FYM ton/hac	0.470804	1								
N(kg)	0.732314	0.528293	1							
P(kg)	0.836129	0.513822	0.729862	1						
K(kg)	0.796281	0.401399	0.672691	0.814605	1					
seed(g)	0.102983	-0.039	-0.00899	-0.03776	-0.13065	1				
ppc	0.357065	0.039146	0.227302	0.376756	0.302171	-0.03095	1			
mac (hr)	0.503476	0.127702	0.360119	0.454273	0.439533	-0.04052	0.25346	1		
Irrigation(rs)	0.235596	0.046296	0.245632	0.128768	0.13609	-0.0444	-0.10035	0.074945	1	
Labour (mandays)	0.528425	0.329838	0.541939	0.534585	0.423574	0.101183	0.048024	0.279751	0.030277	1

FIG 3.1 SELECTED SAMPLE VILLAGES IN ERODE DISTRICT



R1 – THIGINARAI
R2 – KUTHIYALATHUR

REFERENCES

A. Books

Dewett, K.K., **Modern Economic Theory,** (New Delhi: Shyam – Lal charitable Trust, 1975), pp.65-71.

Glover, David and Ken Kusterer, "**Small Farmers, Big Business- Contract Farming and Rural Development**", (Macmillan, London, 1990), p.46.

Johl, S.S., and T.R. Kapur, "**Fundamentals of Farm Business Management**", (New Delhi: Kalyani Publishers, 1981), p.92.

Kalirajan, K.P., and R.T.Shand, "**Economics in Disequilibrium-An Approach from the Frontier**",(New Delhi: Mac Millan India Limited, 1994):p.7.

Raju, V.T., and D.V.S, Rao, "**Economics of Farm Production and Management**", (New Delhi: Oxford and IBH Publishing Co. Private Limited, 1990), p.185.

Roy and Ewell Paul, "**Contract Farming**", (The Interstate Printers and Publishers Inc., Denville Illinois, U.S.A, 1963). p: 122

Samuelson, A. Paul and Nordhans, "**Economics**", (New Delhi: Mc Graw Hill Publishing Company Ltd., 1998), pp: 107-116.

Tandon, R.K., and S.P. Dhondyal, "**Principles and Methods of Farm Management**", (Kanpur: Nirbal-Kebal Ram Press, 1971), p. 341.

Varma, M., M and R.K. Agarwal, "**Managerial Economics**", (Delhi: Suman Printers, Manipur, 1992), p.113.

World Bank, "**India Re-Engineering the Agricultural Sector to Sustain Growth and Reduce Poverty**", Agricultural Rural Development Unit, South Asian Region, World Bank New Delhi**:** Oxford University Press, 2005.

B. Journals

Abate Bakele, Machiel F. Viijoen, Gezahegn Ayele and Syed Ali., "Effect of Farm Size on Efficiency of Wheat Production in Moretna-Jirru District in Central Ethiopia", **Indian Journal of Agricultural Economics**, 64(1): 133-143, 2009.

Ajit Kumar Singh., "Rapporteur's Report on Contractual Arrangements in Land and Labour markets in Rural Areas", **Indian Journal of Agricultural Economics**, 55(3): 576-583, 2001.

Anjugam, M. and C. Ramasamy., "Determinants of Women's Participation in Self-Help Group (SHG) - Led Microfinance Programme in Tamil Nadu", **Agricultural Economics Research Review**, 20 (2): 283-298, 2007.

Anupama, J, R.P. Singh and Ranjit Kumar., "Technical Efficiency in Maize Production in Madhya Pradesh: Estimation and Implications", **Agricultural Economics Research Review**, 18(2): 305-315, 2005.

Asokhan, S.R and Gurdev Singh., "Role and Constraints of Contract farming in Agro-Processing Industry", **Indian Journal of Agricultural Economics**, 58 (3), 2003.

