CONTRACT FARMING OF COLEUS AND TURMERIC IN SALEM DISTRICT – AN ECONOMIC ANALYSIS

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Thesis submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS

to the Tamil Nadu Agricultural University, Coimbatore.

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CERTIFICATE

This is certify that the thesis entitled "**CONTRACT FARMING OF COLEUS AND TURMERIC IN SALEM DISTRICT – AN ECONOMIC ANALYSIS**" submitted in partial fulfillment of the requirements for the award of 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. GNANAPRAKASAM** under my supervision and guidance and that no part of the thesis has been submitted for the award of any 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. K. MANI**

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(A. GNANAPRAKASAM)

ABSTRACT

CONTRACT FARMING OF COLEUS AND TURMERIC IN SALEM DISTRICT – AN ECONOMIC ANALYSIS

By

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Contract farming is an arrangement between producers and agribusiness firms for procuring a certain pre-agreed, quality and quantity of produce at a predetermined price and at time by the latter from the producers. In India, contract farming can be traced back to colonial period when commodities like cotton, indigo, etc were produced by the Indian farmers for English factories. Coleus and turmeric cultivation in Tamil Nadu is promoted through contract farming, where in, the company provides the inputs viz., seeds, fertilizers, plant protection chemicals and technical advice and buys back the produce at a predetermined price. MGP Herbals Care (P) Ltd is a private company mainly concentrating on cultivation of coleus and turmeric through contract farming in Tamil Nadu.

The overall objective of the study was to assess the impact of contract farming on income of the farmers. The specific **objectives** are: (i) to assess the economic returns from the cultivation of coleus and turmeric under the contractual arrangement in Salem district; (ii) to estimate the resource use efficiency in the cultivation of coleus and turmeric under contract and non-contract farming system; (iii) to assess the impact of contract farming in terms of employment generation; (iv) to find out the marketing cost and extent of uncertainty on yield and price and also to identify constraints in contract farming.

For the present study, Salem District was purposively selected, because area of coleus and turmeric under contract farming was maximum in Salem district. Multi stage random sampling technique was used for further selection.

The cost of cultivation of coleus per hectare under contract farming was higher (Rs.52739) than that of non-contract farms (Rs.36768). Similarly, in the case of turmeric cultivation, it was higher in contract farms (Rs.104589) than that of non-contract farms (Rs.81216). The contract farmers realized higher net profit per hectare than the non-contract farmers for both crops. In coleus, it was Rs.36107 for contract farms and Rs.34113 for non-contract farms. In turmeric, the net return was Rs.86348 for contract farms and Rs.57107 for non-contract farms. It revealed that contract farming enhanced farm income. Gini ratio analysis indicated that the inequality in income distribution was high in non-contract farmers for coleus and turmeric than that of contract farmers.

For coleus crop, the co-efficients of all inputs were significant (manures and fertilizers at one per cent and human labour at 5 per cent) in the case of contract farmers and inputs like manures and fertilizers and plant protection chemicals were significant (manures and fertilizers at one per cent and plant protection chemicals at 5 per cent) and positive in case of non-contract farmers and significant indicating lesser use of these inputs. For turmeric crop, the co-efficient of plant protection chemicals in the case of non-contract farmers were negative, indicating excessive use of these inputs.

The Mean Technical Efficiency (MTE) was 0.99 for coleus contract farms and non-contract farms. But, it was not obtained for turmeric contract and non-contract farms. Uncertainty of yield and price were high in the case of non-contract farmers than contract farmers. There was nil price uncertainty for contract farms.

Total marketing cost was higher for non-contract farmers than that of contract farmers in coleus and turmeric. Marketing losses especially, the transport and storage loss, were higher in non-contract farms than that of contract farms in turmeric and coleus.

About 50 per cent of the coleus farmers and all the selected turmeric farmers were introduced to the crop by the company staff. Type of agreement between them and the company was written and formal in nature for both the crops.

A majority of the farmers (> 50 per cent) expressed their desire to receive advance payments. About 70 per cent of the farmers were having problem like inadequate and delayed input supply. More than 95 per cent of the farmers were satisfied with the company as regard the honouring of the contractual arrangements.

Delay in input supply, inadequate input supply and labour scarcity were the major problems in contract farming where as price fluctuation and high transport cost were the major problems in non-contract farming.

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CHAPTER I
INTRODUCTION

Contract farming is an arrangement between producers and agribusiness firms for procuring a certain pre-agreed quality and quantity of produce at a pre-determined price and at time by the latter from the producers. It can be only a pure procurement transaction, extending into supply of inputs or even beyond. This contractual arrangement which would ensure the supply of good quality, adequate, timely and cost effective farm inputs to producers is a prerequisite for any successful agribusiness firm, whether operating in the domestic or international market.

There are several types of contract farming which vary from just buying certain quantity of final output at a pre-determined price to having a complete control over production from supply of seed to harvesting. Broadly speaking, there are two types of contracts, viz., marketing and production contracts. Marketing contracts refer to an oral or written agreement between a contractor and grower that sets a price and an outlet for the commodity before harvest or before the commodity is ready to be marketed, while, production contract specifies in detail the quality and quantity of a particular commodity to be produced and the type and extent of compensation the producer would receive for his efforts.

In India, contract farming can be traced back to colonial period when commodities like cotton, indigo, etc were produced by the Indian farmers for English factories. The colonial period also saw the introduction of cash crops such as tea, coffee, rubber, poppy and indigo in various parts of the country, mostly through a central, expatriate-owned estates. Such arrangements exploited small peasantry and resulted in indenture and alienation of them in some instances. Indian Tobacco Company (ITC) Limited introduced cultivation of Virginia tobacco in coastal Andhra Pradesh in the 1920, incorporating most elements of a fair contract farming system and met with good farmers' response. This however, was replaced only by auctioning of fixed output in 1984.

Organised public and private seed companies which emerged in the 1960's had to necessarily depend on multiplication of seeds in individual farms under contractual arrangement since the companies did not own lands. Faced with an acute shortage of soft wood, Wimco, the country's sole mechanized match manufacturer, instituted an innovative farm-forestry scheme for the cultivation of poplars in Punjab, Haryana and Uttar Pradesh and met with good farmers' response and success, despite the fact that the trees being exotic to those regions. Nijjer in Punjab and Bhilai Engineering in Madhya Pradesh also took up tomato contract cultivation programmes shortly after Pepsico. Smaller cultivation programmes involving specialized export orientated crops, aromatics, medicinal plants and herbs, etc still actively use contracts in India (NABARD, 2003).

Multi National Corporations such as Pepsi Foods Ltd. of Pepsico India Holdings, which ushered in a revolution in growing tomato, potato and chillies through contract farming in Punjab proposes to experiment with Basmati rice, pulses, garlic and groundnut. In Karnataka state, cultivators are growing tomato for Hindustan Lever Ltd (Kissan) and gherkins for Sterling Agro-Product Processing Pvt. Ltd. In India, gherkin cultivation was initiated by Ocennia Peninsular Pvt. Ltd. in the nineties, on an experimental basis. At present, some 20 companies mainly Export Oriented Units (EOUs) are engaged in the cultivation of gherkins in Karnataka, Tamil Nadu and Andhra Pradesh (Saravanan *et al* 2003).

Big corporate houses such as Hindustan Lever, Pepsi Foods, A.V.Thomas, Dabur, Thapar, Marico, Godrej, Mahindra, Wimco, etc apart from several small firms undertake contract farming of many crops. Though many of them follow a bilateral contract arrangement between the firm and the farmers, there are tripartite, multipartite arrangements as well. For example, Rallis organized wheat production in Chattisgarh under contract farming in which State Bank of India took care of the credit needs of the farmers by treating the contract as collateral and the wheat was supplied to Hindustan Lever for processing and marketing. Marico Industries in their scheme to procure safflower seeds in Maharastra retained the commission agent, but his role was changed to that of the company's representative for this crop. The idea seems to be to use the resources of the agent such as his license, labour, godown and office space, etc instead of

searching on such resources on their own. Dabur had taken forest lands on lease in some states and with the help of tribal community, produced several medicinal plants. Their contractual arrangements were with the entire community and the community in turn decided the individual's share. Thus, there are several variants of contract farming depending upon the crop, the company's objective, local conditions, market regulations, etc (Asokan *et al* 2003).

In India, a large number of small and marginal farmers with high lend of illiteracy have limited access to market information on one hand and on the other hand, inadequate storage and transport facilities with weak farm extension services lead to limited scope for Indian farmers to compete in the liberalized global market. The abolition of quantitative restrictions on the import of dairy and poultry products and the dumping of edible oil in Indian markets will likely to have adverse impact on cropping patterns and living standards. Though the union government policies might offer short term relief like imposing more import duties, it is bound to affect free trade adversely and consequently the long term interests (Business Line, 2000). However, with vast agro climatic diversity, production potential, cheap farm labour availability and domestic and overseas market potential, India provides greater scope for private sectors' participation (Shaji 2001). Interestingly, in the recent past, private agri-business firms and Multi National Corporations (MNCs) have also received offers from state governments such as Gujarat, Uttar Pradesh, Maharastra, Karnataka and Tamil Nadu for strengthening contract farming (Balaji 1999). In the last two decades, contract farming is viewed as a tool to provide technology, extension service, credit, etc to the farmers. It is perceived as a mutually beneficial arrangement between the contract firms and the farmer by the government and international aid agencies.

The New Agricultural Policy of 2000 announced by the Government of India sought to promote growth of private sector participation in agribusiness through contract farming and land leasing arrangements to accelerate technology transfer, capital inflow and assured market for crops. There are several agricultural and horticultural crops such as tomato, potato, chillies, gherkin, baby corn, rose, onion, wheat, Basmati rice, groundnut, flowers, medicinal plants, etc that could be produced in some form of contractual arrangements with the farmers in India.

In India, the medicinal plant products were gathered and supplied by tribals from forest areas. As the demand for such produces started surging up owing to their high and safe medicinal values especially in western countries, private firms encouraged the Indian farmers to cultivate selected export oriented medicinal plants in large scale.

1.1. Global Scenario

The Exim Bank's study entitled "Export Potential of Indian Medicinal Plants and Products" (2003) estimated that the global imports of medicinal plants and parts in the year 2001 were of the order of US$ 1 billion. India was the second largest exporter, next only to China, accounting for 13 per cent of global imports in 2001. Although India became the second largest exporter in physical terms, the value of such exports was very low (Appendix.1.1).

USA was the principle market for Indian medicinal plants, accounting for about 50 per cent of exports. India exported medicinal plants to the developed countries viz., USA, UK, Switzerland, Germany, France and Japan which together accounted for 75-80 per cent of the total export of medicinal plants from India. Volume of import of medicinal and aromatic plants and trade competitiveness by different countries in 2001 is given in Appendix.1.2.

Hong Kong was the major importer of medicinal and aromatic plants in 2001 followed by Japan.

The value of medicinal plants marketed domestically was Rs.450 crores, The export of raw materials and finished herbal products is valued around US $ 100 billion in 2000-01 (Foundation for Revitalisation of Local Health Traditions (FRLHT,2001). It shows that the export market growing faster than the domestic market. The exports of major medicinal plants from India are given in Appendix.1.3.

Turmeric is exported both as a spice and a product of medicinal value. Major importers of turmeric were the Middle East, North African countries, Iran, Japan and Sri

Lanka which accounted for 85 per cent of the turmeric world trade and were mostly supplied by the Asian turmeric producing countries.

Europe and North America represented the remaining 15 per cent and were supplied by India and Central and Latin American countries. Ninety seven per cent of the United States' imports of turmeric was from India and the rest was supplied by the islands of the Pacific and Thailand.

United Arab Emirates (UAE) was another major importer of turmeric, followed by United States of America accounting for 24.06 per cent and 12.93 per cent of the total exports from India respectively. The other leading importers were Japan, United Kingdom and Sri Lanka (Spices Board of India, 2003-04).

1.2. Indian Scenario

Medicinal plants like psyllium, opium poopy, senna, etc are largely grown in India. Although coleus is having high medicinal value, it is cultivated only in 450 hectares in 2003 and is mostly confined to Tamil Nadu, Karnataka and Andhra Pradesh (Lokes, 2004).

India is the largest producer, consumer and exporter of turmeric. Area and production in different states of India is given in the Appendix.1.4.

India has 1.5 lakh hectares under turmeric cultivation with a total production of 5.3 lakh tonnes. Andhra Pradesh topped both in area and production with 0.57 lakh hectares and 2.83 lakh tonnes respectively and it is followed by Tamil Nadu with 0.17 lakh hectares and 0.65 lakh tonnes respectively during 2002-03.

Some of the important turmeric varieties exported from India were Alleppey Finger Turmeric, Rajapuri, Madras and Erode variety. India had exported 34,500 tonnes of turmeric, valued at Rs. 127.5 crores in 2003-04 (Spices Board of India, 2003-04).

1.3. Cultivation of Medicinal Crops in Tamil Nadu

In Tamil Nadu, many medicinal plants like senna, periwinkle, glory lily, coleus, gall nut, annato, aloe, Keezhanelli, dhavanum, atmagupta and so on are being grown right from pre-historical times. At present, some varieties which have pharmaceutical value are commercially grown and drugs made out of them are marketed domestically and also are exported. Of these medicinal plants, coleus and turmeric are widely grown in Tamil Nadu.

1.3.1. Coleus

Coleus forskohlii Briq. (synonyms, *C. barbatus* Benth., *Plectranthus forskohlii* Willd., *P. barbatus* Andr. and *P. comosus* Willemse) belonging to the family Labiatae was collected in 1973 from Dehra Dun in North India for targeted pharmacological screening. Bioactivity-guided purification of the active extract provided an active labdane diterpene forskolin (Bhat et al. 1977). Subsequent research revealed that forskolin to have many more pharmacological activities, namely, antiglaucoma, antiplatelet aggregation, anti-inflammatory and antithrombotic (Rupp et al. 1985) and coleus root extract has about 10 to 18 percent of forskolin. Now, it is known to cure Asthama, Glaucoma, Cardiomayopathy, Hypertension and Obesity. As a consequence, demand for forskolin as a bioactive molecule for drug development has increased rapidly.

Cultivation Practice for Coleus

Soil: Coleus prefers sandy loam red soil with a ph range of 6.5 –8.5.

Climate: 600-900mm

Spacing: 2ft ∗1.5ft

Season: Nursery: *June –July,* Crop: *mid July -October*

Planting material: Cuttings

Duration: 180 Days

Fertilizer:

DAP:MOP:GYPSUM:CYTOZYME:NEEM:VERMICOMPOST

50:75:200:5:100:500

Inter- Cultural Operations: The cuttings can be dibbled after dipping in 3% panchakavya and pseudomonas 1.5 kg per acre for dipping.. After life irrigation another

spray of panchakavya is given for better root and shoot initiation.After 2months of planting one more spray of panchakavya is given

Irrigation: Once in 7 - 10 days

Weeding: 15 days and 40 days after planting

Yield: 6-12 Tonnes/acre

1.3.2. Turmeric

Turmeric is a mild aromatic stimulant seldom used in medicine. It was once used to cure jaundice. Its chief use is in the manufacture of curry powders. It is also used as an adulterant of mustard and a substitute for it and forms one of the ingredients of many condiments. Tincture of turmeric is used as a colouring agent as it dyes a rich yellow colour, but the odour is fugitive. Turmeric paper is prepared by soaking unglazed white paper in the tincture and then dried. It is also used for testing alkaloids and boric acid.

It has a wide pharmaceutical value as antioxidant, antibacterial, antitumor, antimicrobial, anti-inflamatory, eases stomach pain and stimulates bile excretion.

Cultivation Practice for Turmeric

Soil: Well drained loamy soil/alluvial soil in the pH range of 5-7.5.

Climate: 1200-1400 mm and 25-35^{q} C

Spacing: 30cm X 20cm

Season: April-May

Planting material: Mother rhizomes and fingers

Fertilizer: 90 N: 60 P: 90 K

Duration: 7-9 Months

Inter-Cultural Operation: Mulching, Hoeing and weeding

Irrigation: 15-20 irrigations with 7-10 days interval

Yield: 150-200 quintals/ha

Post Harvest Management: Curing and colouring

MGP Herbals Care (P) Ltd is a private company mainly concentrating on cultivation of coleus through contract farming. It was started in 1997 with five farmers who cultivated coleus only in five acres. Presently, the company has covered more than 2400 hectares under coleus crop through contract farming.

SAMI Labs Ltd, a Bangalore based exporter of standardized herbal extracts has taken up large scale cultivation of coleus and turmeric in Salem district of Tamil Nadu, areas around Bangalore and in stretches between Mysore and Coorg of Karnataka state.

Contract farming is highly successful in Tamil Nadu, because of the following reasons:

i) The contract firm knows the acreage planted and is assured of the supply of output from the growers and hence there is lesser supply risk.
ii) The company has a total control over contract provisions and stipulations and can encourage quality production through the terms of agreement.
iii) Stability in company-growers' relationship is attained.

The grower benefits from contract farming because of the following factors:

i) There is an assured market which eliminates the price risk.
ii) Contract farming eliminates the exploitation by the middleman like commission agent.
iii) Farmer can receive assistance from the processor in the form of technical service and input supply on credit.
iv) The crop is well suited to the cropping system followed in the region.

However, the contract farming in coleus and turmeric cultivation raises several **issues** like;

i) Does contract farming helps to improve farm income and employment generation in Salem district?
ii) Does contract farming helps to provide economic security to the farmers, effective technology transfer and to reduce uncertainty in yield and price in Salem district?

In view of the above issues in contract farming system, it was decided to study the comparative advantage of contract farming system over the traditional farming. The general observation on contract farming system made during the pilot survey in the study region led to the following **hypotheses**;

i) Contract farming reduces market and price risks and thereby stabilizes farm income.
ii) Contract farming in coleus and turmeric cultivation provides higher employment opportunity to the farmers, as they are labour- intensive.

1.4. Objectives

In order to test the validity of the above hypotheses, the following objectives were framed. The overall objective of the present study is to evaluate the benefits reaped by growers of coleus and turmeric under contract farming system. However, the specific objectives are;

(i) to assess the economic returns from the cultivation of coleus and turmeric under the contract farming system in Salem district;
(ii) to estimate the resource use efficiency in the cultivation of coleus and turmeric under contract and non-contract farming system;
(iii) to assess the impact of contract farming on employment generation; and
(iv) to find out the extent of uncertainty on yield and price in contract farming system and to identify constraints in contract farming.

1.5. Scope of the Study

The study helps to define the applicability and enforceability of contract farming in Salem district. This study would encourage the farmers to take up contract farming by creating awareness on the high income and employment generation under contract farming system. It would also be helpful to farmers in optimizing farm inputs and thereby the farm income can be enhanced. Any policy decision taken based on the outcome of the study will be useful to improve the entire contract farming system. Moreover, results of

the present study would help the contracting companies to refine their strategies and rectify their problems in implementing the agreements with the farmers. This study provides general information about the contract farmers and problems faced by them. It also deals with expectations of contract farmers from the company and their attitude towards adoption of technologies as recommended by the company. These information will be useful to contract farms for increasing their market share of commodities they deal with and the area under different commercial crops, especially coleus and turmeric, under contract farming system.

1.6. Limitation of the Study

Though the contract farming system is developed in other parts of India, it is followed only in a very few pockets of Tamil Nadu and hence, there is less awareness on this type of farming. Due to this reason, the results of the present study could not be directly useful to other regions. The study was restricted to only 90 sample respondents who had contractual arrangements with only one contract firm. So there was no scope for comparing the results of the present study with that of contract farming system being followed in other regions. The contractual arrangements between farmers and contracting firms vary with crop also. Hence, the results of the present study have to be used carefully while designing the contractual arrangements for other crops.

1.7. Organization of the Thesis

The thesis has been organized in the following pattern.

Chapter I : **Introduction:** Problem focus, hypotheses, objectives, scope and limitation of the present study are presented.

Chapter II : **Concepts and Review:** Concepts used in the study along with a brief review of the earlier studies are presented.

Chapter III : **Design of the Study:** Survey design and analytical framework are presented.

Chapter IV : **Description of the Study Area**: Agro-climatic features of the study area which influence the cultivation of coleus and turmeric are presented. Also, the infrastructure facilities available to farmers and traders in undertaking production and marketing of the selected crops are presented.

Chapter V : **Results and Discussion**: Results of the study are presented and then discussed.

Chapter VI : **Summary and Conclusion:** Salient findings are summarized and conclusions are drawn. Policy implications are also outlined.

CHAPTER II

CONCEPTS AND REVIEW

An in-depth understanding of various concepts relating to the identified research problem is vital for having a sharp focus of any research work. Knowledge of past research work done on the related aspects will be highly useful not only for a clear understanding but also for explaining the concepts and tools of analyses as applicable to the present study. Hence, in this chapter, an attempt has been made to present various concepts used in the present study and a brief review of results of the related past studies for capturing the exact details of the terminologies used in the study.

For better understanding, the review has been arranged under the following sub-headings. Under each sub-heading, first, a review of concepts is presented and then the results of the past research relating to the sub-heading are described.

2.1. Review of Concepts

2.1.1. Contract Farming

2.1.2. Cost and Return

2.1.3. Income Distribution

2.1.4. Resource Use Efficiency

2.1.5. Technical Efficiency

2.1.6. Employment

2.1.7. Marketing

2.1.8. Uncertainty

2.2. Review of Results of the Past Results

2.2.1. Contract Farming

2.2.2. Cost and Return

2.2.3. Income Distribution

2.2.4. Resource Use Efficiency

2.2.5. Technical Efficiency

2.2.6. Employment

2.2.7. Marketing

2.2.8. Uncertainty

2.2.9. Constraints

2.2.10. Garrett's Ranking Technique

2.1.1. Contract Farming

Roy (1963) defined contract farming as those contractual arrangements between farmers and companies, whether oral or written, specifying one or more conditions of production and/or marketing of an agricultural product. This definition was considered too broad, as it included marketing or forward contract. Contract farming needs to be distinguished from such simple marketing contracts.

The way farmers perceive contract farming i.e., define their relationship with companies, differs across cultures (Asano-Tamonoi, 1988).

Clapp (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, it is not contract *per se* but 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.

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

Little (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 decisions 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".

According to Singh (2000), contract farming can be defined as an agreement between farmers and processing and/ or marketing firms for the production and supply of agriculture products under forward agreements frequently made at predetermined prices.

Asokan and Singh (2003) pointed out that the contract farming is being viewed as a tool of providing technology, inputs, extension services, credit, etc to the farmers. They also found that the procurement through contract farming is a better option than that of corporate farming for processors. Contract farming in different forms is evolved in India during the last decade to take care of the processing industry needs and to overcome the price risk faced by farms in open trade regime.

Kalamkar (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 solutions 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 those contractual arrangements between farmers and companies for the production and supply of agriculture products at predetermined prices under an oral or written agreement.

2.1.2. Cost and Return

Economics of cultivation of crops would get greatly influenced by costs incurred and gross return received. The costs and returns were differently conceived by different researchers to suit their studies. A brief review of concepts like costs and returns and results on economics of contract farming is given below:

2.1.2.1. Cost

Raju and Rao (1990) classified the costs as Cost A_1, Cost A_2, Cost B_1, Cost B_2, Cost C_1 and Cost C_2. Cost A_1 included all actual expenses in cash and kind incurred in production while Cost A_2 comprised of Cost A_1 and rent paid for leased in land. Cost B_1

included Cost A_1 and interest on value of owned capital assets excluding land where as Cost B_2 was the sum of Cost B_1, rental value of owned land and rent paid for leased in land (net of land revenue). Cost C_1 included Cost B_1 and imputed value of family labour while Cost C_2 comprised of Cost B_2 and imputed value of family labour.

