ECONOMICS OF PRODUCTION AND MARKETING OF SELECTED MEDICINAL PLANTS IN THRISSUR DISTRICT

BY

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THESIS

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DECLARATION

I hereby declare that the thesis entitled **Economics of Production and Marketing of Selected Medicinal plants in Thrissur district**" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree diploma fellow ship associateship or other similar title of any other university or society

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CERTIFICATE

Certified that the thesis entitled **Economics of Production and Marketing of Selected Medicinal plants in Thrissur district"** is a record of research work done independently by **Mrs Mayadevi A** under my guidance and supervision and that it has not previously formed the basis for the award of any degree fellowship or associateship to her

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Mayadevi A

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AT THE LOTUS FEET OF BHAGAVAN
SRI SATHYA SAI BABA

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Introduction

CHAPTER I

INTRODUCTION

Ancient Indian knowledge on medicinal plants was exhaustive and comprehensive Vedic literature stands to the proof of their vast knowledge on herbal medicines The earliest mention of the medicinal use of plants is to be found in the Rigveda which is one of the oldest if not the oldest repositories of human knowledge having been written between 4500 and 1600 BC (Viswanathan 1994)

Developing countries are the leading suppliers of the products of medicinal and aromatic plants in the world market Among them India is a traditional exporter of medicinal plants for the past several decades According to the World Health Organisation there are 20 000 plants that can be used for curative purposes and many of them are found in India Increase in population rapid expansion of area under food and commercial crops deforestation extension of urban area establishment of industries in rural areas etc gave rise to considerable depletion of our herbal wealth

In spite of the considerable advancements taking place in the pharmaceutical field especially in synthetics plants and their derivatives have been able to maintain their position Recently there has been a tendency in the advanced countries of the world to go in more and more for natural drugs in preference to the synthetic ones

The present trend of back to nature and Government of India s policy of health for all by 2000 AD necessitates that valuable medicinal and aromatic plant species are to be preserved and their cultivation developed in order to make available sufficient plant raw material for pharmaceutical and cosmetic industry

The important medicinal and aromatic plants cultivated commercially in Kerala are opium poppy (*Papaver somniferum*) sarpagandhi (*Rawvolfia serpentina*) periwinkle (*Catharanthus roseus*) kacholam (*Kaempferia galanga*) lemongrass (*Cymbopogon flexuosus*) palmarosa (*Symbopogon martinii* var motia) vetiver (*Vetiveria zizanioides*) patchouli (*Pogostemon cablin*) and koduveli (*Plumbago rosea*) Official estimates of area and production of medicinal and aromatic plants are not available

It is estimated that the world demand for medicinal and aromatic plant products is growing at the rate of seven per cent per annum and at this trend it is expected that by 2000 AD our export demand would be of the value of Rs 3 500 million (NBPGR) It is also estimated tha the demand and use of these plant products in the home market may be of the order of a multiple of 3 to 5 times of export figure at raw material level

Medicinal Plants present status

India is a varietal emporium of medicmal plants Nearly three fourth of the drugs mentioned in the various pharmacapoela are grown here in nature Approximately one third of all pharmaceuticals are of plant origin Medicmal plants as a whole occupy a stable place in modern medicine as the industry is showing special interest in synthesising natural substances as they are found to be more effective in particular applications

Indian system of medicine uses over 1100 medicinal plants and most of them are collected from forests The forest belt of India is rich in these plants and

livelihood of local tribes mainly depend upon their collection and trade The wild growing populations of these species are fast reducing particularly in their known habitats and their substitutes and allies have appeared in the market The scarcity of genuine herbs use of substitutes and allies is likely to bring down the efficiency of formulations

Traditional medicines or folk medicmes are prolific sources of useful drugs and therefore great emphasis has now been laid to revive the study of medicinal plants/traditional system of medicine/indigenous drugs Government has formulated diverse schemes to preserve Indian medicines to produce herbal drugs and to open a central cell on medicinal and aromatic plants Large scale production of medicinal plants are also mooted on Indian hills and plains following scientific extraction of chemicals from them Many of the species of medicmal plants now grown wild in forest and waste lands have been identified and can be exploited for commercial purposes

There are very few scientific studies on economics of medicmal plants Such studies on economics of production and marketing of medicinal plants will generate enough information which is vital in the formulation of strategies and programmes for the development of these crops The present study is confined to two important medicinal plants of Thrissur district viz kacholam (*Kaempferia galanga*) and chethikoduveli (*Plumbago rosea*)