Balappa Sivaraya and L.B. Hugar., "Efficiency of Vegetable Farms in Karnataka – Case Study of Brinjal", **Artha- Vikas**, 2001.

Balasubramanian, M and R. Eswaran., "Marketing Practices and Problems of Cotton Culitivators in Virudhunagar District of Tamil Nadu", **Indian Journal of Agricultural marketing**, 37(7): 27-32, 2008.

Bhat Dhar., "Resource Use Efficiency of Apple Cultivation in Jammu and Kashmir State", **Indian Journal of Agricultural Economics**, 69(272): 51-58, 1988.

Bhende, M. J. and K. P. Kalirajan., "Technical Efficiency of Major Food and Cash Crops in Karnataka (India), **Indian Journal of Agricultural Economics**, 62(2): 176 192, 2007.

Bhuse, V.H and S.T.Ghule., "Constraints in Cultivation of Medicinal Plants", **Kisan World**, 29(12):59-60, 2002.

Boris E.Bravo-Ureta and Robert E. Evenson., "Efficiency in Agricultural production : the case of peasant farmers in Eastern Paraguay", **Journal of Agricultural Economics**, 10:27-37,1994.

Chand and Ramesh., "Emerging Crisis in Punjab Agriculture", **Economic and Political Weekly**, 34(13): 2-10, 1999.

Clapp and A.J.Roger., "Representing Reciprocity, Reproducing Domination: Ideology and the Labour Process in Latin American Contract Farming", **Journal of Peasant Studies**, 16(1): 5-39, 1988.

Dhandhalya, M. G and R. L. Shiyani., "Yield Gaps, Constraints Prioritization of Cotton Production in Saurashtra Region", **Agricultural Situation in India**, 63(1): 39-45, 2006.

Dileep, B.K, R.K Grover and K.N.Rai., "Contract Farming in Tomato: An Economic Analysis", **Indian Journal of Agricultural Economics**, 57(2): 197-210, 2002.

Fraser, I.M., "Microeconometric Analysis of Wine Grape Supply Contracts in Australia", **The Australian Journal of Agricultural and Resource Economics**, 49: 23-46, 2005.

Garg, R.B.L., "Contract Farming : An Overview", **Kurukshetra**, 53(6): 42-43, 2005.

Glover, D.J., Contract Farming and Out Grower Schemes in East and South Africa, **Journal of Agricultural Economics**, 41(3):303-315, 1990.

Goodhue, R. E., "Broiler Production Contracts as a Multi-agent Problem: Common Risk, Incentives and Heterogeneity", **American Journal of Agricultural Economics**, 82: 606-622, 2000.

Goyal, S. K., K. S. Suhag and U. K. Pandey., "An Estimation of Technical Efficiency of Paddy Farmers in Harayana State of India", **Indian Journal of Agricultural Economics**, 61(1): 108-121, 2006.

Grover, D.K and J.M. Singh., "Sesamum Cultivation in Punjab: Status, potential and constraints", **Agricultural Economics Research Review**, 20(2): 299-313, 2007.

Grover, D.K and J.M. Singh., "Sesamum Cultivation in Punjab: Status, potential and constraints", **Agricultural Economics Research Review**, 20(2): 299-313, 2007.

Haque, T., "Contracting Arrangements in Land and Labour Markets in Rural India", **Indian Journal of Agricultural Economics**, 55(3): 233-235, 2000.

Hazarika, C and S.R.Subramanian., "Estimation of Technical Efficiency in the Stochastic Frontier Production Function Model-An Application to the Industry in Assam", **Indian Journal of Agricultural Economics**, 54(3): 201-211, 1999.

Jayaram, H, G.G. Chandrasekar and Lalith Achoth, "An Economic Analysis of Technical Efficiency in Rice cultivation In Mondya: Some Issue in Resource Pricing", **Indian Journal of Agricultural Economics**, 47(4): 677-382,1992.