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

Patel and Bhatt (1997) classified the cost as Cost A, Cost A_1, Cost B and Cost C. Cost A included all paid out cost or cash expenditure. Cost A_1 consisted of Cost A plus rent paid by the tenant. Cost B included Cost A plus rental value of owned land and imputed interest on owned capital and Cost C is the Cost B plus imputed value of family labour.

2.1.2.1.1. Fixed 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.

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.

For the present study, fixed cost is conceptualized as the sum of costs of land revenue, interest and depreciation on buildings, machineries, implements and tools and rental value of owned land.

2.1.2.1.2. Variable Cost

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

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

In the present study variable cost comprises cost of seeds, labour charges, manures and fertilizers, plant protection chemicals and interest on working capital. All these costs involved in the production of coleus/turmeric varied proportionately with the change in output of coleus/turmeric.

2.1.2.2. Return

2.1.2.2.1. Gross Return

Tandon and Dhondyal (1971) defined gross return as the difference between the total money income which a farmer would receive from the sale of the produce and the total expenses incurred in producing it.

Chaukan *et al* (1972) included the value at prevailed prices of retained as well as marketed crop output and also the income from allied activities such as dairy, goats and poultry under gross farm income.

Kahlon *et al* (1972) defined gross income as income from farm and non-farm sources and also borrowings from institutional and non-institutional resources.

According to Carlin and Reinsel (1973), gross income included the income derived through farm and non-farm sources. Non-farm income included wages and salaries, rental income, interest, dividends, retirement pension, social security and other transfer payments.

Mani (1982) calculated farm income by adding the value of crop and livestock products, value of FYM, sale of livestock, farm equipment and bullock labour and non-farm income from such sources as services.

Jeyakumar (1999) conceptualized income as the sum total of income received by all members of the family working in different categories or the same kind of work. The source of income included, farm, non-farm and any assistance from government programme.

In the present study, gross income is defined as the income from coleus/turmeric and other crops and income from livestock enterprises, off-farm and non-farm sources.

2.1.2.2.2. Net Return

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.

Mishra and Gupta (1975) opined that income from farming included income from all enterprises after making deduction for cultural, maintenance and other expenses, which were paid by the family in cash and in kind in raising the various enterprises of the farm.

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

For the present study, net income is conceptualized as the gross income minus total cost incurred for all crop activities of the farm.

2.1.3. Income Distribution

Lorenz Curve and Gini Ratio

According to Palanisami *et al* (2002), one of the most useful graphical representations of distribution of income was Lorenz curve and it was used to show the distribution of income. The Lorenz curve was constructed by plotting cumulative percentage share of income against the corresponding cumulative percentage share of households and successively joining the points by a smooth curve. The distribution of income was evaluated through the estimation of Gini ratio which was defined as twice the area between Lorenz curve and egalitarian line. This ratio varies between zero (for total equality) and one (for total inequality).

In the present study, the income distribution was studied by means of Lorenz curve and Gini ratio.

2.1.4. Resource Use Efficiency

Heady (1957) defined resource use efficiency only in terms of a choice indicator. He used the price ratio as the efficiency measure by which decisions could be made. He set down the necessary condition for the use of variable resources to a fixed factor as equality of the factor product price ratio to the marginal productivity of resources.

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.

Rajendran (1978) used net income per acre of chilies, returns to capital investment and labour earning per employed man day as the measures of efficiency.

In the present study, resource use efficiency was measured both in terms of physical efficiency and by computing the ratios of the value of marginal product to the price of respective inputs that significantly influenced production.

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 was maxmimum, 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 Shanmugham 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 activity 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.

For the present study, technical efficiency is defined as the degree to which the actual output of the production unit approaches to the maximum. The overall technical efficiency can be decomposed in to the pure technical efficiency and the scale efficiency.

2.1.6. Employment

Bishnoi (1966) defined employment as a state of being engaged in productive work. It should be continuous and intermittent but should have sufficient amount of man hours, or man days of work rendered and the income accruing from it should be commensurate with the efforts made.

According to Srivastava (1966), agricultural employment included labour spent on crop production and other farm work, labourer gratis and those exchanged in farm work.

Mouly (1972) defined employment as a situation in which remuneration in cash or kind was received in exchange for active, direct and personal participation in the production process.

Krishna (1973) identified four major criteria according to which person would be called employed or unemployed. They were: time, income, willingness and productivity.

Smith (1976) opined employment as a state in which a person combined his/her physical and/or mental efforts with other resources including other human effort in a production process.

Visaria (1980) counted all those who have worked for at least ten days or more during the month of interview or season preceding the survey as employed.

Krishnaraj (1982) defined employment on the basis of time criterion. A person was said to be fully employed, if he obtained employment for 300 days or more during the reference year.

Selvaraj (1985) explained three types of employment for household labour force viz., on-farm, off-farm and non-farm employment. Off-farm employment, referred to wage employment of family labour in agriculture outside their own farm while non-farm employment included wage employment as well as self employment in non-agricultural operations.

Jain (2000) viewed that if a person worked at least for one hour, but less than four hours a day, he would be considered to have employed for half a day. On the contrary, if he had worked for four hours or more during the day, he would be considered as employed for the whole day.

In the present study, employment of farmers was defined as the total man days per annum involved in the production of various crops on their own farm.

2.1.7. Marketing

Khols (1967) defined marketing as the performance of all business activities involved in the flow of goods and services from the point of initial agricultural primary production until they were in the hands of the ultimate consumers.

Gill (1972) defined marketing as the one that would include all intermediaries and functions which happen to fall in the channel to move the farm produce from the farms to the consumers.

According to Chinnapa (1998), marketing could connote different stages at which farmers would convert their hard labour, sacrifice and other inputs into cash. It would start with decision making to produce a particular crop and would involve all operations in moving the produce from the producer to consumer.

In the present study, marketing is defined as all the business activities performed by producer, contracting firm and other intermediaries to facilitate the transfer of produce from the production point to the ultimate user.

2.1.7.1. Marketing Cost

Sumathi (1992) considered marketing cost as the costs of packing and transportation, commission charges and all other expenses in bringing the produce from the grower to the ultimate consumer.

According to Singh *et al* (1994), marketing cost would indicate the difference between the price received by its producer and price paid by the final consumer in a more or less perfect market. It included the cost of transportation, labour, and taxes such as *octroi*, market fee, sales tax, commission and brokerage deductions and other storage and insect damages.

According to Nawadkar *et al* (1995), marketing cost constituted the expenses on items like packing, transportation, *hamali*, weighing charges, commission, market fees, postage, etc.

Vaseeharan (1997) defined marketing cost as all the costs incurred by an agency in moving the produce from one stage to another in the marketing channel.

In the present study, marketing cost is defined as the actual expenses incurred by farmers in selling coleus/turmeric output.

2.1.7.2. Marketing Loss

According to Dileep *et al* (2002), marketing losses included loss in transport, cut in weight, storage loss incurred in the transferring of tomato from the production point to ultimate users.

In the present study, marketing loss is defined as the losses in transport and storage losses while transferring coleus/turmeric from production point to market centres.

2.1.8. Uncertainty

Uncertainty refers to future events where the parameters of probability distribution cannot be determined empirically or quantitatively.

Raipuria (2002) pointed out that the future markets would serve as a risk shifting function and can be used to lock-in prices instead of relying on uncertain price developments. .

In the present study, yield/price uncertainty were measured by dividing the difference between of highest probable yield/price and lowest probable yield/price for coleus/turmeric with the average most probable expected yield/price.

2.2. Review of Results of the Past Studies

2.2.1. 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.

According to Kusterer *et al* (1990), the farmers generally found that the contracts were biased and enforced strictly, firms provide poor extension service, over-price their services, pass on the risk to the producers, offer low prices of the produce, favour large farmers, delay payments, did not provide compensation for natural calamity- loss, and do not explain the pricing method.

According to Fulton and Clark (1996), 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 than the farmers, and they had become dependent on the firms for getting credit and other inputs.

Reddy (1997) reiterated that the corporatisation of agriculture through contract farming arrangement will alter the agrarian relations against the small and marginal farmers who may ultimately lose their land rights and get converted as wage earners.

Siddiqui (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 (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.

Ramesh *et al* (1999) studied on gherkin contracts in Tamil Nadu and tomato contracts in Punjab showed that the technical guidance regarding plant protection and harvesting was given by field officers of contract firms.

Haque (2000) studied 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.

Suckpal 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).

Ravinder Kaur and Amandeep Kaur (2000) studied that flower seed production under contract farming had emerged one of the income and employment generating professions in many countries and particularly in Punjab state (India).

Eaton and Shepherd (2001) revealed that the small and marginal farms found it difficult to cultivate lucrative and new processable crops because of the marketing problems and price risk involved. Contract farming can be a possible solution to this regard.

2.2.2. Cost and Return

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) reported that the cost of potato cultivation has been found 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.

2.2.3. Income Distribution

Velmurugan (2001) found that Lorenz curves were away from the line of equality in all income distribution groups. The income inequality was pronounced more in all categories of income distributions in Unrehabilitated Tank Command (URTC) than in Rehabilitated Tank Command (RTC). On comparison among the income distributions in URTC, it was found that Lorenz curve for the family labourer income distribution of farm households was farther away from line of equality followed by the wage income distribution and crop income distribution curves. The Gini ratio for family labourer income of farm households, wage income of Landless Agricultural Labour (LAL) households and crop income of farm households was 0.41, 0.38 and 0.28 respectively indicating greater degree of inequality in that order while in case of RTC it was 0.28, 0.25 and 0.19 in that order.

According to Kalamani (2001), the inequality in income distribution could be studied with the help of Lorenz curve and Gini co-efficients analyses. The estimated Gini co-efficients were 0.27 and 0.37 in irrigated and dry blocks respectively, which would reveal that the distribution of income among the sample respondents was moderate or medium in both the cases. Compared to irrigated blocks, the inequality in income distribution was more pronounced in dry blocks. Among the irrigated blocks, the sample households in canal irrigated block had more of uneven distribution of income than those in other blocks viz., tank irrigation, well irrigation and dry block.

Rajini (2002) studied the inequality among the sample respondents in all the categories of the farms by means of Lorenz curve and Gini ratio. The estimated Gini co-efficients were found to be 0.42, 0.28, 0.36 and 0.39 in the case of irrigated, dry, less diversified and more diversified farms respectively. Comparatively, inequality in the income distribution was more in irrigated as well as diversified farms.

2.2.4. Resource Use Efficiency

Sirohi and Gangwar (1968) studied the economic optima in resource allocation for irrigated land and unirrigated lands. The study revealed that when the irrigable land was fully utilized, it's 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 and Dhar (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.

Reddy *et al* (1989) analysed resource use pattern in the compounded area of Upper Krishna Project in Karnataka and concluded that educating the farmers for reorganisation of resources with the existing level of own funds and crop loan facilities would enable them to realize better net farm return.

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 at different size group 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) analysed 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.

Sunanda and Narender (2003) studied the resource productivity of mesta farms in Srikakulam district of Andhra Pradesh and revealed that the cultivation of jute involved intensive human labour in addition to manures and fertilizers, seed and cattle labour. The Cobb-Douglas production function analysis for these variables indicated constant returns to scale on all farm size groups. The marginal value product to opportunity cost ratios for all farm size groups revealed that there was a scope for adjustments and reorganisation of resources, so as to obtain high returns in mesta cultivation.

2.2.5. Technical Efficiency

Xiaosang 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 46.5 to 96.7 per cent) across the sample farms and it was time invariant. The mean technical efficiency was computed as 82.0 per cent, which indicated that on an average, the realized output could be increased by 18.0 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 29.4 per cent of the total farms that operated large farm (estates) belonged to the most efficiency category (96.0 to 99.0 per cent) and 8.8 per cent in the least efficient group (64.0 to 70.0 per cent). It was also observed that farm specific technical efficiency varied between 0.64 to 0.99 with mean technical efficiency of 0.88.

2.2.6. Employment

Sen (1975) discussed three aspects of employment in his study. They were income, production and recognition. The income aspect of employment gave an income to the employed, the production aspects of employment yielded an output and the recognition aspect of employment gave a person the recognition of being engaged in something worth while.

Guaraha and Gupta (1993) examined the level of wages paid, employment, income and expenses of marginal farmers with size less than one hectare each. On comparison of two groups in those aspects, earnings in canal irrigated village was more than that of tube well irrigated village group.

2.2.7. Marketing

2.2.7.1. Marketing Cost

Dileep *et al* (2002) reported that the contract farmers of both the processing firms (Hindustan Lever Limited and Nijjer Agro-foods Limited) had to bear very high transportation charges of Rs. 55 per quintal which were about three times that of the non-contract farmers, though their loading and weighing charges were very less in tomato crop. The non-contract farmers had to bear grading, packing in *tokris*, unloading, commission and other charges.

2.2.7.2. Marketing Loss

Dileep *et al* (2002) reported that the transportation losses incurred by the tomato contract farmers were very high as the bulk loading of the ripened produce led to heavy juice leakage while transporting over a long distance. The Nijjer Agro Foods Ltd (NAL) contract farmers faced a compulsory cut in weight on their produce for which they had borne an additional product loss of about 28 qtl/ha. In the case of non-contract farmers, large farmers incurred more storage loss, followed by medium and small farmers as they transported the produce to distant places.

2.2.8. Uncertainty

Dileep *et al* (2002) found that the contract farming system for tomato considerably reduced the yield uncertainty which was attributed to improved quality seedlings supplied and a steady technical guidance by the field executives of the processing firm and completely removed the price uncertainty among its farmers, where as it was very high in the case of non-contract farmers.

Ramaswamy *et al* (2004) found that the contract farmers faced zero price uncertainty while the coefficients of variation of prices received by non-contract farmers ranged from 6 to 27 percent. Production risks were also lower for contract farmers and this was attributed to the supply of better quality seedlings by the processor.

Tripathi *et al* (2005) reported that the yield uncertainty had been less in contract than non-contract potato production. There has been no price uncertainty in the contract farming of potato whereas in the non-contract farming system, it existed to a larger extent due to variations in the price of potatoes in the market.

Arya and Asokan (2005) argued that contract farming was an institutional innovation to reduce the uncertainties in the market. Under the arrangement, production risk remained with the farmer while market risk was transferred to the buyer. Contract farming insulated the farmers from the volatility of the market and assured them certain income.

Venkatram and Venkatesan (2005) revealed that a contractual arrangement in the cultivation of medicinal plant was slowly emerging as the system that could minimize the risks. Though the price offered to farmers through the contract arrangement had been found lesser than that of the non-contract farming, the prevailing price and market uncertainty, monetary and technical inputs delivered by the contracting firm and consequent higher yields and net profit were found to offset the higher price offered by the middlemen through non-contractual practices.

2.2.9. Constraints Faced by the Medicinal Plant Growers

Jeyasubramanian (1996) reported that the lack of information on the cultivation of medicinal plants was the major constraint as expressed by 79 per cent of the growers. Lack of guidance while purchasing seeds, seedlings, and saplings was another important constraint as reported by 64 per cent of the respondents.

Ramu and Suguna (1999) opined that due to the development of synthetic drugs, the medicinal plants have been pushed behind the scene.

Vijayalakshmi (1999) reported that lack of standard cultivation packages/agro-technologies, there were no established sources to obtain authentic or genuine planting materials like seeds and plantlets. Lack of credit and marketing were the other major constraints expressed by a majority of the medicinal plant growers.

Ramesh (1999) found that because of contract farming, farmers lost their independent decision making and management capability in farming. Adoption of new technologies and input decisions were taken at the company level. In course of time, contract farmer will make fewer and fewer decisions, to the extent to reduce themselves to the status of industrial workers.

Anand (2000) revealed that lack of required management and agricultural expertise and lack of financial resources were the major constraints faced by the medicinal plant growers.

Maiti (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.

Prabhakar (2000) revealed that lack of agencies to supply good quality seed, non availability of labour in time and insufficient researches 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.

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.

Kurian *et al* (2002) observed the following as the main constraints in the cultivation of medicinal plants: poor extension and development services, lack of production of seed/planting materials, absence of demonstration farms and herbal gardens, unorganized trade and poor financial support.

Sundar (2002) revealed 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.

Ravinder Kaur and Amandeep Kaur (2000) observed that intensive labour, lack of relevant literature and lack of training were the main problems faced by the flower seed producing farmers in Ludhiana district. Lack of awareness on contract farming among farmers and delay in the export of seeds due to non-cleaning of seed by the farmers were the major problems faced by all the contracting agencies.

Ajit Kumar Singh (2001) 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.

Grover *et al* (2002) revealed that reduction in weight, rejection of the produce by contracting firm, lower contract price, lack of adequate number of processing units were the major constraints in the marketing of tomato by the farmers.

Saravanan and Shivalinge 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.

2.2.10. Garrett's Ranking Technique

Vaseeharan (1997) employed the Garrett's scoring technique to analyse the problems in cultivation and marketing of periwinkle and senna. He found that inadequate rainfall and non-availability of labour were the major problems in cultivation of senna. As regards marketing, high transportation cost, price fluctuation 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.

Jayachandran (2002) observed that among 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.

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 designed. Hence, in this chapter, a brief description about the methodologies 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 analyses

3.1. Selection of the Study Area

In Tamil Nadu, medicinal crops i.e., senna, periwinkle and coleus are being cultivated largely under contract farming. However, there were a very few studies on the economics of medicinal plants in Tamil Nadu. In particular, there is no study in coleus contract farming, so far. Hence, it was decided to study the economics of the coleus cultivation in Salem District where it is largely cultivated. In addition to coleus, turmeric cultivated under contract farming system was also selected for the present study in order to compare the economic benefits of these two competitive crops under contractual arrangement in Salem District.

In Tamil Nadu, coleus is largely being cultivated in districts of Salem, followed by Villupuram, Perambalur, Dindigul and Tiruvannamalai. (Table.3.1). Salem District was purposively selected for the present study because, the area under coleus was maximum in Salem district. Among the taluks in Salem district, the Gangavalli which had more area under coleus, was purposively selected for the present study.

Table 3.1. Area of Coleus under Contract Farming in Selected Taluks of Tamil Nadu (2004-05)

S.No	District/Taluk	Area (Ha)
1.	**Salem District**	
i)	Gangavalli	560
ii)	Attur	420
2.	**Villupuram District**	
i)	Kallakurichi	440
ii)	Sankarapuram	400
3.	**Thiruvannamalai District**	
i)	Thiruvannamalai	480
4.	**Vellore District**	
i)	Thiruthani	320
5.	**Other Districts**	80
	Total	2700

(Source: MGP Herbals Care Private Limited, Salem)

As far as turmeric was concerned, it is being largely cultivated in Erode district followed by Salem (Table.3.2). But, area under contract farming system for turmeric was more in Salem district and hence, Salem district was selected purposively. In Salem district, Gangavalli and Attur taluks had larger turmeric area under contract farming. Hence, these two taluks were selected.

Table 3.2. Area, Production and Productivity of Turmeric in Different Districts of Tamil Nadu during 2003-04

S.No	District	Area(ha)	Production(tonnes)	Productivity (kg/ha)
1.	Villlupuram	1112	3918	3523
2.	**Salem**	**2768**	**7243**	**2617**
3.	Namakkal	1161	5105	4397
4.	Dharmapuri	1659	4114	2480
5.	Krishnagiri	448	1111	2480
6.	Erode	5862	32566	5555
7.	Coimbatore	1786	7945	4448
8.	Others	1385	5248	3789
	Total	16181	67250	4156

Source: Season and Crop Report, 2003-04.

The study was conducted by selecting the sample contract farmers who supplied the produce to MGP Herbal Care (P) Ltd, the only coleus processing company in the state. This company had 15 branch offices spread over various regions in Tamil Nadu.

3.2. Sampling

3.2.1. Sampling Design

For the collection of primary data from coleus farmers, Gangavalli taluk of Salem district was selected purposively as it had more coleus area under contractual arrangement. The respondent farmers were selected from top six coleus growing villages (Sathapadi, Othiathur, Naduvalur, Kadambur, Gudamalai and Veeraganur of Gangavalli taluk) wherein contract farming was in operation. Ten farmers were selected from each of the selected villages (totally, 60 farmers), using random sampling technique. Five non-contract farms which cultivated coleus were also selected randomly from each of these selected villages (totally, 30 farmers) in order to compare their efficiency with that of contract farms.

Similarly, for studying the economics of turmeric cultivation under contractual system, six villages (Mangini, Othiathur, Sathapadi, Irugur, Thalaivasal and Siruvachur spread over two taluks namely, Gangavalli and Attur) were selected. Then, ten farmers who cultivated turmeric under contractual agreement were randomly selected from each of these selected villages (totally, 60 farmers). Five non-contract farms which cultivated turmeric were also selected randomly from each of these selected villages (totally, 30 farmers) for comparing their efficiency with that of contract farms (Table. 3.3).

3.2.2. Study Period

The agricultural year of July 2004 to June 2005 was fixed as the reference period for the study. The primary data were collected during the months of November and December, 2005.

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, area under various crops, inventory of resources, cropping pattern, extent of farm inputs used, cost and returns of crop and livestock activities, maintenance of fixed assets, utilization of family labour and permanent labour, marketing details of farm products, contractual arrangements and problems faced by the farmers as well as the company in executing the contractual agreements were obtained.

Table 3.3. List of Sample Villages and the Number of Farmers Selected in the Study Villages

S.No	Name of the Villages	Coleus		Turmeric	
		No.of CF	No. of NCF	No.of CF	No. of NCF
I.	**Gangavalli Taluk**				
1.	Sathapadi	10	5	10	5
2.	Othiathur	10	5	10	5
3.	Naduvalur	10	5	-	-
4.	Kadambur	10	5	-	-
5.	Gudamalai	10	5	-	-
6.	Veeraganur	10	5	-	-
7.	Thalaivasal	-	-	10	5
II.	**Attur Taluk**				
8.	Mangini	-	-	10	5
9.	Irrugur	-	-	10	5
10.	Siruvachur	-	-	10	5
	Total	60	30	60	30

The branch officers of the contract firm in the study area maintained the data on quantities of produce supplied by the farmers, inputs supplied to them, area under the crop, date of sowing and advance payments made to the farmers. These secondary data pertaining to sample farmers were also collected from the concerned branch offices and were used in the analysis.

3.4. Methods of Analysis

First, the methods of measuring certain important variables are described as follows:

3.4.1. Measurements of Variables

Cost of Cultivation

The total cost of cultivation would include fixed and variable costs.

3.4.1.1. Fixed Cost

Fixed costs refer to the sum of expenditures which will be incurred irrespective of output level. These are relatively long-run costs. The fixed costs comprised of rental values of land, interest on owned fixed assets, depreciation of owned fixed assets like farm buildings, irrigation structures, farm machineries, etc and land revenue. The interest rate for fixed capital was twelve per cent per annum.

3.4.1.2. Variable Cost

Variable costs represent the sum of expenditure on variable inputs which vary with the level of output. These are short-run costs.

Material Cost

The value of farm yard manure, seeds, manures, fertilizers and plant protection chemicals (whether owned or purchased) were included in the variable costs.

Human Labour

It was measured in man days for the purpose of standardizing the work units of different categories of labour. In this study, two women were equated to one man and four juvenile labourers were considered equivalent to one man day unit based on market wage rate prevailing for them. On an average, the daily wage rates for male, female and juvenile were Rs. 100, Rs. 50 and Rs. 25 respectively. Family labour and hired labour were treated alike.

Machine Power

The cost of owned machine power was computed at the prevailing custom hire charges.

Seed Cost

Seeds and seedlings were valued at actual prices paid and the cost of farm produced seeds was imputed at prevailing market price.

Interest on Working Capital

The interest for short term credit i.e., fourteen per cent per annum was charged on working capital.