The major objectives of the study are the following

1 To estimate the cost of cultivation and net returns

2 To analyse the market structure

3 To identify the various uses which they are put into and

4 To examine the problems encountered in cultivation and marketing of medicinal plants

The thesis is divided into six chapters including the present one A review of the relevant literature is given in chapter two A brief description of the area of study is given in chapter three Chapter four deals with the materials and methods used for the study The results of the study and discussion there on are presented in the fifth chapter A summary of the major findings of the investigation is given in the final chapter

Limitations of the study

Since this study is confined to a small region and conducted within a short period of time the conclusions are restricted to conditions prevailing there and any attempt at generalisation must be done with care Farmers and traders do not maintain proper records and they furnish the data mainly from their memory Therefore information gathered is not free from recall bias Moreover the respondents in general are reluctant to reveal the extent of income generation and the source of income They show a tendency to present inflated figures for costs and deflated figures for returns This has created problems m making accurate and reliable estimates during the study However care has been taken to make the estimates as accurate as possible through cross checking

Review of Literature

CHAPTER II

RLVIEW OF LITERATURE

In this chapter an attempt has been made to review the past studies in economics of production and marketing relevant to the present study

The chapter is divided into three sections In section I review of cost of cultivation studies are included Section II contains review of studies in functional analysis relating to economics of production and section III contains past studies in marketing Since the literature on medicinal plants is scanty an attempt is made here to review the literature pertaining to the subject irrespective of the crop

Section I

Cost of cultivation studies

Mittal (1969) examined the economics of ginger cultivation in Sirmur district of Himachal Pradesh The study was undertaken in two stages during 1963 64 and 1965 66 The results showed that human and bullock labour accounted for 7 9 per cent of the total cost and seed which was the main item of cost accounted for 70 per cent of the total cost The remaining items of cost were manures land revenue and other variable cost The study suggested that use of better seeds irrigation and improved implements would increase the revenue

Rathori *et al* (1973) analysed the economics of vegetable crops like potato ginger tomato french beans and chilli in temperate regions The per hectare total cost of cultivation was found to be Rs 6 165 Rs 7 667 Rs 7 736 Rs 7 864 and Rs 5 989 respectively It was also found that over one third of total cost of cultivation was claimed by imputed rental value of land The ratios of marginal

value product to factor cost for different variables indicated vast scope for the reallocation of resources

Mital and Srivastava (1975) reported that the cost of production of bulb crop onion was Rs 4 700 per hectare Among cost components irrigation charges accounted for the highest share followed by cost of manures and fertilizers Gross income and net profit per hectare were Rs 7 500 and Rs 2 800 respectively They also estimated that the per hectare output of onion was 300 quintals

Naidu and Rao (1977) conducted a study on costs returns and marketing of brinjal crop in Tenali area of Guntur district in Andra Pradesh Cost of cultivation of brinjal was found to be Rs 1 136 60 per acre It was found that labour cost was Rs 380 which accounted for 33 44 per cent of total cost followed by fertilizers with Rs 340 75 and manures with Rs 100 00 Gross income from brinjal was estimated at Rs 1 968 and net income at Rs 831 33 Yield of brinjal was 60 quintals per acre

Ashturkar*et al* (1980) made an attempt to examine the performance of turmeric crop in Maharashtra state over a period of 14 years ie from 1960 61 to 1974 75 in respect of area and production and to investigate the profitability of the crop The area under the crop did not show any significant increase Per hectare cost of cultivation on cost A basis amounted to Rs 5 458 on an average of which seed alone accounted for 45 per cent On the revenue side cultivators earned on an average Rs 17 024 and thus the net receipt over the direct cost or cost A worked out to Rs 11 506 The expenditure income ratio worked out to 1 1 77

Nadda *et al* (1981) attempted to find out cost and returns for different farm sizes and examined resource use efficiency for ginger production using data

from a sample of 108 growers in eight villages in Soomur district of Himachal Pradesh Seed alone accounted for 38 per cent of the total cost Average cost of cultivation per hectare was Rs 13 005 and gross income Rs 19 321 One rupee spent on ginger production gave an average net return of forty nine paise Cost of cultivation of ginger did not vary significantly among different farm sizes Net profit was the highest for large farmers and lowest for small farmers Regression analysis showed decreasing returns to scale About 62 per cent of variation in production was explained by variables considered viz seed manure human labour and bullock labour