Jyoti Kachroo, Arti Sharma and Tarunvir Singh., "Technical Efficiency of Paddy in Jammu District of J& K State", **Agricultural Situation in India**, 66 (3): 151-155, 2008.

Kalirajan, K.P., "On Measuring Economics Efficiency", **Journal of Agricultural and Applied Econometrics**, 5(1): 75-85, 1990.

Kehar Singh., "Decomposition of Economic Efficiency under Risk into Technical and Allocative Risks: A Study on Fish Production in South Tripura District, Tripura, India", **Agricultural Economics Research Review**, 18: 73-81, 2005.

Khusro, A.M., "Returns to Scale in Agriculture", **Indian Journal of Agricultural Economics**, 19(3 and 4): 51-80, 1964.

Kiresur, V.R., S.A.Patil and H.S.Vijayakumar., "Contract Farming: An Opportunity for Small and Marginal Farmers in the Context of Trade Liberalization", **Agricultural Economics Research Review**, **9th Conference Proceeding**, p.78-87, 2002.

Korovkin, T, "Peasants, Grapes, and Corporations – The Growth of Contract farming in a Chilean Community", **The Journal of Peasant Studies**, 19 (2): 228-254, 1992.

Krishna Reddy, K., A. Panduranga Rao and S.M. Shareef, "Resource productivity and Resource use Efficiency of Paddy in Guntur District of Andhra Pradesh", **The Andhra Agricultural Journal**, 51(3): 508-512, 2004.

Krishna, R., "Uemployment in India", **Indian Journal of Agricultural Economics**, 19(3): 1-22, 1964.

Kumbhakar, B.C., "Efficiency Estimation in a Profit Maximixizing Model Using Flexible Production Function", **Agricultural Economics**, 10(2): 143, 1994.

Madan Lal Gurjar and Varghese, K. A., "Structural Changes over Time in Cost of Cultivation of Major Rabi Crops in Rajasthan", **Indian Journal of Agricultural Economics**, 60(2): 249-263, 2005.

Maheswarappa, B.O, L.B.Kunnal and S.M.Patil., "Economics of Production and Marketing of Sugarcane in Karnataka", **The Bihar Journal of Agricultural Marketing**, 6(2): 238-244, 1998.

Maiti, S., "Importance of Aromatic and Medicinal Plants: Global and National Perspective", **Indian Journal of Arecanut, Spices and Medicinal Plants**, 2(4): 153-157, 2000.

Mamilla Rajasekhar, "Contract Farming in India – A Latent Marketing Opportunity"; **Southern Economist**, 19-20, 2005.

Maurya, O.P, G.N.Singh and R.K.S.Kushwaha, "Profitability of Banana Plantation in Hajipur District of Bihar", **The Bihar Journal of Agricultural Marketing**, 4(1): 68-70, 1996.

Muralidharan, O.K., "Resource Use Efficiency in Kole Lands in Trichur District, Kerala", **Indian Journal of Agricultural Economics**, 42(4): 578-586, 1987.

Mythili, G. and K. R. Shanmugam., "Technical Efficiency of Rice Growers in Tamil Nadu: A Study based on Panel Data", **Indian Journal of Agricultural Economics**, 55(1): 15-25, 2000.

Nagaraj, T, H.S.S, Khan and N.N.Karnool., "An Economic Analysis of Maize-Sunflower Farming System in Tungabhadra Command Area, Karnataka", **Farming Systems**, 12(3-4): 28-36, 1996.

Nalini Rajan Kumar, N. K. Pandey and R. K. Rana., "Production and Marketing of Potato in Banaskantha District of Gujarat", **Indian Journal of Agricultural Marketing**, 22(1): 99-110, 2008.

Naphade, S. A and A. S. Tingre., "Economics of Production and Marketing of Guava in Buldhana District of Maharashtra", **Indian Journal of Agricultural Marketing**, 22(2): 32-41, 2008.