3.4.1.3 Cost Concepts

Various cost concepts were developed by economists in order to assess the returns to the factors of production. In the present study, the cost concepts used by Acharya and Agarwal (1994) were used for the estimation of various costs as given below:

$$\text{Cost } A_1 = \sum_{i=1}^{14} Xi$$

X_1 = Value of hired human labour

X_2 = Value of hired animal labour

X_3 = Value of owned animal labour

X_4 = Value of owned machine power

X_5 = Charges of hired machinery

X_6 = Value of seeds (farm grown and purchased)

X_7 = Value of insecticides and pesticides

X_8 = Value of manure (owned and purchased)

X_9 = Value of fertilizers

X_{10}= Depreciation on machineries, implements and farm buildings

X_{11} = Irrigation charges

X_{12} = Land revenue and other taxes

X_{13} = Interest on working capital

X_{14} = Miscellaneous expenses

Cost A_2 = Cost A_1 + Rent paid for leased in land

Cost B_1 = Cost A_1 + Interest on owned fixed capital (other than land)

Cost B_2 = Cost B_1 + rental value of owned land (net of land revenue) + rent paid for leased in land.

Cost C_1 = Cost B_1 + Imputed value of family labour (evaluated at wages of hired farm servant)

Cost C_2 = Cost B_2 + Imputed value of family labour (evaluated at wages of hired farm servant)

Cost C_3 = Cost C_2 + 10 percent of cost C_2 to account for the value of management input of the farmer.

3.4.2. Tools of Analysis

3.4.2.1. Conventional Analysis

The conventional methods of analysis viz., percentage and average analysis were carried out to estimate the distributions of socio-economic variables such as age, sex, education, experience in farming, land holding pattern, etc of the sample farm households. The cumulative percentages calculated by the addition of successive percentages estimated were used for the interpretation of distribution of income and for construction of Lorenz curve.

The tabular analysis was adopted to analyse the costs and returns, to determine the resource structure, to analyse the marketing costs and losses, and to study the various problems faced by the farmers. The analysis was done for three categories of small, medium and large farmers under both contract and non-contract farming system separately.

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, namely, contract farms and non-contract farms under coleus and turmeric.

3.4.2.2.1. Resource Use Efficiency

Production Function

In the present study, the production function approach was used to identify and evaluate the factors influencing the productivity of coleus (and also for turmeric) in the case of contract farms and non-contract farms. In the production process, the average productivity 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.

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 level of significance.

After examining the scatter diagram, 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:

$Y = a\ X_1^{b1}.\ X_2^{\ b2}\ .X_3^{b3}\ .\ X_4^{b4}.U$

Where,

Y = production of coleus/turmeric (Kg/ha for coleus and Quintals/ha for turmeric)

X_1 = Human labour (man days/ha)

X_2 = Machine power (tractor hours/ha)

X_3 = Expenditure on manures and fertilizers in rupees (Rs/ha)

X_4 = Expenditure on plant protection chemicals in rupees (Rs/ha)

B_i = (i=1 to 4) are the regression coefficients of factor inputs

U = Error term

Resource-use efficiency can also be measured on the basis of marginal value productivity (MVP) and the marginal factor cost (MFC) of a particular input. MVP indicates the change in the gross return from the use of an additional unit of a given input while keeping the level of other inputs constant. In this present study, the resource-use efficiency was worked out by comparing MVP with the corresponding MFC. The marginal value product (MVP) of the i^{th} input factor was measured by using the following formula:

$$MVP = b_i \left(\frac{\bar{Y}}{\overline{Xi}} \right) P_y$$

Where,

$\bar{Y}$ = geometric mean yield of coleus/turmeric per hectare

$\overline{Xi}$ = geometric mean level of i-th resource

b_i = production elasticity of i-th input

P_y = price of the product

3.4.2.2.2. Technical Efficiency

In the present study, an attempt was made to measure the efficiency of crop production of contract farmers and non-contract farmers for coleus as well as turmeric using stochastic frontier production function.

Frontier Production Function

Aigner *et al* (1977) developed a stochastic frontier model. This model was employed to measure technical efficiencies of the contract farmers and non-contract farmers. This will be useful to compare the resource use efficiencies between the two groups of farms. The concept of production frontier is the same as that of production that describes the greatest possible output from a given combination of inputs. (i.e.,) it is a 'production frontier'. Therefore, failure to operate on the production frontier is technical inefficiency.

The measurement of inefficiency is the main motivation of the study of frontiers. Farell (1957) in his seminal paper elaborated the concept of technical efficiency. It involves the firm's ability to obtain the maximum output from a given set of input or resources. If a firm uses the best practices/ method and could achieve the maximum output with a given inputs and technology, it is likely to be superior to another firm, which does not get the same output with the similar bundle of inputs and technology.

The estimation of production frontier has processed along the two general paths, namely i) Deterministic frontier and ii) Stochastic frontier. In the present study, the stochastic production frontier was estimated.

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.

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

Where,

Q_i is the output of the i th farm

X_i is the vector of K inputs of the i th farm

β is the vector of parameters to be estimated and

$\sum i$ a 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 Vi 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 $Vi \approx N\,(0, \sigma^2_v)$. 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 which may prevent the farm from achieving its fully potential.

Density function can be written as,

$$\sigma_u(U_i) = \frac{1}{\sigma_u\sqrt{\frac{1\left(\frac{-1}{2ui^2}\right)}{2\pi}}} \qquad \text{if } U_i \geq 0$$

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

It follows that $\sigma^2 = V(\sum\sigma^2)$

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

Further defining $\lambda = \sigma_v / \sigma_u$,(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.

Aiger *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.

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

$$\gamma = \sigma_v^2 / \sigma_u^2$$

γ is an indicator of relative variability of U_i and V_i that differentiates that actual yield from the frontier.

There are two interesting points of the above γ

Where σ_v^2 is tending to zero, which implies that U_i is the pre-dominate error, then $\gamma = 1$. This means that farmer's yield difference from the increasing feasible yield is mainly because he did not use best practice or technique.

When σ_u^2 is tending to zero, which implies that the symmetric error term, V_i is the predominant error. γ will be tending to zero. This means that the farmer's yield differences from the frontier yield is mainly because of either statistical error or external factors not included under this model. Maximum Likelihood Method may obtain direct estimates of stochastic production frontier model. In the present study, MLE Method is used to estimate the farm technical efficiency (as used by Olsen et al. (1980), Aigner *et al* (1997), Kutaula (1993) and Arindam Banik (1994).

In the present study, the following assumptions were made while specifying of a stochastic frontier. The frontier is stochastic in nature due to factors beyond human control and symmetrically distributed error term present in it is responsible to capture the effects of outside random effects observation 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.

3.4.2.3. Income Distribution and Lorenz Curve

As one of the objectives of the study was to assess the impact of contract farming on income and employment, the following tools were used.

Income Distribution

To construct the income distribution table, the number of income classes were decided by Yule's formula, i.e., $2.5 \times n^{1/4}$ where n is the total number of observations. The class interval (CI) was then formed out by using the following formula:

$$CI = \frac{\text{Maximum income value in the data set} - \text{minimum income value in the data set}}{\text{Number of classes}}$$

The discontinuous classes were taken for the income classification and were given accordingly.

Lorenz Curve

One of the most useful graphical representations of distribution of income is Lorenz curve and it was used to show the distribution of income (Palanisami *et al*, 2002).

The Lorenz curve was constructed by plotting cumulative percentage share of income against the corresponding cumulative percentage share of households and successively joining the points by a smooth curve.

The area between the egalitarian line or line of equality and the Lorenz curve represented the degree of inequality i.e., wider the area, larger was the inequality in the distribution of income. Lorenz curves were drawn for coleus crop income and turmeric crop income for both contract farms and non-contract farms.

3.4.2.4. Gini Ratio

The area enclosed between the Lorenz curve and egalitarian line or line of equality was taken as a measure of income inequality. The distribution of income was evaluated through the estimation of Gini ratio which was defined as twice the area between Lorenz curve and egalitarian line. This ratio varies between zero (for total equality) and one (for total inequality). The important feature of Gini ratio is that equi-proportional increase at all income levels would not affect the Gini ratio (Palanisami *et al.,* 2002). However, it is sensitive to disproportionate changes at all levels of income.

$$\text{Gini ratio} = 1 - \sum_{j=1}^{n} P_j \left(Y_j - Y_{j-1} \right)$$

Where,

P_j = proportion of households in the jth group

Y_j = cumulative proportions of income in the jth group

Y_{j-1} = cumulative proportions of income in the (j-1)th group

n = total number of groups

3.4.2.5. 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:

$$\text{Yield Uncertainty Ratio (YUR)} = \frac{\text{Average Highest Probable Yield} - \text{Average Lowest Probable Yield}}{\text{Average Most Probable Expected Yield}}$$

$$\text{Price Uncertainty Ratio (PUR)} = \frac{\text{Average Highest Probable Expected price} - \text{Average Lowest Probable Expected Price}}{\text{Average Most Probable Expected Yield}}$$

3.4.2.6. 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:

$$\text{Percent position} = \frac{100\ (Rij - 0.5)}{N_j}$$

R_{ij} = Rank assigned for the i th category by the j th group

N_j = Number of constraints assigned 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.

3.4.2.7. Contractual Arrangements

The type of contractual arrangements and regular interactions between the farmers and the organization were the major determinants of the success of contract farming. These specific information were elicited from the sample farmers and were tabulated.

Percentages were computed for relevant aspects like source of information for the crop introduction, type of agreement, satisfaction level with the company, farmer's expectations, preference of coleus crop in the cropping system, effect of coleus crop on succeeding crop, details of payments and various other problems faced by the farmers.

CHAPTER IV
DESCRIPTION OF THE STUDY AREA

The results of any research cannot be properly understood, unless the background information, such as physical, social, and economic condition of the region, is highlighted. This will help in correlating the results with the actual field condition. Hence, information regarding the geographical location, rainfall distribution, source of irrigation, land use pattern, cropping pattern, demography and general environmental features of the study area are given in a bird's eye view in this chapter.

4.1. Location and Topography

Salem district is situated between 11^{o} and 12^{o} $55^{''}$ of the northern latitude and between 77^{o} 28" and 78^{o} 50" of the eastern longitude. The average altitude of the district is 300 metres above Mean Sea Level.

Salem district is placed in the North Western Agro Climatic Zone and it can be divided into two portions by the Cauvery and the Vellar river systems with the Attur taluk on the east and Salem benefited by Vellar irrigation system and Omalur and Mettur taluks on the west of Salem benefited out of Cauvery irrigation system.

Besides the above two zones, the hilly Yercaud taluk consists of a circle of hillocks called Sheveroy hills with varying elevations ranging from 1372 to 1463 metres. The Kalrayan hill is situated in Attur taluk. Another important hill is Kanjamalai in Salem taluk. A few isolated hills and ridges are scattered all over the southern taluks of Attur and Sangagiri, These hills, valleys and high and low altitude topography contribute to the characteristic physiography of the district.

4.2. Climate and Rainfall

The maximum temperature in Salem district was 34^{o} C and minimum temperature was 22^{o} C with the mean of 28^{o} C in 2004-05.

The amount of rainfall received in the selected area is given in table.4.1. North east monsoon contributed a major share of the total annual rainfall in Salem district with

36 per cent and it was 43 per cent in Gangavalli and 41 per cent in Attur taluks. South west monsoon accounted for 33 per cent in Salem district and 40 per cent in Attur taluk. In Gangavalli taluk summer showers accounted for 36 per cent followed by South west monsoon (21 per cent).

Table 4.1. Rainfall Distribution (2004 - 05)

Season	Months	Rainfall (mm)		
		Salem district	**Gangavalli Taluk**	**Attur Taluk**
1.Southwest monsoon	June - Sep	283.3 (33.33)	130.7 (21.06)	270.7 (40.37)
2.Northeast monsoon	Oct - Dec	305.9 (35.98)	269.7 (43.46)	274.8 (40.98)
3.Winter season	Jan - Feb	5.9 (0.69)	-	-
4.Summer season	March - May	254.9 (29.98)	220.2 (35.48)	125 (18.43)
Annual rainfall		850	620.6	670.5

(Figures in parentheses denote percentage to the total)

Source: Joint Directorate of Agriculture, Salem

4.3. Population

The total population of the district was 30.16 lakhs as per 2001 census. It could be seen from Table 4.2. that the rural population was more which accounted for 53.11 per cent. The male population was higher (51.84 per cent of total population) than female population (48.16 per cent). The literate population in the district was 57.50 per cent. About 58.91 per cent of the total literate population were males.

Table 4.2. Demographic Characters of Salem District (2003 -04)

S.No	Particulars	No. of person	Male	Female
1.	Total population	3016346	1563633	1452713
		(100.00)	(51.84)	(48.16)
2.	Rural population	1626162	852453	773709
		(100.00)	(52.42)	(47.58)
3.	Urban population	1390184	711180	679004
		(100.00)	(51.56)	(48.84)
4.	Literate population	1734442	1021772	712670
		(100.00)	(58.91)	(41.09)
5.	Density of population (Number per sq. km)	573		

(Figures in parentheses are percentage to total)

Source: District Statistical Hand Book, 2003-04.

4.4. Land Use Pattern

Land use pattern would help to study the usage of land for various economic activities and hence, the study of it would be useful in planning the use of land resource.. Land use pattern in Salem district is presented in Table.4.3. It could be seen from table that the net area sown accounted for 47.46 per cent of the geographical area of the Salem district, while it was 57.95 per cent in Gangavalli and 28.71 per cent in Attur taluks

Forests accounted for 24.15 per cent in Salem district, while it was 31.84 per cent in Gangavalli taluk and 21.48 per cent in Attur taluk. This would indicate that the forest coverage was less than the minimum prescribed area i.e., one third of the geographical area, in order to have all ecological balance. Cropping intensity was more in Attur taluk (132.14 per cent). Barren and uncultivable lands accounted for 20.24 per cent in Attur, it was much higher than Gangavalli taluk. The area under cultivable waste, current fallow and other fallow together accounted for 16 per cent in Attur taluk and one per cent in Gangavalli taluk, while the corresponding figure of the district was 8 per cent. These waste lands can be brought under cultivation through proper land reclamation and other land use planning strategies.

Table 4.3. Land Use Pattern in the Study Area (2003 - 04)

S.No	Land Utilization Details	Area (ha)		
		Salem District	Gangavalli Taluk	Attur Taluk
1.	Forest	125682	16733	6980
		(24.15)	(31.84)	(21.48)
2.	Barren and Uncultivable lands	39098	2563	6578
		(7.51)	(4.88)	(20.24)
3.	Land put to non-agricultural purposes	57383	2054	3203
		(11.02)	(3.91)	(9.85)
4.	Cultivable waste	4809	315	260
		(0.92)	(0.60)	(0.80)
5.	Permanent pasture and other grazing lands	4206	105	714
		(0.81)	(0.20)	(2.20)
6.	Land under miscellaneous tree crops	3165	122	392
		(0.61)	(0.23)	(1.21)
7.	Current fallow	28987	97	2517
		(5.57)	(0.18)	(7.74)
8.	Other fallow	10140	108	2525
		(1.95)	(0.21)	(7.77)
9.	Net area sown	247060	30450	9332
		(47.46)	(57.95)	(28.71)
10.	Area sown more than once	43882	5250	3000
		(8.43)	(9.99)	(9.23)
11.	Total cropped area	290942	35700	12332
		(55.89)	(67.94)	(37.94)
12.	Total Geographical area	520530	52547	32501
		(100.00)	(100.00)	(100.00)
13.	Cropping Intensity (%)	117.76	117.24	132.14

(Figures in the parentheses are percentage to total)

Source: Joint Directorate of Agriculture, Salem and Season and Crop Report, 2003-04.

4.4.1. Soil Type

The soil type influences the cropping pattern and other input requirements. Hence, the information on various soil types, their potentials and limiting factors are necessary for effective utilization of these natural resources in an optimum level. Salem district has two major types of soil viz., red loamy soils (Irrugur series) and black cotton soils (Thulukkanure series).

4.5. Cropping Pattern

A study on the cropping pattern helps in deciding the input consumption in agriculture. The details of cropping pattern followed in the study area i.e., the Salem District is furnished in Table.4.4. The principal crops grown in this district were ground nut, jowar, tapioca, paddy, ragi, coconut, maize, cotton, sugarcane, turmeric and so on.

From Table.4.5. it can be inferred that oilseeds are being predominantly cultivated in Salem district followed by vegetables. Coleus is being cultivated in 1200 ha of land which account for 0.41 per cent, while turmeric accounted for 0.95 per cent. Fodder crops accounted for 10.51 per cent. Ground nut accounted for a major share of 8.28 per cent, followed by jowar (8.26 per cent) and tapioca (8.20 per cent).

4.6. Sources of Irrigation

A major factor deciding consumption of fertilizer and pesticides is the availability of irrigation facilities. Different sources of irrigation are presented in Table.4.5. It was found that open wells were the major source of irrigation in Salem district which accounted for 82.89 per cent followed by tube wells which accounted for 13.81 per cent. Irrigation by canals was 2.76 per cent of the total irrigated area.

Table 4.4. Cropping Pattern of Salem District (2003 - 04)

S.No	Crops	Area in ha	Percentage to total
1.	Paddy	13585	4.67
2.	Jowar	24009	8.26
3.	Tapioca	23852	8.20
4.	Ragi	12076	4.15
5.	Coconut	11523	3.96
6.	Ground nut	24080	8.28
7.	Mochai	7705	2.65
8.	Maize	11207	3.85
9.	Cotton	7684	2.64
10.	Coffee	6517	2.24
11.	Sugarcane	4756	1.63
12.	Fruits	4863	1.67
13	Vegetables	5341	1.83
14.	Turmeric	2768	0.95
15.	Coleus	1200	0.41
16.	Gingelly	1412	0.49
17.	Chillies	1156	0.40
18.	Fodder crops	30574	10.51
19.	Others	96634	33.21
20.	Total cultivated area	290942	100.00

Source: Season and Crop Report, 2003-04

Table.4.5. Sources of Irrigation in the Study Area (2003-04)

S.No	Source	Salem District		Attur Taluk		Gangavalli Taluk	
		No.of Sources (Nos.)	GIA (Ha)	No.of Sources (Nos.)	GIA (Ha)	No.of Sources (Nos.)	GIA (Ha)
1.	Canals	70	1932 (2.76)	2	205 (1.89)	1	90 (1.34)
2.	Tanks	546	381 (0.54)	14	21.15 (0.19)	20	26.25 (0.39)
3.	Tube wells	6988	9682 (13.81)	4077	3350 (30.85)	161	145 (2.16)
4.	Open wells	110167	58124 (82.89)	8252	7285 (67.07)	8596	6450 (96.11)
	Total	-	70119 (100.00)	-	10861.15 (100.00)	-	6711.25 (100.00)

GIA – Gross Irrigated Area

Source: Joint Directorate of Agriculture, Salem and Season and Crop Report, 2003-04.

4.7. Area under Irrigated Crops

Areas of different crops under irrigated condition are presented in Table.4.6. Paddy was cultivated widely under the irrigated land, which accounted for 19.05 per cent, followed by coconut (16.43 per cent) and tapioca (13.53 per cent). Turmeric crop was cultivated in 2767 ha of irrigated land accounting for 3.95 per cent, while 1.71 per cent of irrigated land was under coleus.

4.8. Infrastructure Facilities

The infrastructure facilities like vehicles, roads, banks, hospitals and agricultural pump sets are conducive for agricultural development of any region. The Salem district has 24,167 numbers of commercial vehicles. In road development, Salem is well connected with all the district head quarters of the state by road.

Table 4.6. Area of Different Crops under Irrigation in Salem District (2003-04)

S.No	Crops	Irrigated area (ha)	Percentage to total
1.	Paddy	13,356	19.05
2.	Coconut	11520	16.43
3.	Tapioca	9486	13.53
4.	Sugarcane	4,756	6.78
5.	Maize	3903	5.57
6.	Cotton	3,567	5.09
7.	Jowar	3237	4.62
8.	Ground nut	3443	4.91
9.	Turmeric	2,767	3.95
10.	Fruits	2,586	3.69
11.	Vegetables	2363	3.36
12.	Coleus	1200	1.71
13.	Flowers	1212	1.73
14.	Chilies	1,125	1.60
15.	Others	5598	7.98
	Total	70119	100.00

Source: Season and Crop Report of Tamil Nadu, (2004-05).

The district has good net work of National High ways and State High ways are passing through the district to a distance of 98 Km. The district has more numbers of electrified agricultural pump sets (7.36 per cent of the state) and they are used to exploit the ground water in the district. There are twenty Agricultural Extension Centre in Salem district for providing valuable technical advice to the farmers and three State Government Laboratories Viz., Soil Testing Laboratory (STL), Fertilizer Testing Laboratory (FTL) and Pesticide Testing Laboratory (PTL) for testing agricultural inputs. In Salem District, there are two State Government Bio-products production units for producing and supplying of bio-products (bio-fertilizers and bio control agents) to the farmers.

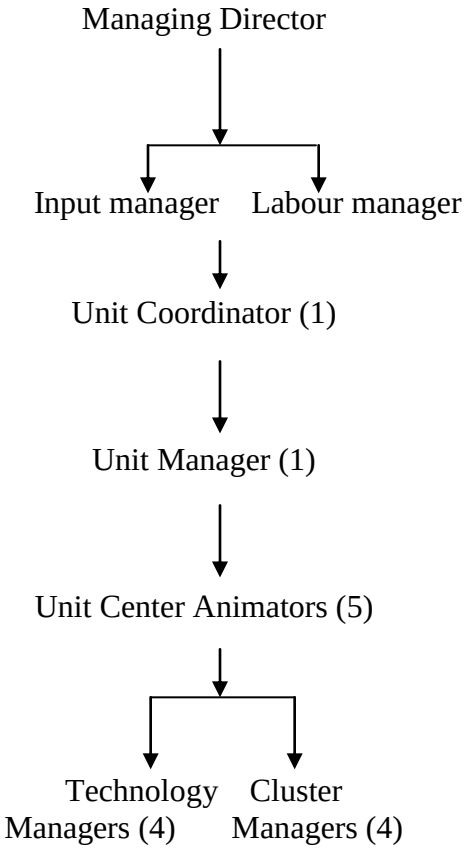
4.9. Contractual Arrangements

MGP Herbal Care (P) Ltd is a private company mainly concentrating on coleus and turmeric contract farming. It was started in 1997 with five farmers and the area under

coleus cultivation was only five acres. Mr.M.G.Palanivelan, the founder of the company, is also its Managing Director.

4.9.1. Organisational Structure

The organizational structure of the company is as follows:



The Input Manager gets information about input requirements of different units and arranges for procuring, stocking and storing the inputs like seedlings, fertilizers, plant protection chemicals and weedicides and distributes the needed inputs to the units at appropriate time.

The following roles are assigned to the technical manager. They are engaging in collecting information about the farmers, selecting the farmers to have contractual agreements based on suitable soil type and water facility in the farms, selecting the correct season for planting, supplying seedlings/rhizomes to the selected farmers and providing technical guidelines to the farmers regarding coleus and turmeric cultivation and plant protection.

The important roles of the cluster managers are forming self help groups, preparation of input requirement report and providing the needed inputs to the farmers at required level at correct time in association with the Technical Manager. They are also responsible for preparing details on credit receipts for the given inputs, facilitating the farmers to get their bank loans and insurance and conducting farmers' meetings and conferences.

4.9.2. Facilities Available at the Company

4.9.2.1. Powdering Unit

The harvested coleus tuber and stem from various units are collected at Manjini, a village located near Attur where it is dried, powdered and then finally sent to Bangalore for extracting the medicinal content from the powder.

4.9.2.2. Bio Compost Units

One Vermi compost unit and one press mud compost unit are there in that factory for producing bio-composts.

There is a written agreement between contract firm and farmers on pre-determined price for the produce by the company and input supply, technical advice, credit provision and arrangements for insurance to the farmers. The contract farmers were getting credit and insurance facilities from State Bank of India with help of the company staff. The total credit availed to the coleus farmers was Rs. 11,000 per acre and it was Rs. 20,000 per acre for turmeric contract farmers during 2004-05. The price fixed to coleus and turmeric crop were Rs. 5.5 per Kg and Rs.5 per Kg respectively. If there is any violation by the farmers from the agreement, they will lose their opportunity to cultivate that crop under contract farming system with this company subsequently.

CHAPTER V
RESULTS AND DISCUSSION

The primary data collected with respect to the stated objectives of the study were analysed and results are presented first and then they are followed by inferences drawn from the results.

5.1. General Characteristics of the Sample Farms

The general characteristics of the sample farms include age, sex, farming experience, family details, and educational status of the head of the households and the family members and the land holding pattern.

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

Age of the head of farm households would influence the decision making in farming. Hence, the details on age of the head of the farm households are given in Table.5.1.The results furnished in the table would show that among the coleus contract farm households, 73 per cent of the heads of the households were in the age group of above 40 years while, 38 per cent of the turmeric contract farmers were in the age group of above 40 years. Among the coleus non-contract farmers, however, only 63 per cent of the head of households were in the age group of above 40 years while, in case of turmeric, they constituted only 33 per cent. Thus, it could be concluded that coleus contract farmers, here after to be referred as CCF were elder than the coleus non-contract farmers, hereafter, to be indicated by CNCF. In case of turmeric also, turmeric contract farmers (TCF) were elder than turmeric non-contract farmers (TNCF).

5.1.2. Sex - Wise Classification of Heads of Sample Households

Sex details used to assess the gender impact on farm income. The results are presented in Table.5.2. indicated that 96 per cent of heads of households in the coleus contract farmers were male farmers, where as in case of non-contract farmers, the male heads of households constituted 93 per cent.

Of the turmeric farmers, 98 per cent of heads of households in contract farming system were male farmers, where as in case of non-contract farmers, the male heads of households constituted 100 per cent.

Thus, it could be concluded that male members of the family dominated in the decision making in coleus as well as turmeric farming.

Table 5.1. Age of Head of the Sample Households

(Number)

S.No	Age (Years)	Coleus			Turmeric		
		Contract Farms	Non-Contract Farms	Total	Contract Farms	Non-Contract Farm	Total
1.	≤30	2 (3.33)	2 (6.67)	4 (4.44)	7 (11.67)	6 (20.00)	13 (14.44)
2.	31-35	6 (10.00)	3 (10.00)	9 (10.00)	15 (25.00)	10 (33.33)	25 (27.78)
3.	36-40	8 (13.33)	6 (20.00)	14 (15.56)	15 (25.00)	4 (13.33)	19 (21.11)
4.	41-45	14 (23.33)	8 (26.67)	22 (24.44)	13 (21.67)	3 (10.00)	16 (17.78)
5.	46-50	18 (30.00)	6 (20.00)	24 (26.67)	4 (6.66)	3 (10.00)	7 (7.78)
6.	≥51	12 (20.00)	5 (16.66)	17 (18.89)	6 (10.00)	4 (13.33)	10 (11.11)
	Total	60 (100.00)	30 (100.00)	90 (100.0)	60 (100.0)	30 (100.00)	90 (100.0)

(Figures in parentheses indicate percentage to total)

Table 5.2. Sex-Wise Classification of Heads of Sample Households

(Number)

S.No	Sex	Coleus			Turmeric		
		Contract Farms	**Non-Contract Farms**	**Total**	**Contract Farms**	**Non-Contract Farms**	**Total**
1.	Male	58 (96.67)	29 (93.33)	87 (95.56)	59 (98.33)	30 (100.00)	89 (98.89)
2.	Female	2 (3.33)	1 (6.67)	3 (4.44)	1 (1.67)	0 (0.00)	1 (1.11)
	Total	60 (100.00)	30 (100.00)	90 (100.00)	60 (100.00)	30 (100.00)	90 (100.00)

(Figures in parentheses indicate percentage to total)

5.1.3. Experience of the Head of the Sample Households in Coleus Farming

The experience of farmers in farming is used to assess the capacity of them to bear risk. The experiences of the heads of the households in coleus and turmeric farming are presented in Table.5.3. The results showed that among the coleus contract farmers, 40 per cent of the head of the sample households were with farming experience of one year, followed by 28 per cent with an experience of two years and 32 per cent with an experience of more than 3 years. The pattern was different for the non-contract farming, where the heads of households having an experience of 1 year constituted 50 per cent while 47 per cent had 2 years of experience. The results revealed that the contract farmers had more experience in coleus farming than non-contract farmers.

As turmeric is a traditionally cultivated crop, farmers had rich experience in cultivating it. The results (Table.5.3) showed that 68 per cent of the contract farmers had a farming experience of more than 10 years in turmeric cultivation. The pattern was more or less same in case of the non-contract farming, where the heads of households having experience of more than 10 years constituted 67 per cent.

5.1.4. Educational Status of Heads of Sample Households

The literacy level of the head of the farm households determines the willingness to adopt new technologies. The results presented in Table.5.4 would indicate that the literacy level of heads of coleus and turmeric cultivating households happened to be 100 per cent. The heads of households of coleus contract farmers were educated up to high school level constituted 87 per cent, while 83 per cent of non-contract farmers were educated up to high school level.

In case of turmeric, the heads of households of both contract and non-contract farming systems educated up to high school level constituted 90 per cent. Thus, there was no significant difference in the educational status of TCF and TNCF categories.

5.1.5. Family Size

The family details would be useful to assess the sex ratio and contribution of family labour to farming. The details on composition of adults and children and the gender composition of the sample households are presented in Table.5.5. An analysis of results could reveal that out of the total number of coleus farm members, 90 per cent were adults and 10 per cent were children. In the case of both contract farmers and non-contract farmers' households, the pattern was more or less the same. In case of the turmeric farmers, 86 per cent of the total contract farmers were adults and 14 per cent were children. In the case of non-contract farmers, 73 per cent were adults and 27 per cent were children.

Regarding sex wise classification, percentage of males was comparatively higher in all the group. Thus, there was no significance difference in gender wise classification between contract and non-contract farmers.

Table 5.5. Family Composition of the Selected Farm Households

(Number)

S.No	Particulars	Coleus			Turmeric		
		Contract Farms	Non-contract Farms	Total	Contract Farms	Non-contract Farms	Total
1.	Adults	318 (89.83)	165 (85.05)	483 (88.14)	207 (85.89)	95 (73.08)	302 (81.40)
	Male	169 (53.14)*	90 (54.54)*	259 (53.62)*	124 (59.90)*	61 (64.21)*	185 (61.26)*
	Female	149 (46.86)*	75 (45.46)*	224 (46.38)*	83 (40.10)*	34 (35.79)*	117 (38.74)*
2.	Children	36 (10.17)	29 (14.95)	65 (11.86)	34 (14.11)	35 (26.92)	69 (18.60)
	Total	354 (100.00)	194 (100.00)	548 (100.00)	241 (100.00)	130 (100.00)	371 (100.00)

(Figures in parentheses indicate percentage to total)

* - Figures in parentheses indicate percentage to adults.

5.1.6. Land Holding Pattern of Sample Farms

Land holding details are used to assess the investment capacity of the farmers and the farm income would also obviously be influenced by the size of the holding. The land holding pattern of the sample farmers are analysed and the results are presented in Table 5.6. The results showed that 55 per cent of the coleus contract farmers were small farmers with an area of 1-2 hectares. In the case of non-contract farmers, the small farmers constituted 50 per cent. The farmers having more than 2 hectares constituted 23 per cent, 30 percent and 25 per cent respectively for contract farmers, non-contract farmers and the pooled sample.

Table 5.6.Distribution of Farm According to Land Holding

(Number)

S.No	Land Holding(Ha)	Coleus			Turmeric		
		Contract Farms	Non-contract Farms	Total	Contract Farms	Non-contract Farms	Total
1.	≤1	13 (21.66)	6 (20.00)	19 (21.11)	8 (13.33)	3 (10.00)	20 (22.22)
2.	1-2	33 (55.00)	15 (50.00)	48 (53.33)	35 (58.33)	14 (46.66)	49 (54.44)
3.	≥2	14 (23.33)	9 (30.00)	23 (25.55)	17 (28.33)	13 (43.33)	21 (23.33)
	Total	60 (100.00)	30 (100.00)	90 (100.00)	60 (100.00)	30 (100.00)	90 (100.00)

(Figures in parentheses indicate percentage to total)

For the turmeric farmers**,** the results showed that 58 per cent of the contract farmers were small farmers with an area of 1-2 hectares. In the case of non-contract farmers, the small farmers constituted 47 per cent. The farmers having more than 2 hectares constituted 28 per cent, 43 per cent and 23 per cent respectively for contract farmers, non-contract farmers and the pooled sample. Thus, it could be concluded that small farmers were the major group in the study region. Regarding average size of holding (Table.5.7), around 60 per cent of the area was held by the big farmers who had the size of holdings of more than 2 hectares in all the groups. From the study results it could be concluded that the average size of land holding was more in all categories of contract farmers excepting TNC big farmers, than that of non-contract farmers in both crops.

Table.5.7.Average Size of Holding of the Selected Farmers

(Ha/Farm)

S.No	Land holding(Ha)	Coleus			Turmeric		
		Contractor	Non-Contractor	Total	Contractor	Non-Contractor	Total
1.	≤1	0.95	0.90	0.93	0.95	0.6	0.85
2.	1-2	1.98	1.84	1.94	1.97	1.88	1.95
3.	≥2	5.00	4.61	4.85	5.16	7.28	6.08
	Average	2.46	2.48	2.47	2.74	4.09	3.19

5.2.1. Cropping Pattern of the Sample Farms

The results of the analysis of the cropping pattern in the sample households during the year 2004-05 are presented in Table.5.8. The results revealed that coleus occupied 32 per cent of the total cropped area for coleus contract farmers' households, followed by maize with 21 per cent, tapioca with 17 per cent, turmeric with 15 per cent and so on. In respect of coleus non-contract farmers, coleus occupied 27 per cent of the total cropped area, followed by maize with 26 per cent, tapioca with 20 per cent, turmeric with 13 per cent and so on.

In case of turmeric farms, the results revealed that maize was the major crop accounting for 35 per cent followed by tapioca (24 per cent), turmeric (19 per cent) and so on. The results would reveal that the area under coleus was more in contract farms than that of non-contract farms. Similarly, in case of turmeric also, area under turmeric in contract farms was more than that of non-contract farms.

Table 5.8. Cropping Pattern in the Sample Farm Households

(Ha)

S.No	Crop	Coleus			Turmeric		
		Contract Farms	**Non-Contract Farms**	**Total**	**Contract Farms**	**Non-Contract Farms**	**Total**
1.	Coleus	0.66 (32.04)	0.47 (27.49)	1.13 (29.97)	0.06 (2.74)	0.04 (1.44)	0.10 (2.02)
2.	Turmeric	0.30 (14.56)	0.23 (13.45)	0.53 (14.06)	0.41 (18.73)	0.48 (17.33)	0.89 (17.94)
3.	Tapioca	0.35 (17.00)	0.35 (20.47)	0.70 (18.57)	0.53 (24.20)	0.53 (19.13)	1.06 (21.37)
4.	Maize	0.44 (21.36)	0.44 (25.73)	0.88 (23.34)	0.76 (34.70)	1.04 (37.55)	1.80 (36.29)
5.	Paddy	0.16 (7.77)	0.09 (5.26)	0.25 (16.63)	0.20 (9.13)	0.25 (9.03)	0.45 (9.07)
6.	Cotton	0.05 (2.43)	0.07 (4.09)	0.12 (3.18)	0.12 (5.48)	0.31 (11.19)	0.43 (8.67)
7.	Yam	0.01 (0.48)	0.05 (2.93)	0.06 (1.59)	0.08 (3.65)	0.08 (2.89)	0.16 (3.23)
8.	Groundnut	0.01 (0.48)	-	0.01 (0.27)	-	-	-
9.	Castor	0.01 (0.48)	-	0.01 (0.27)	-	-	-
10.	Others	0.07 (3.40)	0.01 (0.58)	0.08 (2.12)	0.03 (1.37)	0.04 (1.44)	0.07 (1.41)
	Total	2.06 (100.00)	1.71 (100.00)	3.77 (100.00)	2.19 (100.00)	2.77 (100.00)	4.96 (100.00)

(Figures in parentheses indicate percentage to total)

5.2.2. Extent of Use of Credit Facilities by the Selected Farms

The results presented in Table.5.9 would show that 41 per cent of the coleus contract farmers availed the credit facilities from State Bank of India and the average credit availed per farm was Rs.6208.

Table 5.9. Extent of Use of Credit Facility by the Selected Farms

(Number)

S.No	Institution	Coleus			Turmeric		
		Contract Farms	**Non-Contract Farms**	**Total**	**Contract Farms**	**Non-Contract Farms**	**Total**
1.	Bank	25 (41.66)	-	25 (27.77)	14 (23.33)	1 (3.33)	15 (16.66)
2.	Cooperatives	-	1 (3.33)	1 (1.11)	0 (0.00)	1 (3.33)	1 (1.11)
3.	Non-Borrowers	35 (58.33)	29 (96.66)	64 (71.11)	46 (76.66)	28 (93.33)	74 (82.22)
	Total	60 (100.00)	30 (100.00)	90 (100.00)	60 (100.00)	30 (100.00)	90 (100.00)
	Amount Borrowed (Rs/farm)	6208	166	6374	4333	333	4666

(Figures in parentheses indicate percentage to total)

For the turmeric farmers, the results would show that 23 per cent of the contract farmers availed the credit facilities from State Bank of India and the average credit availed per farm was Rs.4333. Among the non-contract farmers, however, only 3.33 per cent of the sample household availed credit from either co-operative bank or commercial bank. Thus, it could be inferred that the contract farms were able to get institutional finance owing to the guarantee offered by the contract firm.

5.2.3. Impact of Contact Farming on Income and Employment

5.2.3.1.1. Income of the Selected Farms

The impact of the contract farming was also assessed by comparing the income earned from different activities by the contract farmers and non-contract farmers. The on-farm income included the income from crops and livestock. The off-farm income indicated the income earned by the family members in others' farms. The non-farm income included income from non-agricultural activities. The results on per farm income earned from various sources are given in Table.5.10 (for coleus farms) and Table.5.11

(for turmeric farms). The results on income earned per ha of gross cropped area from different sources in the coleus farms are presented in Table.5.12. An analysis of the results furnished in the table would show that the share of coleus crop income to on-farm income and total income under contract farming system were 64 per cent and 55 per cent respectively. Under non-contract farming system, the shares of coleus crop income to on-farm income and total income were 65 per cent and 51 per cent respectively. The shares of livestock, off-farm and non-farm income to total income in contract farming system were 16 per cent, 1 per cent and 12 per cent respectively where as the corresponding figures were 13 per cent, 2 per cent and 19 per cent for non-contract farming system.

Table 5.10. Average Income of the Selected Coleus Farm Households

(Rs/farm)

S.No	Income (Rs)	Contract Farms	Non-Contract Farms	Total
1.	On-farm			
i)	Crop			
a)	Coleus	31933.33 (30.92)	15933.72 (23.99)	47867.05 (28.21)
b)	Other Crops	18056.19 (17.49)	11955.62 (18.00)	30011.81 (17.68)
	Sub-total	49989.52 (48.41)	27889.34 (41.99)	77878.86 (45.89)
ii)	Livestock	29443.21 (28.51)	14797.45 (22.28)	44240.66 (26.07)
	Total On-farm	79432.73 (76.93)	42686.79 (64.27)	122119.52 (71.96)
2.	Off-farm	2420.83 (2.34)	2466.67 (3.71)	4887.50 (2.89)
3.	Non-farm	21400.00 (20.73)	21266.67 (32.02)	42666.67 (25.15)
	Total	103253.56 (100.00)	66420.13 (100.00)	169673.69 (100.00)

(Figures in parentheses indicate percentage to total)

Table 5.11. Average Income of the Selected Turmeric Farm Households

(Rs/farm)

S.No	Income (Rs)	Contract Farms	Non-Contract Farms	Total
1.	On-farm			
i)	Crop			
a)	Turmeric	39543.63	32905.92	72449.55
		(46.33)	(44.31)	(45.39)
b)	Other Crops	15734.33	23449.53	39183.86
		(18.44)	(31.57)	(24.55)
	Sub-total	55277.96	56355.45	111633.41
		(64.77)	(75.88)	(69.94)
ii)	Livestock	13294.71	7674.72	20969.43
		(15.58)	(10.33)	(13.14)
	Total On-farm	68572.67	64030.17	132602.84
		(80.35)	(86.21)	(83.08)
2.	Off-farm	4188.00	3736.66	7924.66
		(4.91)	(5.04)	(4.96)
3.	Non-farm	12583.33	6500.00	19083.33
		(14.74)	(8.75)	(11.96)
	Total	85344.00	74266.83	159610.83
		(100.00)	(100.00)	(100.00)

(Figures in parentheses indicate percentage to total)

Table 5.12. Average Income of the Selected Coleus Farm Households

(Rs/Ha of gross operated area)

S.No	Income (Rs)	Contract Farms	Non-Contract Farms	Total
1.	On-farm			
i)	Crop			
a)	Coleus	48020 (55.26)	33901 (51.20)	81921 (53.51)
b)	Other Crops	12974 (14.93)	9693 (14.64)	22667 (14.80)
	Sub-total	60994 (70.19)	43594 (65.84)	104588 (68.31)
ii)	Livestock	14315 (16.47)	8687 (13.12)	23002 (15.02)
	Total On-farm	75309 (86.67)	52281 (78.96)	127590 (83.33)
2.	Off-farm	1177 (1.35)	1448 (2.19)	2625 (1.72)
3.	Non-farm	10405 (11.98)	12485 (18.85)	22890 (14.95)
	Total	86891 (100.00)	66214 (100.00)	153105 (100.00)

(Figures in parentheses indicate percentage to total)

Table 5.13. Average Income of the Selected Turmeric Farm Households

(Rs/Ha of Gross operated area)

S.No	Income (Rs)	Contract Farms	Non-contract Farms	Total
1.	On-farm			
i)	Crop			
a)	Turmeric	96057	68554	164611
		(81.02)	(80.42)	(80.77)
b)	Other Crops	8814	10225	19039
		(7.43)	(12.00)	(9.34)
	Sub-total	104871	78779	183650
		(88.45)	(92.42)	(90.11)
ii)	Livestock	6052	2767	8819
		(5.10)	(3.25)	(4.33)
	Total On-farm	110923	81546	192469
		(93.55)	(95.67)	(94.44)
2.	Off-farm	1906	1347	3253
		(1.61)	(1.58)	(1.60)
3.	Non-farm	5728	2343	8071
		(4.84)	(2.75)	(3.96)
	Total	118557	85236	203793
		(100.00)	(100.00)	(100.00)

(Figures in parentheses indicate percentage to total)

The results of the turmeric farmers are presented in Table.5.13. An analysis of the results furnished in the table would show that the share of turmeric crop income to on-farm income and total income under contract farming system were 87 per cent and 81 per cent respectively. Under non-contract farming system, the shares of turmeric crop income to on-farm income and total income were 84 per cent and 80 per cent respectively. The shares of livestock, off-farm and non-farm income to total income in contract farming system were 5 per cent, 2 per cent and 5 per cent respectively where as the corresponding figures for non-contract farming system were 3 per cent, 2 per cent and 3 per cent respectively.

Thus, it could be concluded that the proportion of coleus crop income to total income under contract farming system was greater than that of non-contract farming system. This was made possible due to the input support and better prices offered by the contract firms.

5.2.3.1.2. Lorenz Curve

To depict the income inequalities of the respondents in Contract farming and non-contract farming, Lorenz curves were drawn on the basis of per household's income separately for coleus/turmeric crop and total income of contract farmers and non-contract farmers and are presented in Figure.5.1 and Figure 5.2. for coleus and Figure.5.3 and Figure.5.4 for turmeric.

From the perusal of the figures, it could be concluded that the inequality in income distribution was found to be less in coleus crop income and total crop income for contract farmers than that of non-contract farmers. For the turmeric farmers also, the inequality in income distribution was found to be less in turmeric crop income and also total crop income for the contract farmers than that of non-contract farmers.

5.2.3.1.3. Gini Ratio of Income Distribution

Gini ratio which is an alternative technique for measuring the income inequality in the distribution of income was also worked out and the results are presented in Table.5.18. Higher ratio, greater the degree of inequality in the income distribution.

The gini ratio was 0.31 for coleus income and 0.28 for total crop income for coleus contract farmers where as it was 0.33 and 0.35 for the same to non-contract farmers. In the case of turmeric farmers, the gini ratio was 0.30 for turmeric income and 0.29 for the total crop income to the turmeric contract farmers where as it was 0.34 and 0.38 for the same to the non-contract farmers respectively. This showed that the inequality in income distribution had been more in non-contract farmers in all categories than that of contract farmers.

Table 5.18. Gini Ratio for Income Distribution of the Selected Farm Households

S. No	Particulars	Coleus		Turmeric	
		Contract Farms	Non-Contract Farms	Contract Farms	Non-Contract Farms
1.	Crop income	0.31	0.33	0.30	0.34
2.	Total crop income	0.28	0.35	0.29	0.38

5.2.3.2. Share of Employment Generation by Coleus in the Selected Region

Share of various employment sources per farm for the coleus farmers are presented in Table.5.19. Also, employment generation per hectare of gross cropped area was worked out for coleus farmers separately for contract and non-contract farming system (Table 5.21). It revealed that 21 per cent of the total employment was generated out of coleus cultivation and it was 26 per cent of the total on-farm employment generated by the contract farmers. In the case of non-contract farmers, employment generation through crops other than coleus was higher than that of contract farmers.

Share of various employment sources per farm for the turmeric farmers are presented in Table.5.20. Also, employment generation per hectare of gross cropped area was worked out for turmeric farmers separately for contract and non-contract farming systems (Table 5.22). It revealed that 26 per cent of the total employment was generated out of turmeric cultivation and it was 30 per cent of the total on-farm employment generated by the contract farmers. In the case of non-contract farmers, 25 per cent of the total employment was generated through turmeric cultivation and it was 28 per cent of the total on-farm employment.