Parasurama Reddy, G, J.V.Venkataram and G.N. Nagaraja., "An Optimum Resource Use Pattern and Credit Required for the Beneficiaries of Upper Krishna Project Command Area of Karnataka", **Financing Agriculture**, 21(4): 25, 1989.

Patel, R.J and P.Mahesh Bhatt., "Cost and Returns of Hybrid Bajra Seed Production in Gujarat", **Agricultural Marketing**, (20): 17, 1997.

Paty, B.K., "Contract Farming in India-Progress and Potential", **Agricultural Marketing**, XLVIII (1): 13-20, 2005.

Radha, Y. and K. R. Chowdry., "Comparative Economics of Seed Production vis-à-vis Commercial Production of Cotton in Andhra Pradesh", **Indian Journal of Agricultural Economics**, 60(1): 94-102, 2005.

Ram Singh and Abhey Singh., "Economics of Production and Marketing of Mushroom in Haryana", **Indian Journal of Agricultural Marketing**, 22(2): 185-195, 2008.

Rama Rao C. A, P. Sudhakar Reddy, V. Srinivas and Y. V. Reddy., "Price Spread and Efficiency of Sorghum Grain Marketing in Mahabubnagar District of Andhra Pradesh", **Indian Journal of Agricultural Marketing**, 22(1): 25-34, 2008.

Rangi, P S and M S Sidhu., "A Study on Contract Farming of Tomato in Punjab", **Agricultural Marketing**, 42(4): 15-23, 2002.

Ravinder Kaur and Amandeep Kaur,"Income and Employment Generation in Flower Seed Production Under Contract Farming in Ludhiana District (Punjab)", **Indian Journal of Agricultural Economics**, 55(3): 357-358, 2000.

Rupasena, L. P, H. S. Vijayakumar and N.M. Kerur., "Resource Use Efficiency in Rice Cultivation in Srilanka", **Indian Journal of Agricultural Marketing**, 22(2): 1-11, 2008.

Salikram., "A Study of Resources Productivities on an Adopter and Non-Adopter farms of Varanasi District", **Agricultural Situation in India**, 32(4): 205-206, 1977.

Saravanan, R and N.S. Shivalinge Gowda., "Contract Farming- Where We Gain and Lose?", Manage **Extension Research Review**, 4(1): 2003.

Satish, P., "Contract Farming as a Backward Linkage for Agro-processing – Experiences from Punjab", **Indian Journal of Agricultural Economics**, 58(3): 2003.

Senthilkumar, C. and Alagumani, T., "Resource Use Efficiency of Paddy in Lower Bhavani Project Command Area in Tamil Nadu", **Indian Journal of Agricultural Economics**, 60(3): 515-516, 2005.

Shanmugam, T.R and K.Palanisamy., "Measurement of Economic Efficency-Frontier Function Approach", **Journal of Indian Society of Agricultural Statistics**, 45(2): 125-242, 1993.

Sharma, R.K, S. K. Chauhan and Sonika Gupta," Technical Efficiency in North-Western Himalayan Region: A study of Himachal Pradesh Agriculture", **Agricultural Economics Research Review**, 21: 82-90, 2008.

Shrikant S. kalamakar., "Management of Market Riks in Agriculture", **Agricultural Economics Research Review**, 18 (2): 1-17, 2005.

Siddiqui and Kalim., "Agricultural Exports, Poverty and Ecological Crisis- Case Study of Central American Countries", **Economic and Political Weekly**, 33(39): 128-136, 1998.

Simmons, Phil, Paul Winters and Ian Patrick., "An Analysis of Contract Farming in East Java, Bali and Lombok, Indonesia", **Agricultural Economics**, 513-525, 2005.

Sirohi, A.S and A.C.Gangwar., Economics Optima in Resource Allocation for the Cultivators of Kanghawala Block", **Indian Journal of Agricultural Economics**, 22(3): 1-13, 1968.