Table 5.19. Employment Generation of the Selected Coleus Farms

(mandays /farm)

S.No	Sources	Contract Farms	Non-Contract Farms	Total
1.	On-farm			
i) a)	Crop Coleus	140 (20.99)	79 (13.88)	219 (17.72)
b)	Other Crops	289 (43.33)	306 (53.78)	595 (48.14)
	Sub-total	429 (64.32)	385 (67.66)	814 (65.86)
ii)	Livestock	106 (15.89)	41 (7.21)	147 (11.89)
	Total On-farm	585 (80.21)	426 (74.87)	961 (77.75)
2.	Off-farm	15 (2.25)	14 (2.46)	29 (2.35)
3.	Non-farm	117 (17.54)	129 (22.67)	246 (19.90)
	Total	667 (100.00)	569 (100.00)	1236 (100.00)

(Figures in parentheses indicate percentage to total)

Table 5.20. Employment Generation of the Selected Turmeric Farms

(mandays /farm)

S.No	Sources	Contract Farms	Non-Contract Farms	Total
1.	On-farm			
i)	Crop	169	166	335
a)	Turmeric	(26.08)	(24.92)	(25.49)
		346	379	725
b)	Other Crops	(53.40)	(56.91)	(55.18)
		515	545	1060
	Sub-total	(79.48)	(81.83)	(80.67)
		44	38	82
ii)	Livestock	(6.79)	(5.71)	(6.24)
		559	583	1142
	Total On-farm	(86.27)	(87.54)	(86.91)
		34	33	67
2.	Off-farm	(5.25)	(4.95)	(5.10)
		55	50	105
3.	Non-farm	(8.48)	(7.51)	(7.99)
	Total	648	666	1314
		(100.00)	(100.00)	(100.00)

(Figures in parentheses indicate percentage to total)

Table 5.21. Employment of the Selected Coleus Farms

(mandays /Ha of gross operated area)

S.No	Sources	Contract Farms	Non-Contract Farms	Total
1.	On-farm			
i)	Crop			
a)	Coleus	211 (39.44)	168 (32.06)	379 (35.79)
b)	Other Crops	208 (38.88)	248 (47.33)	456 (43.06)
	Sub-total	419 (78.32)	416 (79.39)	835 (78.85)
ii)	Livestock	52 (9.72)	24 (4.58)	76 (9.17)
	Total On-farm	471 (88.04)	440 (83.97)	911 (86.02)
2.	Off-farm	7 (1.31)	8 (1.53)	15 (1.42)
3.	Non-farm	57 (10.65)	76 (14.50)	133 (12.56)
	Total	535 (100.00)	524 (100.00)	1059 (100.00)

(Figures in parentheses indicate percentage to total)

Table 5.22. Employment of the Selected Turmeric Farms

(mandays /Ha of gross operated area)

S.No	Sources	Contract Farms	Non-Contract Farms	Total
1.	On-farm			
i)	Crop			
a)	Turmeric	410 (61.75)	346 (62.34)	756 (62.01)
b)	Other Crops	194 (29.22)	165 (29.73)	359 (29.45)
	Sub-total	604 (90.97)	511 (92.07)	1115 (91.46)
ii)	Livestock	20 (3.01)	14 (2.52)	34 (2.79)
	Total On-farm	624 (93.98)	525 (94.59)	1149 (94.25)
2.	Off-farm	15 (2.26)	12 (2.16)	27 (2.22)
3.	Non-farm	25 (3.76)	18 (3.25)	43 (3.53)
	Total	664 (100.00)	555 (100.00)	1219 (100.00)

(Figures in parentheses indicate percentage to total)

Thus, it could be concluded that more employment was generated in both turmeric and coleus cultivation under contract farming than that of non-contract farming system.

5.2.4. Measure of Resource Use Efficiency

The efficiency measure estimated includes:

i) Resource Use Efficiency using OLS method and

ii) Technical efficiency measured through Stochastic Frontier Production Function using Maximum Likelihood Estimate Method.

5.2.4.1. Resource Use Efficiency in Coleus Cultivation

5.2.4.1.1. Production Function

The ordinary least squares (OLS) estimates of the Cobb-Douglas production function for different size groups are presented in Table.5.23. The co-efficients of all inputs in the case of contract farmers and non-contract farmers were positive and significant indicating lesser use of these inputs. The R^2 values indicated that the independent variables included in the production function explained about 78 per cent of the variation in the production of coleus contract farms and 73 per cent for non-contract farms. The return to scale ($\sum b_i$) did not depict a uniform pattern with the size of holdings.

For the turmeric farmers (Table 5.24), the co-efficient of plant protection chemicals in the case of non-contract farmers were negative, indicating excessive use of these inputs. However, the co-efficients of all other inputs in the case of contract farmers and non-contract farmers were positive and significant indicating lesser use of these inputs. The R^2 values indicated that the independent variables included in the production function explained about 94 per cent of the variation in the production of turmeric under contract farming system where as it was 73 per cent for the non-contract farming system. The return to scale ($\sum b_i$) did not depict a uniform pattern with the size of holdings.

Table 5.23. Estimated Production Function for Coleus in Sample Farm Households

S.No	Particulars	Contract Farms		Non-contract farms	
		Partial Co-efficients	't' value	Partial Co-efficients	't' value
1.	Intercept	5.725 (0.351)	16.328	-4.895 (2.827)	-1.731
2.	Human labour (Mandays/ha) (X_1)	0.276** (0.081)	3.436	0.230 (0.195)	1.184
3.	Machine power (Tractor hrs/ha) (X_2)	0.088* (0.041)	2.150	0.254 (0.142)	1.790
4.	Manure& Fertilizers (Rs/ha) (X_3)	0.179** (0.032)	5.523	1.097** (0.282)	3.890
5.	Plant protection chemicals (Rs/ha)(X_4)	0.057** (0.016)	3.451	0.293* (0.116)	2.528
	R^2	77.57		73.30	
	$\overline{R^2}$	75.94		69.03	
	$\sum b_i$	0.600		1.874	
	No. of Observations	60		30	

Dependent variable = Production of coleus (Kg/ha)

Note: Figures in parentheses indicate standard errors of estimates

** - Significant at 1% level

* - Significant at 5% level

Table 5.24. Estimated Production Function for Turmeric of Sample Farm Households

S.No	Particulars	Contract Farms		Non-contract farms	
		Partial Co-efficients	**'t' value**	**Partial Co-efficients**	**'t' value**
1.	Intercept	2.96 (0.276)	10.712	1.788 (0.458)	1.845
2.	Human labour (Mandays/ha) (X_1)	0.066* (0.031)	2.139	0.234** (0.086)	2.696
3.	Machine power (Tractor hrs/ha) (X_2)	0.043 (0.031)	1.370	0.458* (0.226)	2.024
4.	Manure& Fertilizers (Rs/ha) (X_3)	0.139** (0.040)	3.472	0.155 (0.121)	1.281
5.	Plant protection chemicals (Rs/ha)(X_4)	0.127** (0.020)	6.183	-0.011 (0.063)	-0.178
	R^2	93.58		73.49	
	$\overline{R^2}$	93.11		69.25	
	$\sum b_i$	0.375		0.836	
	No. of Observations	60		30	

Dependent variable = Production of turmeric (Quintals/ha)

Note: Figures in parentheses indicate standard errors of estimates

** - Significant at 1% level

* - Significant at 5% level

5.2.4.1.2. Analysis of Value of MVP/Price Ratio

To assess whether the resources were used rationally or otherwise the ratio of value of marginal product to the input prices were worked out and the results are presented in Table.5.25. In coleus contract farms, the ratio of MVP and MFC was more than unity in case of machine power and plant protection chemicals indicating their lesser usage in the production of coleus. However, the inputs like human labour and manures and fertilizers had the MVP/MFC ratios of less than unity revealing that the usages were more than the optimal level.

In case of non-contract farming system, the resources like manures and fertilizers and plant protection chemicals were found to be significant and the MVP/MFC ratio for the former was less than unity and the ratio for the latter was more than unity. This would indicate the excessive application of manures and fertilizer and sub-optimal application of plant protection chemicals in non-contract farms.

For the turmeric farmers as could be seen from the Table 5.26**,** it is evident that the ratio of MVP to MFC in case of human labour and manure and fertilizers for contract group of sample farms was positive but less than unity and significant indicating the need to curtail their excessive use. But in case of machine power it was more than unity for both contract and non-contract farms and significant indicating considerable scope for increasing the use of this input. The ratio for plant protection chemicals for the contract farms was positive (more than one) and significant indicating the scope for increasing the use of this input. In case of non-contract farmers, it was negative for the plant protection chemicals and non significant.

Table 5.25. Marginal Value Product (MVP) and Marginal Factor Cost (MFC) of Different Inputs in Coleus Cultivation

Particulars	Contract Farms	Non-Contract Farms
Human Labour		
MVP (Rs)	74.68**	59.06
MFC (Rs)	100	100
MVP: MFC	0.746	0.59
Machine Power		
MVP (Rs)	715.71*	1710.635
MFC (Rs)	300	300
MVP: MFC	2.38	5.702
Manure&Fertilizer		
MVP (Rs)	0.800**	4.613**
MFC (Rs)	4.8	4.8
MVP: MFC	0.166	0.961
Plant Protection Chemicals		
MVP (Rs)	9.25**	28.438*
MFC (Rs)	1	1
MVP: MFC	9.25	28.438

** - Significant at 1% at level

* - Significant at 5% at level

Note: 1. Marginal Physical Product was computed as follows,

Marginal Physical Product = Elasticity X Average Physical Product

2. VMP – Value of Marginal Product (Marginal Product Value at price of output)

3. P_x = Prices of respective inputs

Table 5.26. Marginal Value Product (MVP) and Marginal Factor Cost (MFC) of Different Inputs in Turmeric Cultivation

Particulars	Contract Farms	Non-Contract Farms
Human Labour		
MVP (Rs)	32.96*	101.11**
MFC (Rs)	100	100
MVP: MFC	0.329	1.011
Machine Power		
MVP (Rs)	624.15	6828.07*
MFC (Rs)	300	300
MVP: MFC	2.081	22.76
Manure&Fertilizer		
MVP (Rs)	0.873**	1.33
MFC (Rs)	2	2
MVP: MFC	0.436	0.66
Plant Protection Chemicals		
MVP (Rs)		
MFC (Rs)	6.96**	-0.351
MVP: MFC	0.6	0.6
	11.60	-0.586

** - Significant at 1% at level

* - Significant at 5% at level

Note: 1. Marginal Physical Product was computed as follows,

Marginal Physical Product = Elasticity X Average Physical Product

2. VMP – Value of Marginal Product (Marginal Product Value at price of output)

3. P_x = Prices of respective inputs

5.2.4.2. Technical Efficiency

Efficiency is a very important performance measure in production economics, where resources are meagre and opportunities for developing and adopting better technologies are competitive. Efficiency of a farm refers to its performance in the utilization of resources at its disposal. It is also important to know how well the resources are being utilized and what possibilities exist for improving the operational efficiency in the phase of overall resource scarcity.

Efficiency study could show that it is still possible of raise productivity by improving the level of efficiency without actually increasing the resource base. Estimates on the extent of inefficiency could also help to decide whether to improve efficiency or to develop new technologies to raise agricultural productivity.

In the present study, for assessing the technical efficiency among the contract farms and non-contract farms with reference to the selected crops, the stochastic frontier production function of Cobb-Douglas form was estimated using MLE method. The stochastic frontier production function analysis attempted in this study had the coleus output in Kg/ha as dependent variable and machine power in tractor hours/ha, human labour in man days/ha, manures and fertilizers in rupees/ha and plant production chemical in rupees/ha as independent variables. In case of turmeric the dependent variable i.e., output was in terms of quintals/ha and the independent variables were same as explained in case of coleus.

Among the stochastic frontier production functions attempted under the different farming methods for contract and non-contract farms in turmeric, the MLE estimates could not be obtained due to presence of skewness. Hence, the estimates of stochastic frontier production function for coleus contract farms and non-contract farms alone were presented and discussed.

In order to find out the reasons for non-convergence and convergence of frontier production function, the details on number of sample farms with turmeric yields closer to

the sample mean yield, above the sample mean yield and below the sample mean yield, were worked out under different farming methods.

On perusal of the non-converged function, the number of farmers with turmeric yields above and below the sample mean yield were found to be almost equal. Besides, a sizeable number of farms closer to the sample mean yield was also observed. This pattern of distribution of yield among the sample farms implied that most of the sample farmers were closer to the sample mean yield with the existing level of inputs and technology and hence, the function did not converge to frontier. This would mean that the farmers were their already technically efficient. The mean inputs used by the non-convergence farms and CV (Co-efficients of variation) are presented in Table**.**5**.**27. There was 9 to 32 per cent variation of all inputs from mean level for contract farms. In case of non-contract farms, the variation ranged between 12 and 54 per cent.

Table 5.27. The Mean Inputs Used by the Non-Convergence Farms

S.No	Particulars	Turmeric Contract Farms		Turmeric Non-Contract Farms	
		Mean	CV (%)	Mean	CV (%)
1	Machine (Tractor hrs/ha)	12.3	17.18	9.5	12.74
2	Labour (man days/ha)	381	25.57	321	34.60
3	Manures & fertilizers(Rs/ha)	30263	18.95	20758	27.93
4	Plant protection chemicals (Rs/ha)	3496	32.06	2680	54.11
5.	Yield (Qtl/ha)	380.75	8.98	276.64	20.16

CV – Co-efficients of Variation

But in case of the convergence function, the number of farmers whose coleus yields closer to the sample mean was nil. The distribution of yield among the sample farmers implied that most of the sample farmers' yields were below the frontier yield. Hence, the function converged to show that some of the farmers' existing yields were below the maximum possible yield (frontier yield) with the present level of inputs and this would indicate that these farmers were technically inefficient.

MLE Estimates of Production Function for Coleus Contract Farms

The results of the Maximum Likelihood Estimates are presented in Table.5.28.

Table 5.28. Estimates of Stochastic Frontier Production Function for Coleus Contract Farms

S.No	Explanatory variables	Estimated Values	Standard Errors
1	Constant	5.57356	0.7024
2	Machine power (Tractor hours/ha)	0.0876	0.0425
3	Labour (mandays/ha)	0.2762	0.0809
4	Manures and Fertilizers(Rs/ha)	0.179	0.0317
5	Plant protection chemicals(Rs/ha)	0.057	0.0163
6	δ^2_u	0.000033	
7	δ^2_v	0.000142	
8	$\lambda = \delta u / \delta v$	0.2307	
9	$\theta = \delta^2 u/(\delta^2 u/ \delta^2 v)$	0.1874	
10	Mean Technical Efficiency $= 1- \delta u(2/\pi)^{1/2}$	0.99	

It could be seen from table that the variance of one sided error term (δ^2_u) and symmetric error term (δ^2_v) were 0.0000328 and 0.000142 respectively which implied that symmetric error term was dominant which measured the short fall of output from the maximum possible output. The ratio of one sided error term to symmetric error term (λ) worked out at 0.2307, which implied that the standard error of one sided error term was lesser than the standard error of symmetric error term.

The estimate of discrepancy parameter (θ) indicated that maximum percent of the difference between the actual output and the maximum possible output were due to the difference in technical efficiency of farmers. The Mean Technical Efficiency (MTE) was 0.99 which indicated that the yield of coleus was one per cent less than the maximum possible output, thus, showing a better scope for further increasing the productivity of coleus contract farmers with the existing level of input use in the study area.

MLE Estimates of Production Functions for Coleus Non-Contract Farms

The results of the Maximum Likelihood Estimates are presented in Table.5.29.

It could be seen from table that the variance of one sided error term (δ^2_u) and symmetric error term (δ^2_v) were 0.0000102 and 0.0102020 respectively which implied that symmetric error term was dominant which measured the short fall of output from the maximum possible output. The ratio of one sided error term to symmetric error term (λ) was worked out at 0.009901, which implied that the standard error of one sided error term was lesser than that of symmetric error term.

Table 5.29. Estimates of Stochastic Frontier Production Function for Coleus Non-Contract Farms

S.No	Explanatory variables	Estimated Values	Standard Errors
1	Constant	-4.893	444.017
2	Machine power (Tractor hours/ha)	0.2539	0.1325
3	Labour (mandays/ha)	0.2304	0.2116
4	Manures and Fertilizers(Rs/ha)	1.0967	0.3760
5	Plant protection chemicals(Rs/ha)	0.2933	0.120
6	δ^2_u	0.0000102	
7	δ^2_v	0.0102020	
8	$\lambda = \delta u / \delta v$	0.009901	
9	$\theta = \delta^2 u/(\delta^2 u/ \delta^2 v)$	0.0102	
10	Mean Technical Efficiency $= 1- \delta u(2/\pi)^{1/2}$	0.99	

The estimate of discrepancy parameter (θ) indicated that maximum per cent of the difference between the actual output and the maximum possible output was due to the difference in technical efficiency of farmers. The Mean Technical Efficiency (MTE) was 0.99 which would indicate that the yield of coleus was one per cent lesser than the maximum possible output, thus, showing a very limited scope for further increasing the productivity of coleus under both contract and non-contract farming with the existing

level of input use in the study area. Though, technical efficiency was same for both contract and non-contract groups, the contract farmers got more yield, as they had been receiving technical advice from the company on efficient application of inputs.

5.2.5. Economics of Coleus Production

The per ha costs and return for coleus production are presented in Table.5.30 and Table.5.31. The total variable cost constituted the costs of labour, bullock labour, machime labour, seed, farm yard manure, fertilizers, plant protection chemicals, irrigation charges and interest on working capital. The total cultivation cost was slightly higher in the case of contract farmers when compared to that of non-contract ones, which was due to higher quantity of variable inputs used in the former category of farms. The rental value of land was calculated at the rate of Rs.6000 per hectare and the irrigation cost was deducted from this amount as it was borne by the land owners. The per ha yield and gross return under contract farming were 1.25 times more than that of non-contract farming. The net returns were also very high in the case of contract farmers when compared to that non-contract farmers which was due to difference in their yield. Thus, it can be concluded that contract farming of coleus was highly profitable for farmers.

The costs and Return from turmeric production are presented in Table.5.32 and Table.5.33. For the turmeric farmers, the per ha yield and gross return under contract farming were 1.4 times more than that of non-contract farming. The net returns were also very high (1.5 times) in the case of contract farmers compared to that non-contract farmers which was due to difference in their yield and price. Thus, it can be concluded that contract farming of turmeric was highly profitable for farmers.

5.2.6. Uncertainty in Coleus Production

Uncertainty refers to future events where probability distribution of the parameters cannot be determined empirically or quantitatively. Though it is very difficult to measure the uncertainty with any acceptable degree of accuracy, an attempt has been made to estimate the yield and price uncertainty ratios.

Yield Uncertainty

The yield uncertainty ratios for coleus in different farm size groups are presented in Table.5.34. It is evident from the table that the yield uncertainty was lower in the case of contract farmers, which were 0.16, 0.13 and 0.11 for marginal, small and big farmers respectively. In the case of non-contract farmers, it was comparatively higher with 0.41, 0.33 and 0.36 for marginal, small and big farmers respectively. 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 to contract farms.

Table 5.34. Yield Uncertainty Ratios of Coleus

S.No	Holding size group	Average Expected Yield (Tonnes/Ha)			Uncertainty ratio
		Highest Probable Yield	Most Probable Yield	Lowest Probable Yield	
1.	Contract Farmer				
	Marginal	16.85	16.02	14.33	0.16
	Small	16.30	15.38	14.40	0.13
	Big	16.65	15.65	14.90	0.11
	Overall	16.50	15.58	14.50	0.14
2.	Non-Contractor				
	Marginal	17.50	14.38	11.65	0.41
	Small	17.82	15.58	12.65	0.33
	Big	16.93	14.42	11.78	0.36
	Overall	17.50	15.00	12.20	0.35

Table 5.35. Yield Uncertainty Ratios of Turmeric

S.No	Holding size group	Average Expected Yield (Qtl /Ha)			Uncertainty ratio
		Highest Probable Yield	Most Probable Yield	Lowest Probable Yield	
1.	Contract Farmer				
	Marginal	43.28	38.75	35.93	0.19
	Small	44.38	41.02	38.25	0.15
	Big	44.60	42.43	40.23	0.10
	Overall	44.30	41.15	38.53	0.14
2.	Non-Contractor				
	Marginal	46.65	39.58	30.40	0.41
	Small	47.28	39.90	31.73	0.39
	Big	52.10	45.00	36.43	0.35
	Overall	49.30	40.08	33.63	0.39

The yield uncertainty ratios for turmeric in different farm size groups are presented in Table.5.35. It could be seen from the table that the yield uncertainty was lower in the case of contract farmers, which were 0.19, 0.15 and 0.10 for marginal, small and big farmers respectively. In the case of non-contract farmers, it was comparatively higher with 0.41, 0.39 and 0.35 for marginal, small and big farmers respectively. 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. It could also be observed that marginal farms had higher yield uncertainty than the farms with larger holdings. This was due to the fact that marginal farms applied lesser inputs in case of both coleus and turmeric (as given in Table 5.32 and 5.34).

Price Uncertainty

The price uncertainty ratios of coleus for different farm size group are presented in Table.5.36. In case of contract farmers, the price uncertainty ratio was zero because of fixed procurement price paid by their processing firm. In case of non-contract farmers, the price uncertainty ratios were as high as 0.35, 0.34 and 0.33 for marginal, small and big farmers respectively.

Table 5.36. Price Uncertainty Ratios of Coleus

S.No	Holding Size Group	Average Expected Price (Rs/Kg)			Uncertainty Ratio
		Highest Probable Price	Most Probable Price	Lowest Probable Price	
1.	Contractor	5.5	5.5	5.5	0.00
2.	Non-Contractor				
	Marginal	9.08	7.75	6.33	0.35
	Small	9.5	8.2	6.33	0.34
	Big	8.83	7.44	6.37	0.33
	Overall	9.21	7.88	6.49	0.34

The price uncertainty ratios of turmeric for different farm size group are presented in Table.5.37. In the case of TCF also, there was no price uncertainty due to fixed procurement price paid by their processing firm. In case of non- contract farmers, the price uncertainty ratios were as high as 0.31, 0.30 and 0.29 for marginal, small and big farmers respectively. Thus, it could be concluded that the contract farmers faced lesser yield and price uncertainties in the cultivation of coleus and turmeric than that of non-contract farmers.

Table 5.37. Price Uncertainty Ratios of Turmeric

S.No	Holding Size Group	Average Expected Price (Rs/Qtl)			Uncertainty Ratio
		Highest Probable Price	Most Probable Price	Lowest Probable Price	
1.	Contractor	500.00	500.00	500.00	0.00
2.	Non-Contractor				
	Marginal	2900	2350	2183.33	0.31
	Small	3096.42	2545.71	2339.28	0.30
	Big	3150	2618.46	2392.31	0.29
	Overall	3100	2557.66	2346.66	0.30

Note: Rs/ Qtl of processed produce for non-contract farmers

5.2.7. Marketing of Coleus and Turmeric

5.2.7.1. Marketing Costs Incurred by the Sample Farmers

One of the advantages of contract farming system was that the marketing cost would be drastically reduced as the contracting firms would partially or totally bear such costs. Hence, the extent of marketing costs incurred by contract and non-contract farms were analysed and the results are given in Table.5.38. It could be noted from the table that the non-contract farmers had to bear high transportation charges of Rs.16 to 22 per quintal, where as it was comparatively lower for contract farmers. The total marketing costs was the highest in case of large farmers, followed by small and marginal farmers in non-contract farming group. But, for the contract farmers, highest marketing cost was incurred by large farmers, followed by small and marginal farmers.

The marketing costs incurred by the turmeric sample farmers are presented in Table.5.39. It could be noted from the table that the non-contract farmers had to bear high transportation charges than the contract farmers. Such high transportation charges were on account of distantly located co-operative marketing society where the produce was sold. The total marketing cost was the highest in the case of marginal farmers, followed by small and big farmers in non-contract farming group and they were found to be higher than the corresponding farm categories of contract farmers.

5.2.7.2. Average Marketing Losses Incurred by the Sample Farmers

As could be observed from Table.5.40. that the average marketing losses incurred by the coleus sample farmers, the transport losses incurred by the non-contract farmers were higher than the contract farmers. The storage and other losses incurred by the non-contract farmers were also higher than that of contract farmers as the contract farmers sent their produce to the firm immediately after harvest.

The average marketing losses incurred by the turmeric sample farmers (Table 5.41) would indicate that the transportation losses incurred by the non-contract farmers were higher than that of the contract farmers. The pest and disease loss and other losses incurred by the non-contract farmers were higher than that of contract farmers. There was no storage loss in contract farms, as they sent their produce immediately after

the harvest. In case of non-contract farmers, it was Rs.9.33, Rs.12.92 and Rs.14.76 for marginal, small and big farmers respectively. Thus, it could be inferred that marketing losses especially, the transport and storage loss, were higher in non-contract farms than that of contract farms.

5.2.8. Contractual Arrangements

The various contractual agreements between the company and the farmers were examined. The results on the prevailing arrangements, farmers' attitude towards crop, field staff and company, expectations of the farmers, payment pattern and problem faced by the farmers and coleus based cropping system are presented in Tables.5.42, 5.43 and 5.44.

Coleus

It can 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 11.66 per cent of the farmers took up the crop cultivation after knowing its advantages through neighboring farmers.

Invariably, all the farmers in the all villages of the study revealed that the type of agreement between them and the company was written and formal in nature.

In general, the awareness of medicinal plant cultivation was low. Hence, the field staff of the company were monitoring the crop growth and provided technical advice on day to day basis. The frequency of field visits by the field officers varied between the sample farmers i.e., 58.33 per cent of the farmers were visited by the field officers once in a week, 23.33 per cent of the farmers were visited twice a week, 15.00 per cent of the farmers were visited once in fifteen days and 3.33 per cent of the farmers were visited once in two days.

Only 3.33 per cent of the farmers were not satisfied with the terms of agreement. Further, all the farmers indicated that they were willing to grow coleus again, obviously, till they get better price for the produce.

More than 77 per cent of the farmers would grow a different crop in the same plot where coleus/turmeric was cultivated. However, 16.66 per cent of farmers would grow the same crop in the same piece of land.

The respondents were asked to indicate additional facilities expected from the company. A larger percentage of the farmers (73.33 per cent) expected more price for their produce. A majority of the farmers (53.33 per cent) expressed the desire to receive advance payments. The facilities like loan for other crops, supply of good quality seed material at nominal price, regular visits by the field staff, prizes and awards and trial field, were expected by 46.66 per cent, 41.66 per cent, 23.33 per cent 13.33 per cent and 3.33 per cent of the farmers respectively.

It was observed that the farmers in the study area faced problems like delay in input supply (75 per cent), delayed payment by the company (13 per cent) and compulsion to have insurance (63.33 per cent). About 43 per cent of the farmers expressed insufficient input supply as the problem. Two farmers (3.33 per cent) have changed over to a new contractor when they cultivated the successive crop due to the overall dissatisfaction they had with the first contractor.

Turmeric

It can be observed that all the selected farmers were introduced to the turmeric contract farming by the company staff.

Invariably, all the farmers in the all villages of the study revealed that the type of agreement between them and the company was written and formal in nature.

The frequency of field visits by the field officers varied between the sample farmers, i.e., 76.66 per cent of the farmers were visited by the field officers once a week, followed by 15.00 per cent of the farmers were visited twice a week and 5.00 per cent of the farmers were visited fifteen days interval. All the sample farmers were satisfied with the terms of agreement. All the farmers expressed that they would continue to grow turmeric under contract farming with the same company.

About Eighty per cent of the farmers expressed that they would grow a different crop in the same plot where turmeric was grown. However, 11.66 per cent of farmers would grow the same crop on the same piece of land. The respondents were asked to indicate additional facilities expected from the company. A majority of the farmers (63.33 per cent) expressed their desire to receive advance payments. A larger percentage of the farmers (56.66 per cent) expected loan for other crops as well. The benefits like more price for the produce, prizes and awards and regular visits by the field staff were expected by 8.33 per cent, 11.66 per cent and 13.33 per cent of the farmers respectively.

It was observed that the farmers in the study area faced problems such as delayed input supply (70 per cent), delayed payment by the company (21.66 per cent) and compulsory insurance (13.33 per cent). It could be observed that 21 per cent of the farmers had problems with input supply.

The payment pattern practiced by the company for the sample farmers and the average number of settlements are presented in Table.5.43.

The average number of payments made to all the coleus growing farmers was 1.41. The date of final settlement from the date of last harvest varied from 1 to 4 weeks. A majority of the farmers accounts (83.32 per cent) were settled in about 2 to 3 weeks.

The average number of payments made to all the turmeric growing farmers was 1.23. The date of final settlement from the date of last harvest varied from 1 to 4 weeks. A majority of the farmers accounts (93.32 per cent) were settled in about 3 to 4 weeks days.

Table 5.43. Settlement Pattern of Farmers' Accounts

S.No	Particulars	Coleus	Turmeric
1.	Number of payments made to the farmers (Average)	1.41	1.23
2.	Advances given to the farmers (%)	41.66	23.33
3.	Day of final settlement from final harvest (%)		
a.	1 week	15.00	-
b.	2weeks	43.33	5.00
c.	3weeks	40.00	41.67
d.	4weeks	1.67	53.33

In order to find out the effect of coleus cultivation on the yield of its succeeding crop and also to know whether farmers had any apprehension on growing a different crop in the plot where coleus was cultivated, details on crop cultivated after coleus gathered. The crop rotation in coleus based cropping systems was studied and the results of the analysis are presented in Table.5.44.

Tapioca-coleus-coleus and Tapioca-coleus-maize were the predominant coleus based cropping systems, which were practiced by 18.33 per cent and 15 per cent of the farmers respectively and followed by maize-coleus-turmeric and maize-coleus-coleus cropping system.

It can be concluded that tapioca and maize were main crops grown in coleus based cropping systems.

The opinions/experience of the farmers on the effect of coleus crop on its successive crops was elicited and the results are presented in Table.5.45.

It can be observed from the table that paddy and maize grown after coleus showed positive effects in terms of yield. Totally, 6 farmers cultivated paddy as the successive crop after coleus and 4 farmers were opined that coleus had positive effect on the successive crop and 2 farmers did not know/find any such effects on their crop after coleus cultivation. Out of the 13 farmers who cultivated turmeric as the successive crop to coleus, 4 farmers opined that coleus had negative effect on the successive crop and 7 farmers did not know/find any such effects on their crop after coleus cultivation. Curry leaf was adversely affected by the coleus as successive crop as observed by one farmer.

Of the 19 farmers cultivating coleus as successive crop, 7 farmers noticed that coleus had positive effect on coleus as successive crop again in the same field, 12 farmers did not know/find any such effects on their crop. Coleus had negative effect on sunhemp as expressed by two farmers.

The turmeric based cropping systems were not presented as it was observed that the farmers followed different crop mix with this crop. It was one of the important crop in

cropping system existing in the study region. Generally, the effect of the turmeric crop on successive crop was positive.

Table 5.44. Coleus based Cropping Pattern Prevailing in the Study Region

(Numbers)

S.No	Previous crop	Successive crop	Contractor
1.	Tapioca	Maize	9
2.	Tapioca	Paddy	5
3.	Tapioca	Coleus	11
4.	Tapioca	Turmeric	5
5.	Maize	Turmeric	6
6.	Maize	Sunhemp	1
7.	Maize	Coleus	6
8.	Maize	Maize	2
9.	Maize	Fallow	1
10.	Maize	Paddy	1
11.	Ground nut	Onion	1
12.	Ground nut	Sunhemp	1
13.	Turmeric	Maize	3
14.	Turmeric	Coleus	1
15.	Turmeric	Tapioca	1
16.	Coleus	Maize	2
17.	Coleus	Turmeric	2
18.	Sunhemp	Cuuryleaf	1
19.	Fallow	Coleus	1

5.2.9. Constraints Encountered by the Selected Farmers

The farmers in the study region are facing so many problems in production and marketing of coleus and turmeric. These problems are being listed out by using Garrett's ranking technique. The following problems are being faced by the selected farmers. The contract farmers expressed that delayed input supply was the major problem which was followed by inadequate input supply, labour scarcity and so on.

The coleus non-contract farmers expressed that lack of knowledge on cultivation was the major problem which was followed by price fluctuation, labour scarcity and so on while, turmeric non-contract farmers expressed that price fluctuation was the major problem which was followed by high transport cost, labour scarcity and so on.

Table 5.46. Constraints Faced by the Coleus Contract Farmers

S.No	Problems	Garrett's score	Rank
1.	Delay in input supply	67.18	I
2.	Insufficient input supply	62.06	II
3.	Seasonal labour scarcity and high cost of labour	57.58	III
4.	Forced to insurance	45.85	IV
5.	Yield loss due to climate	38.23	V
6.	Lack of fixed price policy	30.08	VI

Table 5.47. Constraints Faced by the Coleus Non-Contract Farmers

S.No	Problems	Garrett's score	Rank
1.	Lack of knowledge on cultivation	73.26	I
2.	Price fluctuation	68.66	II
3.	Seasonal labour scarcity and high cost of labour	58.86	III
4.	Lack of agencies to supply quality seedling	45.86	IV
5.	Lack of market information	38.96	V
6.	Yield loss due to climate	28.86	VI

Table 5.48. Constraints Faced by the Turmeric Contract Farmers

S.No	Problems	Garrett's score	Rank
1.	Delay in input supply	67.83	I
2.	Insufficient input supply	57.00	II
3.	Seasonal labour scarcity and high cost of labour	51.50	III
4.	Yield loss due to climate and Pest and Diseases	37.83	IV
5.	Forced to insurance	35.00	V

Table 5.49. Constraints Faced by the Turmeric Non-Contract Farmers

S.No	Problems	Garrett's score	Rank
1.	Price fluctuation	68.83	I
2.	High transport cost	65.15	II
3.	Seasonal labour scarcity and high cost of labour	59.73	III
4.	Yield loss due to climate and Pest and Diseases	46.33	IV
5.	Lack of market information	37.85	V
6.	Storage loss due to lack of storage facilities	29.85	VI

Table 5.42. Contractual Arrangements Prevailing in the Study Regions

(Figures in Percentages)

S.No	Particulars	Coleus	Turmeric
1.	Total samples (Numbers)	60	60
2.	Introduced to the crop by		
	Company staff	53.33	100.00
	Fellow farmers	11.67	0.00
	Friends and relatives	35.00	0.00
	Others	0.00	0.00
3.	Type 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 2 days	3.33	3.33
	Twice a 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 and field staff		
	Satisfied	96.67	100.00
	Unsatisfied	3.33	0.00
6.	Interested to cultivate Coleus/Turmeric crop again		
	Yes	100.00	100.00
	No	0.00	0.00
7.	Successive coleus/Turmeric crop on		
	Same piece of land	16.67	11.67
	Other areas	76.67	80.00
	Both	6.66	8.33
8.	Expectations of the farmers from company		
	Loan for other crops	46.66	56.66
	Crop advance	53.33	63.33
	Prizes and awards	13.33	11.66
	More price of the produce	73.33	8.33
	Regular field visits by field officers	23.33	13.33
	Trial field	3.33	0.00
	Good quality seed material	41.66	0.00
9.	Problems faced by the farmers		
	Delay in input supply	75.00	70.00
	Insufficient input supply	43.33	21.66
	Transport of the produce	0.00	0.00
	Delay in payments	13.33	21.66
	Forced to insure	63.33	13.33
10.	Successive coleus crop with previous contractor or new contractor		
	Old	96.67	100.00
	New	3.33	0.00

Table 5.14. Distribution of Coleus Crop Income of Selected Farm Households

S.No	Income group (Rs)	House holds (Numbers)		Average income (Rupees/farm)		Percentage to total				Cumulative percentage			
		CCF	CNCF	CCF	CNCF	Households		Income(Rs)		Households		Income(Rs)	
						CCF	CNCF	CCF	CNCF	CCF	CNCF	CCF	CNCF
1.	<14500	2	5	12700.00	11554.80	3.33	16.66	1.71	3.21	3.33	16.66	1.71	3.21
2.	14501-29000	12	14	23300.00	26287.50	20.00	46.66	3.15	7.30	23.33	63.33	4.86	10.51
3.	29001-43500	16	6	37020.29	38008.33	26.66	20.00	5.00	10.56	50.00	83.33	9.87	21.07
4.	43501-58000	10	0	51430.68	0	16.66	0.00	6.95	0.00	66.66	83.33	16.82	21.07
5.	58001-72500	9	3	63270.00	67500.00	15.00	10.00	8.55	18.75	81.66	93.33	25.37	39.83
6.	72501-87000	1	1	80400.00	74000.00	1.66	3.33	10.87	20.56	83.33	96.66	36.25	60.40
7.	87001-101500	6	0	96621.40	0.00	10.00	0.00	13.06	0.00	93.33	96.66	49.31	60.40
8.	101501-116000	1	0	114000.00	0.00	1.66	0.00	15.41	0.00	95.00	96.66	64.72	60.40
9.	116001-130500	1	0	116850.00	0.00	1.66	0.00	15.79	0.00	96.66	96.66	80.52	60.40
10.	>130500	2	1	144050.00	142500	3.33	3.33	19.47	39.59	100.00	100.00	100.00	100.00
	Total	60	30	739642.40	359850.6	100.00	100.00	100.00	100.00	-	-	-	-

CCF – Coleus Contract Farms ; C**NCF** – Coleus Non-Contract Farms

Table 5.16. Distribution of Turmeric Crop Income of Selected Farm Households

S.No	Income group(Rs)	House holds (Numbers)		Average income (Rupees/farm)		Percentage to total				Cumulative percentage			
		TCF	TNCF	TCF	TNCF	Households		Income(Rs)		Households		Income (Rs)	
						TCF	TNCF	TCF	TNCF	TCF	TNCF	TCF	TNCF
1.	<32050	1	4	31250	25631.25	1.66	13.33	3.36	3.51	1.66	13.33	3.36	3.51
2.	32051-64100	31	19	39935.61	43216.66	51.66	6.33	4.30	5.92	53.33	26.66	7.66	9.43
3.	64101-96150	20	0	79340.48	0.00	33.33	0.00	8.54	0.00	86.66	76.66	16.20	9.43
4.	96151-128200	4	3	118640.00	110566.7	6.66	10.00	12.77	15.15	93.33	86.66	28.98	24.59
5.	128201-160250	0	2	0.00	155962.5	0.00	6.66	0.00	21.37	93.33	93.33	28.98	45.97
6.	160251-192300	2	1	175766.70	163125.0	3.33	3.33	18.92	22.36	96.66	96.66	47.91	68.33
7.	192301-224350	1	0	206250.00	0.00	1.666	0.00	22.20	0.00	98.73	96.66	70.11	68.33
8.	>224350	1	1	277500.00	231000	1.66	3.33	29.88	31.66	100.00	100.00	100.00	100.00
	Total	60	30	928682.80	729502.1	100.00	100.0	100.00	100.00	-	-	-	-

TCF – Turmeric Contract Farms; T**NCF** – Turmeric Non-Contract Farms

Table 5.15. Distribution of Total Crop Income of Selected Coleus Farm Households

S.No	Income group(Rs)	House holds (Numbers)		Average income (Rupees)		Percentage to total				Cumulative percentage			
		CCF	CNCF	CCF	CNCF	Households		Income(Rs)		Households		Income(Rs)	
						CCF	CNCF	CCF	CNCF	CCF	CNCF	CCF	CNCF
1.	<44000	2	5	23451.33	26904.00	3.33	16.66	1.48	3.07	3.33	16.66	1.48	3.07
2.	44001-88000	12	15	71536.67	65430.67	20.00	50.00	4.53	7.47	23.33	66.66	6.02	10.54
3.	88001-132000	27	4	105693.5	106034.90	45.00	13.33	6.70	12.11	68.33	80.00	12.72	22.66
4.	132001-176000	3	4	142196.7	153310.00	5.00	13.33	9.01	17.51	73.33	93.33	21.74	40.18
5.	176001-220000	10	0	188804.0	0.00	16.66	0.00	11.97	0.00	90.00	93.33	33.71	40.18
6.	220001-264000	4	1	238257.5	238363.00	6.66	3.33	15.10	27.23	96.66	96.66	48.82	67.41
7.	264001-308000	0	1	0.00	285170.00	0.00	3.33	0.00	32.58	96.66	100.00	48.82	100.00
8.	308001-352000	0	0	0.00	0.00	0.00	0.00	0.00	0.00	96.66	100.00	48.82	100.00
9.	352001-396000	1	0	370560.0	0.00	1.66	0.00	23.49	0.00	98.33	100.00	72.32	100.00
10.	>396000	1	0	436380.0	0.00	1.66	0.00	27.67	0.00	100.00	100.00	100.00	100.00
	Total	60	30	1576880.	875212.60	100.00	100.00	100.00	100.00	-	-	-	-

CCF –Coleus Contract Farms ; C**NCF** –Coleus Non-Contract Farms

Table 5.17. Distribution of Total Crop Income of Selected Turmeric Farm Households

S.No	Income group(Rs)	Households (Numbers)		Average income (Rupees/farm)		Percentage to total				Cumulative percentage			
		TCF	TNCF	TCF	TNCF	Households		Income(Rs)		Households		Income(Rs)	
						TCF	TNCF	TCF	TNCF	TCF	TNCF	TCF	TNCF
1.	<39350	1	1	36250.00	34100.00	1.66	3.33	1.73	1.66	1.66	3.33	1.73	1.67
2.	39351-78700	10	10	62310.00	12963.67	16.66	33.33	2.98	3.09	18.33	36.33	4.72	4.77
3.	78701-118050	13	6	104829.60	89840.56	21.66	20.00	5.02	4.42	40.00	56.66	9.74	9.20
4.	118051-157400	13	1	138218.80	135580.00	21.66	3.33	6.62	6.67	61.66	60.00	16.37	15.87
5.	157401-196750	8	3	178220.00	171805.30	13.33	10.00	8.54	8.45	75.00	70.00	24.91	24.33
6.	196751-236100	5	2	226725.80	235260.50	8.33	6.66	10.86	11.58	83.33	76.66	35.78	35.91
7.	236101-275450	3	3	263828.80	265884.10	5.00	10.00	12.64	13.08	88.33	86.66	48.42	49.00
8.	275451-314800	4	1	297166.00	280675.00	6.66	3.33	14.24	13.81	95.00	90.00	62.67	62.82
9.	314801-354150	2	2	351190.00	341977.50	3.33	6.66	16.83	16.83	98.33	96.66	79.50	79.65
10	>354150	1	1	427640.00	413258.90	1.66	3.33	20.49	20.34	100.00	100.00	100.00	100.00
	Total	60	30	2086379.0	2031346.0	100.00	100.00	100.00	100.00	-	-	-	-

TCF – Turmeric Contract Farms ; T**NCF** – Turmeric Non-Contract Farms

Table 5.30. Costs and Returns for the Cultivation of Coleus in Sample Farm Households (Rs/ha)

S.No	Particulars	Contract Farmers				Non-contractors			
		Marginal	Small	Big	Overall	Marginal	Small	Big	Overall
	Variable Cost								
1.	Labour	20471 (38.95)	20443 (39.00)	21402 (39.87)	20673 (39.21)	10896 (30.22)	10567 (29.50)	12278 (31.31)	11146 (30.31)
2.	Machine power	3425 (6.52)	3424 (6.53)	3848 (7.17)	3523 (6.60)	3021 (8.38)	3075 (8.59)	3875 (9.98)	3304 (8.99)
3.	Seed cost	2500 (4.76)	2500 (4.77)	2500 (4.66)	2500 (4.74)	2500 (6.93)	2500 (6.99)	2500 (6.42)	2500 (6.80)
4.	Manures	11673 (22.29)	11576 (22.09)	9821 (18.30)	11187 (21.21)	7292 (20.23)	7958 (22.22)	8028 (20.67)	7846 (21.34)
5.	Fertilizers	8207 (15.62)	8122 (15.50)	9412 (17.54)	8442 (16.0)	6950 (19.28)	6184 (17.28)	6344 (16.33)	6385 (17.37)
6.	Plant Protection Chemicals	648 (1.23)	572 (1.09)	571 (1.06)	588 (1.11)	742 (2.06)	753 (2.10)	822 (2.12)	772 (2.10)
7.	Irrigation charges	-	161 (0.31)	369 (0.69)	175 (0.33)	-	-	261 (0.67)	78 (0.21)
8.	Interest on Working capital	5631 (10.71)	5616 (10.71)	5751 (10.71)	5651 (10.72)	4652 (12.90)	4770 (13.32)	4739 (12.20)	4737 (12.88)
9.	Total	52555 (100.00)	52414 (100.00)	53674 (100.00)	52739 (100.00)	36053 (100.00)	35807 (100.00)	38847 (100.00)	36768 (100.00)
10.	Gross Return	98197	88117	90237	88846	67030	67975	78292	70881
11.	Net Return	36642	35703	36263	36107	30977	32168	39445	34113
12.	Yield (Qtl/ha)	153	152	154	153	116	119	130	122
13.	Cost of Production (Rs/Qtl)	3.41	3.43	3.49	3.44	3.20	3.09	3.06	3.11

Table 5.32. Costs and Returns for the Cultivation of Turmeric in Sample Farm Households (Rs/ha)

S.No	Particulars	Contract Farmers				Non-contractors			
		Marginal	**Small**	**Big**	**Overall**	**Marginal**	**Small**	**Big**	**Overall**
	Variable Cost								
1.	Labour	33656 (36.36)	37403 (37.16)	45948 (38.82)	39325 (37.60)	28708 (38.76)	29795 (38.75)	35346 (40.02)	32092 (39.52)
2.	Machine power	3687 (3.98)	4046 (4.02)	5125 (4.33)	4304 (4.12)	3000 (4.05)	3152 (4.10)	3279 (3.71)	3192 (3.93)
3.	Seed cost	15000 (16.21)	15000 (14.90)	15000 (12.67)	15000 (14.34)	13250 (17.89)	12827 (16.67)	13346 (15.11)	13092 (16.12)
4.	Manures	14906 (16.11)	15950 (15.85)	20073 (16.96)	16979 (16.23)	9167 (12.38)	9010 (11.72)	10635 (12.04)	9733 (11.99)
5.	Fertilizers	12359 (13.35)	13725 (13.64)	14713 (12.43)	13822 (13.22)	8917 (12.04)	10836 (14.09)	11715 (13.27)	11025 (13.57)
6.	Plant Protection Chemicals	3031 (3.28)	3653 (3.63)	4006 (3.39)	3670 (3.51)	3083 (4.16)	2375 (3.09)	2915 (3.30)	2680 (3.30)
7.	Irrigation charges	-	92 (0.09)	808 (0.68)	283 (0.27)	-	-	1615 (1.83)	700 (0.86)
8.	Interest on Working capital	9916 (10.71)	10784 (10.71)	12681 (10.72)	11206 (10.71)	7935 (10.72)	8909 (11.58)	9462 (10.72)	8702 (10.71)
9.	Total	92555 (100.00)	100653 (100.00)	118351 (100.00)	104589 (100.00)	74060 (100.00)	76898 (100.00)	88313 (100.00)	81216 (100.00)
10.	Gross Return	182031	188571	200000	190937	127937	129707	150000	138323
11.	Net Return	89476	87918	81646	86348	53877	52809	61687	57107
12.	Yield (Qtl/ha)	364	377	400	382	256	259	300	276
13.	Cost of Production (Rs/Qtl)	252.93	265.25	293.97	271.75	289.45	293.24	295.45	293.82

Table 5.31.Average Total Cost of Cultivation for Coleus in the Sample Farm Households

(Rs/Ha)

S.No	Costs	Contract Farmers				Non-contract Farmers			
		Marginal	Small	Big	Overall	Marginal	Small	Big	Overall
1.	**Cost A_1**	54113	58951	85539	64107	41611	44138	50097	45420
2.	**Cost A_2**	55267	58951	85539	64357	41611	44138	50097	45420
3.	**Cost B_1**	93396	113838	160539	120306	58611	86198	117764	90150
4.	**Cost B_2**	100550	119677	166170	126381	64611	92198	123503	96072
5.	**Cost C_1**	98819	120209	167468	126601	63486	92356	123597	95955
6.	**Cost C_2**	105973	126048	173099	132677	69486	98356	129336	101876
7.	**Cost C_3**	116570	138653	190409	145944	76434	108192	142270	112064
8.	**Gross Return**	93250	77401	69473	80041	67030	67975	78292	71099
9.	**Net Return over Variable Cost**	36642	35703	35263	36107	30977	32168	39445	34113
10.	**Net Return over Cost C_3**	-23320	-61252	-720936	-65903	-9404	-40217	-63978	-40965

Table 5.33.Average Total Cost for Turmeric in the Sample Farm Households

(Rs/Ha)