Smitha, P. R, Jayashree. A. Handigol and S. S. Guledgudda, "Costs, Returns and Resource Use Efficiency in Anthurium Cultivation in Coorg District", **Agricultural Situation in India**, VLX (9): 593-597, 2008.

Sunandini, S. Haffis, P.B. Parathasarathi and Y.V.R. Reddy, "Resource Productivity and Resource Use Efficiency on Paddy Farms of Andhra Pradesh", **Agricultural Situation in India**, 48(11): 835-840, 1993.

Sunil Phougat, "Problems and Prospects of Contract Farming", **Southern Economist**: 11-12, 2005.

Surender Singh, "A Study on Technical Efficiency of Wheat Cultivation in Haryana", **Agriculture Economics Research Review**, 20: 127-135, 2007.

Tewodros Tefera and Melesse., "Determinants of Coffee Husk Manure Adoption: A Case Study from Southern Ethiopia", **Indian Journal of Agricultural Economics**, 65(1):pp.159-172, 2010.

Thakar, D.R, T.V.Moothy and H.R.Sharma., Resource Use Farm Size and Returns to Scale on Tribal Farms of Hibachis Pradesh", **Agricultural Situation in India**, (45): 885-892, 1990.

Thakre, A.B., V.D. Panjankar and D.S. Pajankar., "Resource Productivity and Resource Use Efficiency of Turmeric", **Rural India**, 2005.

Tripathi,R.S, Ram Singh and Sube Singh., "Contract Farming in Potato Production: An Alternative for Managing Risk and Uncertainty", **Agricultural Economics Research Review**, 18(1-2): 2005

White, B., "Agro Industry and Contract Farmers in Upland West Java", **Journal of Peasant Studies**, 24 (3):100–136, 1997.

Wilson, J., "The political Economy of Contract Farming**", Review of Radical Political Economics**, 18(4): 47-70, 1986.

Xiaosang Xu and R.Jelfrey., "Efficiency and Technical Progress in Traditional and Modern Agriculture: Evidence from Rice Production in China", **Agricultural Economics**, 18: 157-165, 1998.

C. Thesis

Duraisamy, M.R., "**Planning for Optimum Agricultural Production in Theni District of TamilNadu- A Fuzzy Goal Programming Approach**", (Unpublished Ph.D. (Ag) thesis, submitted to Department of Agricultural Economics, Agricultural College and Research Institute, Madurai, 2007.

Ganaprakasam.A., "**Contract Farming of Coleus and Turmeric in Salem District- An Economic Analysis**", (Unpublished M.Sc.(Ag) thesis, submitted to Department of Agricultural Economics Tamil Nadu Agricultural University, Coimbatore, 2006).

Ganesh, K., "**Evaluation of Alternative Farming System in Gazani Lands of Karnataka- An Economic Analysis**", (Unpublished M.Sc.(Ag) thesis, University of Agricultural Sciences, Dharward, 2000).

Jayachandran, R., "**Economics of Alternative Farming Systems in Gazani Lands of Karnataka-An Economic Analysis**", (unpublished M.Sc.(Ag) thesis, submitted to Department of Agricultural Economics, Agricultural College and Research Institute, Madurai, 2002).

Jayachandran.R., **"Economics of Alternative Farming System in Gazani Lands of Karnataka – An Economic Analysis",** (Unpublished M.Sc.(Ag) thesis, submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 2002).

Jeyanthi, P., "**An Economic Analysis of Tissue culture banana vis-à-vis Sucker Propagated Banana**", (Unpublished M.Sc.(Ag) thesis, submitted to Department of Agricultural Economics, Agricultural College and Research Institute , Madurai, 2002).

Prabhakar, P., "**Impact of Medicinal Plant Cultivation in Nilgris District**", (Unpublished M.Sc.(Ag) thesis, submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 2000).