S.No	Costs	Contract Farmers				Non-contract Farmers			
		Marginal	**Small**	**Big**	**Overall**	**Marginal**	**Small**	**Big**	**Overall**
1.	**Cost A_1**	97581	107897	139392	115445	79260	83552	106143	92912
2.	**Cost A_2**	97581	107897	139392	115445	79260	83552	106143	92912
3.	**Cost B_1**	109224	123182	164147	132927	107360	122659	181974	146832
4.	**Cost B_2**	115224	129182	170147	138927	113360	128659	187974	152832
5.	**Cost C_1**	112536	126643	167838	136434	114569	129819	190137	154432
6.	**Cost C_2**	118536	132643	173838	142434	120569	135819	196137	160432
7.	**Cost C_3**	130390	145907	191222	156677	132626	149401	215751	176475
8.	**Gross Return**	182031	188571	200000	190201	127938	129707	150000	135882
9.	**Net Return over Variable Cost**	89476	87918	81646	86348	53877	52809	61687	57107
10.	**Net Return over Cost C_3**	51641	42664	8778	33524	-4688	-19694	-65751	-40593

Table 5.38. Marketing Costs Incurred by the Coleus Farmers

(Rs/Qtl)

S.No	Particulars	Contract Farmers				Non-contract Farmers			
		Marginal	**Small**	**Big**	**Overall**	**Marginal**	**Small**	**Big**	**Overall**
1.	Grading and Packing	-	-	-	-	-	-	-	-
2.	Loading	6.01	6.52	8.03	6.85	4.64	4.72	4.06	4.48
3.	Weighing Charges	1.40	1.30	1.50	1.40	1.10	1.14	1.06	1.10
4.	Transportation Charges	10.42	10.40	12.30	11.04	16.00	17.37	21.66	18.34
5.	Unloading	-	-	-	-	-	-	-	-
6.	Commission and Others	-	-	-	-	-	-	-	-
	Total	17.83	18.22	21.83	19.29	21.74	23.23	26.78	23.92

Table 5.39. Marketing Costs Incurred by the Turmeric Farmers

(Rs/Qtl)

S.No	Particulars	Contract Farmers				Non-contract Farmers			
		Marginal	**Small**	**Big**	**Overall**	**Marginal**	**Small**	**Big**	**Overall**
1.	Grading and Packing	-	-	-	-	-	-	-	-
2.	Loading	1.96	2.12	2.35	2.16	1.83	1.96	2.07	2.00
3.	Weighing Charges	0.80	0.80	0.80	0.80	-	-	-	-
4.	Transportation Charges	19.09	20.64	22.08	20.84	82.5	66.78	63.65	67.00
5.	Unloading	-	-	-	-	28.33	32.85	34.46	33.10
6.	Commission and Others	-	-	-	-	2.00	2.92	2.92	2.70
	Total	21.85	23.56	25.23	23.80	114.66	104.24	103.11	104.80

Table 5.40.Average Marketing Losses incurred by the Coleus Sample Farmers

(Kg/ha)

S. No	Particulars	Contract Farms				Non-Contract Farms			
		Marginal	Small	Big	Overall	Marginal	Small	Big	Overall
1.	Transportation loss	19.12	17.60	24.70	20.47	24.7	23.55	23.17	23.80
2.	Storage and other loss	57.70	43.35	77.75	59.60	155.30	152.42	135.10	147.60
3.	Total loss	76.82	60.95	102.45	80.07	180.00	175.97	158.27	171.40
4.	Value(Rs)	422.51	335.22	563.47	440.38	990.00	967.83	870.48	942.70

Table 5.41.Average Marketing Losses incurred by the Turmeric Sample Farmers

(Kg/ha)

S.No	Particulars	Contract Farms				Non-Contract Farms			
		Marginal	Small	Big	Overall	Marginal	Small	Big	Overall
1.	Transportation loss	9.67	11.57	14.70	11.97	14.82	17.3	27.95	20.02
2.	Pest & Diseases and other losses	13.12	14.92	20.00	16.02	12.50	15.70	29.02	19.07
3.	Storage loss	-	-	-	-	23.32	32.30	36.90	49.82
4.	Total loss	22.79	26.49	34.70	27.99	50.64	65.30	93.87	88.91
5.	Value(Rs)	113.95	132.45	173.50	139.95	253.20	326.50	469.35	444.55

Table 5.4. Educational Status of the Heads of Coleus and Turmeric Households

(Number)

S.No	Educational Status	Coleus			Turmeric		
		Contractor	**Non-contractor**	**Total**	**Contractor**	**Non-contractor**	**Total**
1.	Illiterate	-	4 (13.33)	4 (4.44)	-	2 (6.67)	2 (2.22)
2.	Primary (upto 5^{th})	22 (36.67)	9 (30.00)	31 (34.44)	23 (38.33)	14 (46.67)	37 (41.11)
3.	Middle School ($6\text{-}8^{th}$)	19 (31.67)	7 (23.33)	26 (28.89)	18 (30.00)	9 (30.00)	27 (30.00)
4.	High School	11 (18.33)	5 (16.67)	16 (17.78)	13 (21.67)	4 (13.33)	17 (18.89)
5.	Higher Secondary	6 (10.00)	3 (10.00)	9 (10.00)	5 (8.33)	1 (3.33)	6 (6.67)
6.	Collegiate	2 (3.33)	2 (6.67)	4 (4.44)	1 (1.67)	-	1 (1.11)
	Total	60 (100.00)	30 (100.00)	90 (100.00)	60 (100.00)	30 (100.00)	90 (100.00)

(Figures in parentheses indicate percentages to total)

Table5.3. Experience in Coleus and Turmeric Farming

(Number)

S.No	Coleus				Turmeric			
	Experience (Years)	**Contractor**	**Non-contractor**	**Total**	**Experience (Years)**	**Contractor**	**Non-contractor**	**Total**
1.	1	24 (40.00)	15 (50.00)	39 (43.33)	≤ 3	2 (3.33)	0 (0.00)	2 (2.22)
2.	2	17 (28.33)	14 (46.67)	31 (34.44)	4-9	17 (28.33)	10 (33.33)	27 (30.00)
3.	3	9 (15.00)	1 (3.33)	10 (11.11)	10-15	26 (43.33)	13 (43.33)	39 (43.33)
4.	4	6 (10.00)	-	6 (6.67)	16-21	10 (16.67)	1 (3.33)	11 (12.22)
5.	≥5	4 (6.67)	-	4 (4.44)	22-27	3 (5.00)	3 (10.00)	6 (6.67)
6.	-	-	-	-	>27	2 (3.33)	3 (10.00)	5 (5.55)
	Total	60 (100.00)	30 (100.00)	90 (100.00)	-	60 (100.00)	30 (100.00)	90 (100.00)

(Figures in parentheses indicate percentages to total)

Table 5.45. Effect of Coleus Cultivation on Successive Crop: Opinions of Farmers

S.No	Successive Crop	Sathapadi			Othiathur			Naduvalur			Kadampur			Gudamalai			Veeraganur			Total		
		P	N	NK	P	N	NK	P	N	NK	P	N	NK	P	N	NK	P	N	NK	P	N	NK
1.	Turmeric			1				1	2	1						1	1	2	4	2	4	7
2.	Paddy	1		1				2									1		1	4	-	2
3.	Maize	2		1		1		2			3		2	2	1	2				9	2	5
4.	Onion			1																-	-	1
5.	Sunhemp		1			1														-	2	-
6.	Tapioca									1										-	-	1
7.	Coleus	1		1	2		3	1	1	2	2		3	1		1			2	7	1	12
8.	Curryleaf								1											-	1	-

Note: P – Positive

N – Negative

NK – Not Known

CHAPTER VI

SUMMARY AND CONCLUSION

India is the second largest exporter of medicinal plants in 2001, next to China, accounting for about 13 percent of global imports. The export of medicinal plants is steadily increasing from Rs.27 crores in 1987-88 to Rs.751 crores in 2002-03. In Tamil Nadu, many medicinal plants like senna, periwinkle, glory lily, coleus, gall nut, annato, aloe, Keezhanelli, dhavanum, atmagupta and so on are being grown right from pre-historical times. At present, some varieties which have pharmaceutical value are commercially grown and drugs made out of them are marketed domestically and also are exported. Of these medicinal plants, coleus and turmeric are widely grown in Tamil Nadu. SAMI Labs Ltd, a Bangalore- based exporter of standardized herbal extracts has taken up large scale cultivation of coleus in Salem district of Tamil Nadu and areas around Bangalore and in stretches between Mysore and Coorg of Karnataka state. India is the largest producer, consumer and exporter of turmeric which has also been promoted through contract farming.

Coleus and turmeric cultivation in Tamil Nadu is promoted through contract farming, where in the company provides the inputs viz., seeds, fertilizers, plant protection chemicals and technical advice and buys back the produce at a predetermined price. MGP Herbals Care (P) Ltd is a private company mainly concentrating on cultivation of coleus and turmeric through contract farming in Tamil Nadu.

Contract farming was advantages to farmers as the firm supplies the necessary inputs on interest free credit and arranges for marketing of output. Hence, contracted crops provided better returns per rupee of cost incurred when compared to that of non-contract farming of the same crops

The field of contract farming has immense potential for research, as it is an emerging organizational structure, which is only recently been considered as a sustainable alternative for firm management. The boundary of traditional farm management concepts has broadened after contract farming and has provided new vistas for research.

Gherkin contracting firms in India shut down their units and farmers who were dependent on them suffered severe loss. Processing companies are favouring large farmers

mainly for undertaking contract farming (Singh, 2000 and Dileep et al, 2002). Thus, there is an urgent need for a detailed survey to find out the economic feasibility of coleus and turmeric contract farming in Tamil Nadu.

The overall objective of the study was to assess the impact of contract farming on income of the farmers and to assess the benefits that accrued to the farmers in terms of optimum use of resources, easy and adequate credit and better price realized through the assured market under contract firms. The specific **objectives** are:

(i) to assess the economic returns from the cultivation of coleus and turmeric under the contract farming system in Salem district;
(ii) to estimate the resource use efficiency in the cultivation of coleus and turmeric under contract and non-contract farming system;
(iii) to assess the impact of contract farming on employment generation; and
(iv) to find out the extent of uncertainty on yield and price in contract farming system and also to identify constraints in contract farming.

For the present study, the Salem District was purposively selected, because area of coleus and turmeric under contract farming was maximum in Salem district. Among the taluks in Salem district, the Gangavalli which had more area under coleus cultivation was purposively selected for the present study. For turmeric, Gangavalli and Attur taluks were selected as they had larger area under contract farming.

The sample villages (six) were selected using probability proportional to size sampling technique considering the area under the contract farming as the criterion. From among the selected villages, ten farmers were selected from each of the villages (totally, 60 farmers), and five non-contract farms were also selected from each of these villages (totally, 30 farmers), using random sampling technique to compare their efficiency with that of contract farms for the selected crops.

The salient findings of the study after analysis of the data collected are summarized as follows.

6.1. General Description

Among the coleus contract farm households, 73 per cent of the heads of the households were in the age group of above 40 years while, 38 per cent of the turmeric contract farmers were in the age group of above 40 years. Among the coleus non-contract farmers, however, only 63 per cent of the head of households were in the age group of above 40 years while, in case of turmeric, they constituted only 33 per cent. About, 96 per cent of heads of households in the coleus contract farmers were male farmers, whereas in case of non-contract farmers, the male heads of households constituted 93 per cent. Of the turmeric farmers, 98 per cent of heads of households in contract farming system were male farmers, whereas in case of non-contract farmers, the male heads of households constituted 100 per cent.

Among the coleus contract farmers, 40 per cent of the head of the sample households were with farming experience of 1 year, followed by 28 per cent with an experience of 2 years. The heads of households in non-contract farming group having an experience of 1 year constituted 50 per cent while 47 per cent had 2 years of experience. Around 68 per cent of the farmers had a farming experience of more than 10 years in turmeric cultivation under contract farming system and non-contract farming system.

The heads of households educated up to high school level constituted 87 per cent, while 83 per cent of non-contract farmers were educated up to high school level in coleus farming group. In case of turmeric, the heads of households of both contract and non-contract farmers educated up to high school level constituted 90 per cent.

Regarding farm holdings, 55 per cent of the coleus contract farmers were small farmers with an area of 1-2 hectare. In case of turmeric, 58.33 percent of the contract farmers were small farmers with an area of 1-2 hectare.

6.2. Cropping Pattern of the Sample Farms

Coleus occupied 32 per cent of the total cropped area for coleus contract farmers' households, followed by maize with 21 per cent, tapioca with 17 per cent, turmeric with 15 per cent and so on. In case of turmeric farms, maize was the major crop accounting for 35 per cent followed by tapioca (24 per cent), turmeric (19 per cent) and so on.

6.3. Extent of Use of Credit Facilities by the Selected Farms

Among the coleus contract farmers, 41 per cent of the coleus contract farmers availed the credit facilities from State Bank of India and the average credit availed per farm was Rs.6208. For the turmeric farmers, 23 per cent of the contract farmers availed the credit facilities from State Bank of India and the average credit availed per farm was Rs.4333

6.4. Impact of Contact Farming on Income and Employment

6.4.1. Income

The share of coleus crop income to on-farm income and total income under contract farming system were 64 per cent and 55 per cent respectively. Under non-contract farming system, the shares of coleus crop income to on-farm income and total income were 65 per cent and 51 per cent respectively. The share of turmeric crop income to on-farm income and total income under contract farming system were 81 per cent and 58 per cent respectively. Under non-contract farming system, the shares of turmeric crop income to on-farm income and total income were 80 per cent and 51 per cent respectively.

6.4.2. Gini Ratio for Income Distribution

The gini ratio which would indicate the extent of equality of income distribution was 0.31 for coleus income and 0.28 for total crop income for coleus contract farmers where as it was 0.33 and 0.35 for the same to non-contract farmers. In the case of turmeric farmers, the gini ratio was 0.30 for turmeric income and 0.29 for the total crop income to the turmeric contract farmers whereas it was 0.34 and 0.38 for the same to the non-contract farmers respectively.

6.4.3. Share of Employment by Coleus in the Selected Region

In coleus contract farmers, 16 per cent the total employment was generated out of coleus cultivation and it accounted for 21 per cent of the total on-farm employment generated by the contract farmers. In the case of non-contract farmers, employment generation through crops other than coleus was higher than that of contract farmers.

In turmeric contract farmers, 26 per cent the total employment was generated out of turmeric cultivation and it was 30 per cent of the total on-farm employment generated by the

contract farmers. In the case of non-contract farmers, 25 per cent of the total employment was generated through turmeric cultivation and it was 28 per cent of the total on-farm employment.

6.5. Efficiency Measurement

6.5.1. Resource Use Efficiency

For coleus crop, the co-efficients of all inputs were significant (manures and fertilizers at 1 per cent and human labour at 5 per cent) in the case of contract farmers and in case of non-contract farmers, inputs like manures and fertilizers and plant protection chemicals were positive (manures and fertilizers at 1 per cent and plant protection chemicals at 5 per cent) and significant. The return to scale ($\sum b_i$) did not depict a uniform pattern with the size of holdings.

For turmeric crop, the co-efficient of plant protection chemicals in the case of non-contract farmers was negative, indicating excessive use of these inputs. Similarly, the co-efficients of all other inputs in the case of contract farmers and non-contract farmers were positive and significant. The return to scale ($\sum b_i$) did not depict a uniform pattern with the size of holdings.

6.5.2. MVP/MFC Ratio

In coleus contract farms, the ratio of MVP and MFC was more than unity in case of machine power and plant protection chemicals indicating their lesser usage in the production of coleus. However, the inputs like human labour and manures and fertilizers had the MVP/MFC ratios of less than unity revealing that the usages were excessive than the optimal level. In case of non-contract farming system, the resources like manures and fertilizers and plant protection chemicals were found to be significant and the MVP/MFC ratio for the former was less than unity and the ratio for the later was more than unity. This would indicate the excessive application of manures and fertilizer and sub-optimal application of plant protection chemicals in non-contract farms.

For turmeric, the ratio of MVP to MFC in case of human labour and manures and fertilizers for the contract group of sample farms were positive, less than unity and significant indicating the need to curtail their excessive use by them. In case of non-contract farmers, coefficient was negative for the plant protection chemicals but insignificant.

6.5.3. Technical Efficiency

In the case of coleus contract farms, the variance of one sided error term (δ^2_u) and symmetric error term (δ^2_v) were 0.0000328 and 0.000142 respectively which implied that symmetric error term was dominant which measured the short fall of output from the maximum possible output. The Mean Technical Efficiency (MTE) was 0.99 would indicate that the yield of coleus was one per cent less than the maximum possible output, thus showing limited scope for further increasing the productivity of coleus contract farmers with the existing level of input use in the study area.

In the case of coleus non-contract farms, the variance of one sided error term (δ^2_u) and symmetric error term (δ^2_v) were 0.0000102 and 0.0102020 respectively which implied that symmetric error term which measured the short fall of output from the maximum possible output was dominant. The Mean Technical Efficiency (MTE) was 0.99 which would indicate that the yield of coleus was one per cent less than the maximum possible output, thus showing limited scope for further increasing the productivity of coleus contract farmers with the existing level of input use in the study area. The Maximum Likelihood Estimates could not be obtained due to skewness for both contract and non-contract farms of turmeric. It would indicate that the turmeric farmers were already technically efficient.

6.4. Economics of Coleus Production

The cost of cultivation to raise 1 hectare of coleus under contract farming was higher (Rs.52739) than that of non-contract farms which was Rs.36768.But, it was high in the case of turmeric cultivation which was Rs.104589 for contract farms and Rs.81216 for non-contract farms. The contract farmers realized higher net profit per hectare than the non-contract farmers for both crops. In coleus, it was Rs.36107 for contract farms and Rs.34113 for non-contract farms. In turmeric, it was Rs.86348 for contract farms and Rs.57107 for non-contract farms.

The per ha yield and gross return under coleus contract farming were 1.3 times that of non-contract farming. The net returns were also very high (1.23) in the case of contract farmers when compared to that of non-contract farmers which was due to difference in their yield. For the turmeric farmers, the per ha yield and gross return under contract farming were 1.4 times

more than that of non-contract farming. The net returns were also very high (1.5 times) in the case of contract farmers compared to that non-contract farmers which was due to different in their yield and price.

6.5. Uncertainty

6.5.1. Yield Uncertainty

The yield uncertainty was lower in the case of coleus contract farmers which were 0.16, 0.13 and 0.11 for marginal, small and big farmers respectively. In the case of coleus non-contract farmers, it was as high as 0.41, 0.33 and 0.36 for marginal, small and big farmers respectively. In the case of turmeric, the yield uncertainty was lower in the case of contract farmers which were 0.19, 0.15 and 0.10 for marginal, small and big farmers respectively. In the case of non-contract farmers, it was as high as 0.41, 0.39 and 0.35 for marginal, small and big farmers respectively. Thus, the contract farmers had less yield uncertainty than that of non-contract farmers, which was due to steady guidance by the field executives of the contract farms.

6.5.2. Price Uncertainty

In the case of contract farmers, the price uncertainty ratio was zero because of fixed procurement price paid by their processing firm. In the case of coleus non-contract farmers, the price uncertainty ratios were high as 0.35, 0.34 and 0.33 for marginal, small and big farmers respectively In the case of turmeric non-contract farmers, the price uncertainty ratios were high as 0.31, 0.30 and 0.29 for marginal, small and big farmers respectively.

6.6. Marketing Aspects

6.6.1. Marketing Costs Incurred by the Sample Farmers

In the case of coleus, non-contract farmers had to bear high transportation charges of Rs.16 to 22 per quintal, where as it was comparatively lower for contract farmers. The total marketing costs was the highest in case of large farmers, followed by small and marginal farmers in non-contract farming group. But, for the contract farmers, highest marketing cost was incurred by large farmers, followed by marginal and small farmers.

For turmeric also, the non-contract farmers had to bear high transportation charges. Such high transportation charges were on account of distantly located co-operative marketing society where the produce was sold. The total marketing cost was the highest in case of marginal

farmers, followed by small and big farmers in non-contract farming group and they were found to be higher than the corresponding farm categories of contract farmers.

6.6.2. Average Marketing Losses Incurred by the Sample Farmers

For coleus, the transport losses incurred by the non-contract farmers were higher than the contract farmers. The storage and other losses incurred by the non-contract farmers were also higher than that of contract farmers as the contract farmers sent their produce to the firm immediately after harvest.

For turmeric, the transportation losses incurred by the non-contract farmers were higher than that of the contract farmers. The pest and disease loss and other losses incurred by the non-contract farmers were higher than that of contract farmers. There was no storage loss in contract farms, as they sent their produce immediately after the harvest. In case of non-contract farmers, storage loss was Rs.9.33, Rs.12.92 and Rs.14.76 for marginal, small and big farmers respectively. Thus, it could be inferred that marketing losses especially, the transport and storage loss, were higher in non-contract farms than that of contract farms.

6.7. Contractual Arrangements

To coleus crop, 53.33 per cent of the contract sample farmers were introduced to the crop by the company staff and all the farmers in the all villages of the study revealed that the type of agreement between them and the company was written and formal in nature for both the crops. Among the coleus farms, 58.33 per cent were visited by the field officers once in week, followed by 23.33 per cent were visited twice a week. Only 3.33 per cent of the farmers were not satisfied with the contractor and the term of agreement. Further, all the farmers indicated that they were willing to grow coleus once again. A majority of the farmers (53.33 per cent) expressed the desire to receive advance payments. A larger percentage of the farmers (73.33 per cent) expected more prices for their produce. 75.00 per cent and 63.33 per cent of the sample farmers had problems with input supply and forced to insurance respectively.

To turmeric crop, all the selected farmers were introduced to the turmeric contract farming by the company staff. Among the farmers, 76.66 per cent were visited by the field officers once a week, followed by 15.00 per cent were visited twice a week. A majority of the farmers (63.33 per cent) expressed their desire to receive advance payments.

A larger percentage of the farmers (56.66) expected loan for other crops. Regarding to the problems, 70.00 per cent of the farmers had problems with input supply and 21.66 percent of the farmers indicated the problems with delay in payments and insufficient input supply

The average number of payments made to all the coleus growing farmers was 1.41. A majority of the farmers accounts (83.32 per cent) were settled in about 2 to 3 weeks. The average number of payments made to all the turmeric growing farmers was 1.23. Payment (93.32 per cent) was settled to a majority of the farmers (93.32 per cent) in about 3 to 4 weeks days.

Regarding cropping system, tapioca and maize were main crops for coleus based cropping systems, and paddy and maize grown after coleus showed positive effects.

6.8. Constraints Encountered by the Selected Farmers

Lack of knowledge on cultivation and processing was the major problem faced by the coleus non contract farmers. But, price fluctuation was the major problem for turmeric non-contract farmers. Delay in input supply and labour scarcity were the major problem faced by the contract farmers.

The results of the study could prove the **hypotheses** that:

1. Contract farming reduces market and price risks and stabilizes farm income.
2. Coleus and turmeric crops give higher net income to the farmers.
3. Contract faming in coleus and turmeric cultivation provides greater employment opportunity to the farmers, as they are labour-intensive.

6.9. Conclusion

The following conclusions could be drawn from the results of the present study:

1. Coleus and turmeric were the predominant crops grown in the study region, followed by maize and tapioca. This would indicate that contract firm had diversified agricultural production in the study region.

2. The cost of cultivation of coleus and turmeric per hectare under contract farming was higher than that of non-contract farms and this was due to the application of optimum quantity of inputs as suggested by the contract firm.
3. The contract farmers realized higher net profit per hectare than the non-contract farmers for both crops. In coleus, it was Rs.36107 for contract farms and Rs.34113 for non-contract farms. In turmeric, it was Rs.86348 for contract farms and Rs.57107 for non-contract farms. It revealed that contract farming enhanced the farm income.
4. Gini ratio on income distribution was high in non-contract farms for coleus and turmeric when compared to that of contract farms indicating that the inequality in income distribution was more in non-contract farms.
5. Turmeric crop was the labour intensive than coleus in the study region. Contract farming provided more employment in that region than that of non-contract farming system.
6. For coleus crop, the co-efficients of the regression analysis for all inputs were significant in the case of contract farmers and inputs like manures and fertilizers and plant protection chemicals were significant and positive in case of non-contract farmers. For turmeric crop, the co-efficient of plant protection chemicals in the case of non-contract farmers were negative. The results would reveal that there was a scope to reduce the use of human labour and manures and fertilizer in case of coleus and turmeric contract farms. Further, the manures and fertilizers can be reduced in case of coleus non-contract farmers.
7. The Mean Technical Efficiency (MTE) was 0.99 for coleus contract farms and non-contract farms indicated that the yield of coleus was one per cent less than the maximum possible output, thus showing limited scope for further increasing the productivity of coleus with the existing level of input use in the study area. But, MLE (Maximum Likelihood Estimates) could not be obtained for turmeric contract and non-contract farms. It would indicate that the turmeric farmers were already technically efficient.
8. Uncertainty of yield and price were higher in the case of non-contract farmers than that of contract farmers. There was zero price uncertainty for contract farms.
9. Transport cost as well as transport loss were higher for non-contract farms than that of contract farms of coleus and turmeric.

10. About 50 per cent of the coleus farmers and 100 per cent of turmeric farmers were introduced to the crop by the company staff. Type of agreement between them and the company was written and formal in nature for both the crops. More than 60 per cent of the farms were visited once in week by the field officers. More than 95 per cent of the farmers were satisfied with the company. A majority of the farmers (> 50 per cent) expressed their desire to receive advance payments. About 70 per cent of the farmers were having problem in getting adequate input supply.
11. The average number of payments made to the coleus growing farmers was 1.41 and it was 1.23 to the turmeric growing farmers.
12. The small and marginal farmers can also participated in contract farming effectively and benefits under the present situation. There was no bias against these farms by the firms.

6.10. Policy Options

1. There is only one contracting company for coleus and turmeric in the study region. As the demand for coleus was higher, government should encourage other private Contract to expand the area under contract farming through the provision of rural infrastructure.
2. Over dependence on foreign markets for marketing of medicinal crops would lead to pressure on the farmers to produce high quality produce and sell it through private export traders. Hence, government should create an alternative public sector institutional arrangements for exporting the medicinal plants and thereby protecting the interests of farmers.
3. The price offered by the company needs to be revised regularly/once in two years according to input costs.
4. There is no standard quality parameters for the inputs used in the cultivation of medicinal plants. There is a need for research on this issue, especially on the use of plant protection and fertilizer.
5. Development of cultivation technology and market intelligence assistance are essential to bring more area under contract farming of medicinal plants in Tamil Nadu.
6. Extension efforts must be focused on creating awareness about the benefits of contract farming and also educating farmers about input management and sustainable agricultural practices for successful contract farming.

7. Monitoring the activities of contract firms by Government to eliminate the exploitation by the firms concerned.

BIBLIOGRAPHY

A.BOOKS

Dewett, K.K and Avarsh Chand, **"Modern Economic Theory- Micro and Macro Analysis"**, (New Delhi: Shymam Lal Charitable Trust, 1975), p.169.

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

Heady, E.O., **"Economics of Agricultural Production and Resource Use"**, (Newyork: Engle wood cliffs, M.J. Prentice Hall Inc, 1957, p.98).

Khols, L.Richard, **"Marketing of Agricultural Products"**, (New York: The Mac Millan Co., 1967), p.9-11, 109.

Little and D.Peter, **"Contract Farming and Development Question**" in Peter. D. Little and Michael. J. Watts, Living under Contract, University of Wesconsin Press, Wisconsin, U.S.A, 1994.

Mishra and Gupta, **"Consumption Pattern in India- A Study of International Variations"** (Bombay: Tata Mc Graw Hill Publishing Company Limited., 1975) p.52-55.

Moore, R.John, Sardar S, Johl and M.Khusro Ali, **"Indian Food Grain Marketing",** (New Delhi: Prentice Hall of India Private Limited, 1973), p.40, 196.

Palanisami, K, P.Paramasivam and C.R.Ranganathan, **"Agricultural Production Economics:** Analytical Methods and Applications (New Delhi: Associated Publishing Company, 2002), p.98-101.

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.

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

Sen, Amartya ., **"Employment Technology and Development"**, (Oxford: Claredon Press, 1975), p.5.

Tandon, R.K and S.P.Dhondyal, **"Principles and Methods of Farm Management"**, (Kanpur: Nibal Kebal Ram Press, 1971), p.5-7, 461.

Varma, M.M and R.K.Agarwal, **"Managerial Economics"**, (New Delhi: Suman Printers, Majupur, 1992), p.64, 113, 319.

B.JOURNALS

*Anand, M., "Significance of Medicinal Plants**", Agricultural Today**, 3(2):33-35, 2000.

*Asano- Tamanoi, Mariko, "Farmers, Industries and the State: The Culture of Contract Farming in Spain and Japan", **Comparative Studies in Society and History**, 30(3): 432-452, 1988.

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.

Asokan, S.R and Gurdev Singh, "Role and Constraints of Contract Farming in Agro-Processing Industry", **Indian Journal of agricultural Economics**, 58(3): 566-576, 2003.

Anita Arya and S.R.Asokan, "Role of Contract Farming in Managing Risk in Agriculture", **Agricultural Economics Research Review**, 18(1-182): 169, 2005.

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

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

Bishnoi, R.N., "Pattern of Employment and Nature and Causes of Unemployment in Agriculture", **Indian Journal of Agricultural Economics**, 21(1): 51-56, 1966.

Carlin, T.A and E.I.Reinsel, "Combining Income and Wealth: An Analysis of Farm Family Wellbeing", **American Journal of Agricultural Economics**, 55(2): 38-44, 1973.

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

Chaukan, K.K.S., S.Mundle and D.Jadhar, “Income, Savings and Investment Behavior of Small Farmers”, **Indian Journal of Agricultural Economics**, 27(4): 43-50, 1972.

*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.

Chinnappa, B., “Resource Use, Cost Structure and Marketing of Sugarcane- A Case Study of Karnataka”, **The Bihar Journal of Agricultural Marketing**, 4(1): 75-79, 1998.

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.

Gill, K.S., “Role of Commercial Banks in Marketing of Agricultural Produce”, **Agricultural Marketing**, 15(3): 10-14, 1972.

Haque,T., “Contractual 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 Tea Industry in Assam”, **Indian Journal of Agricultural Economics**, 54(3): 201-211, 1999.

Jain.D.K and Sharma, A.K., “Nutrient Consumption Pattern across Occupation Groups in Different Regions of India”, **The Asian Economic Review**, 42(1): 458-463, 2000.

Jayaram, H, G.S. 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): 677-682, 1992.

Kahlon, A.S., H.S.Bal and Garbachan Singh, “Savings and Investment Patterns of Farm Families in Punjab”, **Indian Journal of Agricultural Economics**, 27(4): 19, 1972.

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

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

Krishna, R., "Some Production Functions for Punjab", **Indian Journal of Agricultural Economics**, 19(3): 87-93, 1964.

Krishna.R., "Unemployment in India", **Indian Journal of Agricultural Economics**, 28(1): 1-22, 1973.

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

Kurian.A., L.Joshep., R.Keshavachandran., E.V.Nybe and G.S.Nair, "Two Decades of Research on Medicinal Plants at College of Horticulture, KAU, Vellanikkara-An Overview", **Indian Journal of Arecanut, Spices and Medicinal Plants**, 2(4): 125-127, 2002.

Mahendra Dev. S and N. Chandrasekara Rao, "Food Processing and Contract Farming in Andhra Pradesh: A Small Farmer Perspective", **Economic and Political Weekly**, 2705-2713, 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.

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.

Mouly and Jean, "Some Remarks on the Concept of Employment, Under-Employment and Unemployment", **International Labour Review**, 105(2): 155-160, 1972.

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

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

Nawadkar, D.S., S.M.Shete, S.K.Nawale and S.H.Khemnar, "An Economics Analysis of Tomato Marketing in Unorganised Sector", **The Bihar Journal of Agricultural Marketing**, 3(3): 280-283, 1995.

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(3): p.17, 1997.

Rajpuria, Kalyan, "Future Trading: Looking in Profitable Prices", Economic **and Political Economy**, p.1883-1885, 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.

Saravanan, R and N.S.Shivalinge Gowda, "Contract Farming: Where We Gain and Lose", **MANAGE Extension Research review**, 4(1): 32-43, 2003.

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

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

Singh, R.V., R.C. Verma and N.L.Agarwal, "Marketing Costs and Margins: A Co-Operative Marketing Society and A Private Wholesale Trader", **Agricultural Marketing**, 17(1): p.14, 1994.

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

Smith, L.D., "The Political Economy of Employment Creation in Agriculture", **Journal of Agricultural Economics**, 27(3): 351-363, 1976.

Shrikant S. Kalamkar, "Management of Market Risks in Agriculture", **Agricultural Economics Research review**, 18(2005-1-182):1-17, 2005.

Srivastava, G. C., "The Influence of Urban Growth on Employment and Wages in Agriculture", **Indian Journal of Agricultural Economics**, 21(1): 87, 1966.

Sukhpal Singh., "Contract Farming for Agricultural Diversification in the Indian Punjab: A Study of Performance and Problems", **Indian Journal of Agricultural Economics**, 55(3):283-294, 2000.

Sukhpal Singh., "Contract Farming System in Thailand", **Economic and Political Weekly**, 15(53): 5578-5580, 2006.

Sunanda, N and I. Narender, "Resource Productivity of Mesta Farms in Srikakulam District of Andhra Pradesh", **The Andhra Agricultural Journal**, 50 (3 & 4): 327-331, 2003.

Thakar, D.R, T.V.Moothy and H.R.Sharma, "Resource Use Farm Size and Returns to Scale on Tribal Farms of Himachal Pradesh", **Agricultural Situation in India**, 45(11): 885-892, 1990.

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(1-182): 47-60, 2005.

Venkatraman, N.S., "Case for Integrated Herbal Management Education", **Kisan World**, 61-63, 2002.

Venkatram, R, and S.Venkatesan, "Contract Farming to Minimize the Risk in Coleus Cultivation: A Study in the Salem District, Tamil Nadu", **Agricultural Economics Research Review**, 18(1-182): 171, 2005.

Vijayalaksmi, K., "Cultivation of Medicinal Plants and Contract farming", **Plant Horti Tech**, 1: 39-40, 1999.

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

C.DISSERTATIONS

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

Jayachandran, R., **"Economics of Alternative Farming Systems in Gazani Lands of Karnataka- An Economic Analysis",** (Unpublished M.Sc thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 2002).

Jeyakumar, P.M., **"A Micro Level Study on Poverty and Food Insecurity of Rural Households in Kancheepuram District of Tamil Nadu",** (Unpublished M.Sc thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 1999).

Jeyasubramanian, B., **"Impact of Distance Education Programme of TNAU through Correspondence Course: A Diagnostic Analysis",** (Unpublished M.Sc thesis, Agricultural College and research institute, Madurai, 1996).

Kalamani, M., **"A Study on Food Security of Farm Households under Different Production Environments in Namakkal District, Tamil Nadu- An Application of Almost Ideal Demand System",** (Unpublished M.Sc thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 2001).

Krishnaraj, S., **"A Study on Employment, Income and Levels of Living of Landless Agricultural Labour Households in Paramathy Block of Salem District"**, p.18. (Unpublished M.Sc thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 1982).

Mani, K., **"Impact of Dairy Loan on Income and Employment of Farms in Keel vazhithunaiyankuppam Block, North Arcot District"**, (Unpublished M.Sc thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 1982).

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

Rajendran.G., **"A Study on the Economics of Production and Resource Use Efficiency in Chillies of Satur taluk, Ramanathapuram district",** (Unpublished M.Sc thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 1978).

Rajini, R., **"A Study on Income, Employment, Consumption and Food Security of Households Under Different Levels of Farm Diversification in Erode District of Tamil Nadu",** (Unpublished M.Sc thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 2002).

Ramesh, T., **"Economics of Contract Farming: A Study of Gherkin Cultivation in Tamil Nadu",** (Unpublished M.Sc thesis, submitted to Department of Agricultural Economics, UAS, GKVK, Bangalore, India), 1999.

Selvaraj,P., **"An Economic Analysis of Diversification of Income Sources in Dry land Farmer Households",** (Unpublished Ph.D thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 1985).

Sreekumar, K., **"Impact of Kerala Horticultural Development Programme on Resource Use Efficiency in Banana (Nendran) Production in Ernakulam District",** (Unpublished M.Sc thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 1999).

Sumathi, **"An Economic Analysis of Production and Marketing of Grapes in Thondamuthur Block, Coimbatore District",** (Unpublished M.Sc thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 1992).

Sundar, A., **"An Economic Analysis of Production and Marketing of *Gloriosa superba*",** (Unpublished M.Sc thesis, 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 thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 1997).

Velmurugan, D., **"Comparative Evaluation of Income Employment and Out-Migration in Farm and Landless Agricultural Labourer Households in Rehabilitated and Unrehabilited Tank Commands of Ramanathapuram District in Tamil Nadu",** (Unpublished M.Sc thesis, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, 2001).

Vishweshwar, S.P., **"Economics of Hybrid Cotton with Special Reference to Pest Management in Malaprabha Command Area",** (unpublished M.Sc. (Agri.) thesis, University of Agricultural Sciences, Dharwad, p. 10, 1994)

D.RESEARCH REPORTS, PAPERS AND PRESENTATIONS

Eaton, Charles and Andrew W.Shepard, **"Contract Farming: Partners for Growth",** Agricultural Services Bulletin 145, Food and Agricultural Organisation of the United Nations, Rome, 2001.

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.Lawrence, Globalization and Agri-Food Restructuring- Perspectives from the Australian Region, Avebury, Brookfield, U.S.A, 219-237, 1996.

Gauraha and Gupta, **"Competitive Study on Income and Employment of Marginal Farmers in Two District Irrigation System",** 48(3):21-25, 1993.

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

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

Kiresur, V.R., S.A.Patil and H.S.Vijayakumar (2002), **"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.

Ramaswami, Bharat, S.Ravi and S.D.Chopra (2004), **"Risk and Management State of the Indian Farmers- A Millennium Study",** New Delhi: Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India.

Ramu, S and M. Suguna, **"Shrinking Area under Medicinal Plants in Nilgiris District",** Workshop on Cultivation and Marketing of Medicinal, Aromatic and Culinary herb, Udhagamandalam, 27-28 April, 1999.

Sukhpal Singh, **"Multi National Corporations and Agriculture 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.

Visaria, P., **"Poverty and Unemployment in India- An Analysis of Recent Evidences",** World Bank Staff Working Paper, 417, (Washington D.C., World Bank, (1980), pp.12-41.

World Bank (2005), **"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.

* Originals not seen

Appendix 1.1. Export of Medicinal and Aromatic Plants during 2001

S.No	Country	Volume (000 tonnes)	Value ($million)	Unit value ($/tonne)
1.	China	139.75 (49.64)	298.65 (46.43)	2137.03
2.	**India**	**36.75 (13.05)**	**57.40 (8.93)**	**1561.90**
3.	Germany	15.05 (5.35)	72.40 (11.26)	4810.63
4.	USA	11.95 (4.24)	114.45 (17.79)	9577.41
5.	Others	78.05 (27.72)	100.30 (15.59)	1285.45
	Total	281.55 (100.00)	643.20 (100.00)	2284.50

(Figures in parentheses denote percentage to total)

Source: UNCTAD COMTRADE database, UN statistics division, New York (Lange, 2002)

Appendix 1.2. Volume of Import of Medicinal and Aromatic Plants and Trade Competitiveness by Different Countries in 2001

S.No	Country	Volume (000 tonnes)	Value ($million)	Unit value ($/tonne)
1.	Hong kong	73.65 (21.50)	314.00 (39.95)	4263.41
2.	Japan	56.75 (16.57)	146.65 (18.66)	2584.14
3.	USA	56.00 (16.35)	133.35 (16.97)	2381.25
4.	Germany	45.85 (13.38)	113.90 (14.49)	2484.19
5.	Republic of Korea	31.40 (9.17)	52.55 (6.69)	1673.57
6.	Others	78.9 (23.03)	25.48 (3.24)	3229.4
	Total	342.55 (100.00)	785.93 (100.00)	2963.65

(Figures in parentheses denote percentage to total)

Source: UNCTAD COMTRADE database, UN statistics division, New York (Lange, 2002).

Appendix 1.3. Export of Major Medicinal Plants from India (US$ million)

S.No	Importing country	1999-2000	2000-2001	Percentage change
1.	USA	21.41	35.71	66.79
2.	Germany	3.12	8.04	157.69
3.	Russia	3.84	5.79	50.69
4.	UK	2.76	4.83	75.00
5.	Taiwan	1.95	4.24	117.44
6.	UAE	1.75	2.95	68.57
7.	Hong Kong	0.89	2.87	222.47
8.	Malaysia	1.26	2.25	78.57
9.	Others	20.42	36.756	180.00
	Total	57.40	103.53	180.36

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS), 2001

Appendix 1.4. Area and Production of Turmeric in Different States of India

S.No	State	2001-02			2002-03		
		Area	Production	Yield	Area	Production	Yield
1.	Andhra Pradesh	61680 (37.57)	249487 (44.64)	4044	56822 (38.02)	283541 (53.70)	4989
2.	Assam	11812 (719)	8164 (1.46)	691	12066 (8.07)	8315 (1.58)	689
3.	Bihar	2918 (1.78)	3038 (0.55)	1041	2895 (1.94)	2873 (0.55)	992
4.	Karnataka	6710 (4.08)	35600 (6.37)	5305	6153 (4.12)	30147 (5.71)	4899
5.	Kerala	3558 (2.17)	7895 (1.41)	2218	3140 (2.10)	6938 (1.31)	2209
6.	Maharastra	6765 (4.12)	8507 (1.52)	1257	6604 (4.42)	8220 (1.56)	1244
7.	Orissa	27140 (16.53)	65830 (11.78)	2425	23640 (15.82)	55970 (10.60)	2367
8.	**Tamil Nadu**	**23638 (14.40)**	**118257 (21.16)**	**5002**	**17298 (11.58)**	**64536 (12.22)**	**3730**
9.	Others	19966 (12.16)	62086 (11.11)	3109	20812 (13.93)	67424 (12.77)	3239
	Total	164457 (100.00)	558847 (100.00)	3398	149430 (100.00)	527964 (100.00)	3533

(Figures in parentheses denote percentage to total)
(Area in hectares; Production in tonnes and Yield in Kgs/ha)
Source: Spices Board of India, 2002-03.

Appendix 1.5. Rainfall Distribution of Salem District

(Unit in mm.,)

Month	Normal Rainfall	2000	2001	2002	2003	2004	2005
January	20.2	0.0	4.7	2.1	0.0	0.0	0.0
February	10.5	20.6	0.0	2.3	1.8	1.3	5.9
March	15.0	5.7	1.5	22.8	53.6	0.0	25.7
April	53.4	50.5	119.7	16.4	36.2	55.0	150.1
May	110.7	103.1	72.8	103.8	82.3	333.0	79.1
June	66.6	29.1	20.4	47.4	80.4	42.7	29.2
July	96.8	27.9	181.5	35.4	91.8	74.0	62.9
August	145.6	169.2	102.6	67.7	166.4	19.7	183.5
September	146.8	288.5	219.2	104.9	72.1	146.9	133.1
October	197.7	193.1	135.2	168.4	261.7	206.9	317.7
November	122.9	132.7	67.3	48.8	87.9	99.0	99.8
December	48.5	21.6	42.3	3.7	18.8	0.0	21.2
Annual	1034.7	1042.0	967.2	623.7	953.0	978.5	1108.2

Source: Joint Directorate of Agriculture, Salem

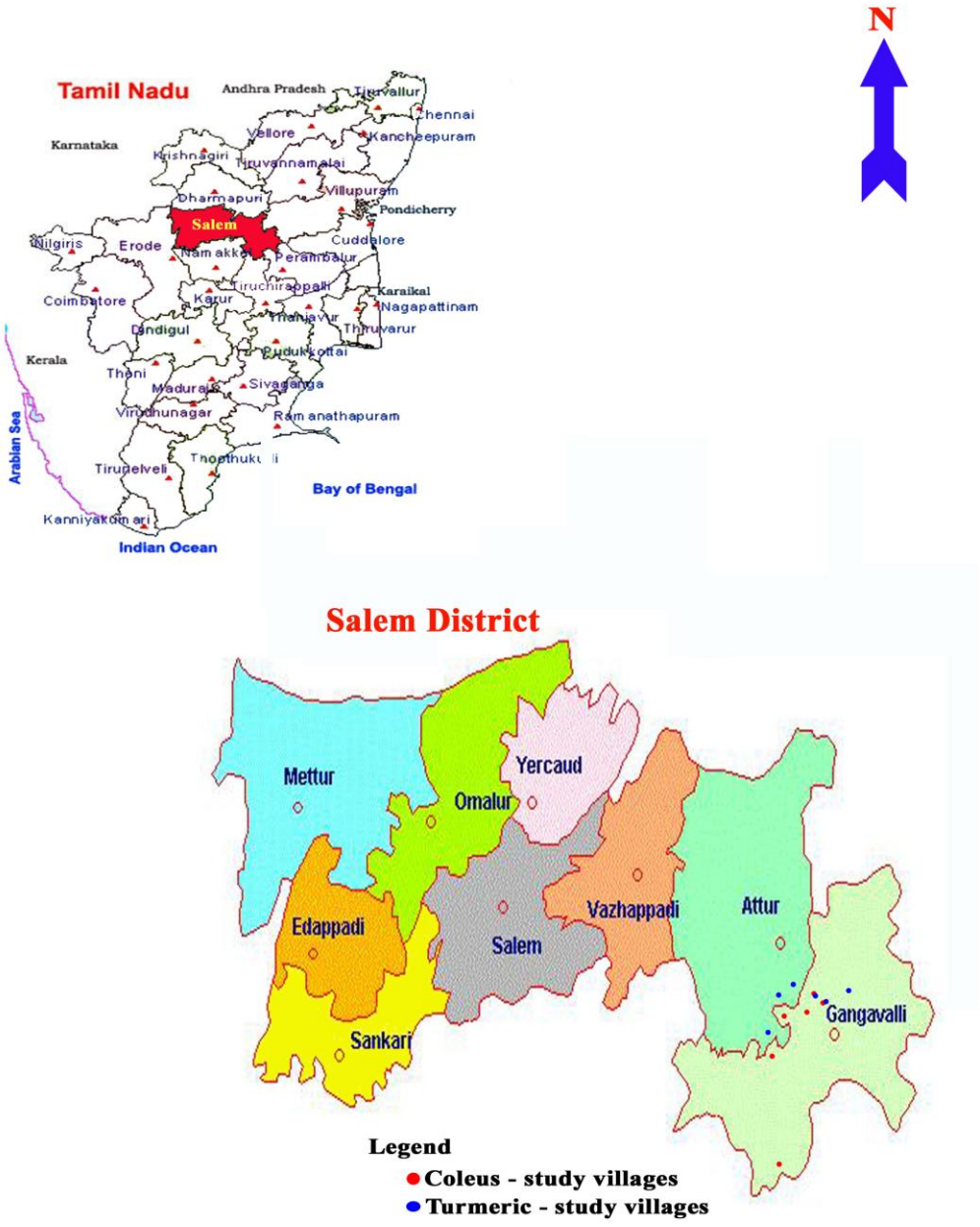


Fig 3.1. Map showing the study area