Senthil Kumar.R., "**Economics of Production and Marketing of Banana in Thiruchirapalli District**", (Unpublished M.Sc. (Ag) thesis, submitted to Department of Agricultural Economics, Agricultural College and Research Institute, Madurai, 1991).

Senthilkumar., **"Market Study on Mushrooms and Spawns",** (Unpublished M.Sc.(Ag) thesis, submitted to Department of Pathology, Tamil Nadu Agricultural University, Coimbatore, 1992).

Senthilnathan., **"Soil and Water Conservation Activities in Watershed- Technology, Production and Economics",** (Unpublished M.Sc.(Ag) thesis, submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 2004).

Sudalaimani., **"An Assessment of Market Potential for Tissue Culture Plantlets in India",** (Unpublished M.Sc.(Ag) thesis, submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1991).

Sudha.R., "**Study of Economic and Environmental Impact of Plant Protection Methods in Paddy and Cotton Production in Western Zone of Tamil Nadu**", (Unpublished M.Sc.(Ag) thesis, submitted to Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 2005).

Sundar, A., "**An Economic analysis of Production and Marketing of Gloriosa Suberpa**", (Unpublished M.Sc.(Ag.) thesis, submitted to Department of Agricultural Economics, Agricultural College and Research Institute, Madurai, 2002).

Vaseeharan, S.S., *"***An Economic Analysis of Production and Marketing of Medicinal Plants (Senna and Periwinkle) in Tamil Nadu***,"* (Unpublished M.Sc (Ag), thesis submitted to the Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, 1997).

Vishweshwar, S.P., "**Economics of Hybrid Cotton with Special Reference to Pest Management in Malaprabha Command Area**", (Unblished M.Sc (Ag) thesis, University of Agricultural Science, Dharwad, 1994).

D. Research Reports, Papers and Presentations

Athiyaman and Sekar., "Impact of Labour migration on food and Nutritional Security – a micro level enquiry of Dharmapuri District of Tamil Nadu", **IGIDR Conference Issue**, 2007.

Charles Eaton and A.W. Shepherd., "Contract Farming - Partnerships for Growth", **FAO Agricultural Sciences Bulletin, Rome**, 2001.

Fraser, I.M., "The role of contracts in wine grape supply coordination: an overview" **Australian Agribusiness Review (Serial online)**, 11. Available from URL: http//www.agribusiness.asn.au/Review/2003v11/index.htm., 2003.

Fulton, L.A.Amabel and Robert.J.Clark., "Farmer Decision Making Under Contract Farming in Northern Tasmania", in D.Burch, R.E.Richson and G.Lawerence, Globalization and Agri-Food Restructuring-Perspectives from the Australian Region, Avebury, **Brookfield**, U.S.A, 219-237, 1996.

Haque, T.,"Contract Farming in India", New Delhi: **National Centre for Agricultural Economics and Policy Research,** 1999.

Khare , Nupu., "Contract Farming, Where We Gain and Lose?", **Agriculture Today**, 2005.

Little and M. Watts., "Living Under Contract: Contract Farming and Agrarian Transformation in Sub-Saharan Africa. Madison", Wis.: **University of Wisconsin Press**, 1994.

Martinez, S. W., "Vertical Coordination of Marketing Systems: Lessons from the Poultry, Egg, and Pork Industries", **Agricultural Economic Report**, United States Department of Agriculture, 2002.

Sukhpal Singh., "Contract Farming in India: Impacts on Women and Child Workers", the **Gatekeeper Series, Paper No. 111,** International Institute for Environment and Development (IIED), London, 2003.

Sukhpal Singh., "Multi National Corporations and Agricultural Technology Transfer: A Case Study of Contract Farming in the Indian Punjab", Paper Presented at **National Seminar on Private Extension Approaches and Challenges in the Millennium,** National Institute of Agricultural Extension Management**,** Hyderabad, India, 2000.