Singh *et al* (1981) worked out the cost of cultivation of ginger in Himachal Pradesh and it was found to be Rs 14 250 per ha inclusive of family labour fertilizer and other inputs Net income was estimated as Rs 8 500 per hectare

Subrahmanyam and Doss (1981) estimated cost of cultivation of vegetables in Malur and Chickballapur taluks of Kolar district of Karnataka It was found that the total cost of cultivation per hectare of tomato and brinjal were Rs 5 133 75 and Rs 4 141 25 respectively in Malur taluk and Rs 5 604 71 and Rs 5 456 17 respectively in Chickballapur taluk Manures and manuring accounted for nearly 70 to 75 per cent of total cost Gross returns were Rs 21 222 12 from tomato and Rs 13 990 29 from brinjal Input output ratios of tomato and brinjal were 1 3 92 and 1 3 16 respectively

Rajagopalan (1983) in his study on standardisation of propagation method time of planting time of harvest and phytochemical analysis of kacholam found that cost of cultivation of kacholam per hectare amounted to Rs 7 696 with

an yield of dry rhizomes 10 92 quintals and sale price of Rs 1 100 per quintal Gross income per hectare was Rs 12 012 00 and net income Rs 4 316 00

Saraf and Mishra (1987) have estimated the cost of cultivation of tomato potato cauliflower and brinjal based on samples drawn from the villages situated within a radius of 10 km from Jabalpur city in Madhya Pradesh The cultivation of tomato is shown to be quite remunerative as compared to the other three vegetable crops The net return from tomato was Rs 2 037 per acre followed by brinjal with Rs 1 952 cauliflower with Rs 1 467 and potato with Rs 1 428 per acre

Inamdar and Diskalkar (1987) in their study described the cultivation practices for obtaining good yield of turmeric (*Curcuma longa*) in Sangli district of Maharashtra They nave suggested that steps should be taken to increase the area under turmeric cultivation More intensive methods of cultivation should be intro duced to increase the yield as well as to make the crop more remunerative

Bastine and Radhakrishnan (1988) in a study on economics of Banana cultivation in Irinjalakuda block in Trichur district found that cost of cultivation per hectare of banana was Rs 36 349 00 The returns worked out to Rs 45 068 and net income was found to be Rs 8 819 on cost C basis The main items of expendi ture were found to be human labour (26 98 per cent) and manures (24 60 per cent) Farm business income family labour income and farm investment income amounted to Rs 20 439 Rs 11 061 and Rs 18 197 per hectare respectively

Subha (1990) in her study on effect of spacing and planting material on the growth yield and active principle in *Plumbago rosea* worked out the economics of cultivation of *Plumbago rosea* L for one hectare under experimental conditions

and showed the total cost of cultivation was Rs 23 646 and yield dry roots 2 56 tonnes and total income generated was Rs 38 400 Net income was found to be Rs 14 754 and cost benefit ratio 1 1 62 (at cost A_1 level)

Venkatanarayanan (1990) analysed the economics of chilli cultivation in Khammam district of Andra Pradesh He found operation of diminishing factor returns in general on all the farm size groups Marginal value product to opportunity cost ratios indicated a high degree of resource use inefficiency and revealed the scope of re organization of resources High input output ratios revealed the profitability of chilli farming and break even analysis also clearly indicated that chilli cultivation was a highly paying proposition

Sandhya (1992) in her study on economics of production and marketing of vegetables in Ollukkara block in Thrissur district calculated total cost of cultivation for bittergourd and ashgourd on per hectare basis on various cost concepts Cost A_1 Cost A_2 Cost B_1 Cost B_2 Cost C_1 and Cost C_2 for bittergourd were Rs 13 584 55 Rs 13 914 53 Rs 13 964 23 Rs 15 958 24 Rs 20 562 37 and Rs 22 556 38 respectively The corresponding figures for ashgourd were Rs 6 630 22 Rs 6 910 22 Rs 7 012 22 Rs 8 689 80 Rs 9 360 07 and Rs 11 037 67 respectively Input wise costs incurred for bittergourd and ashgourd showed that human labour was the largest single item of expenditure in both cases

Ram *et al* (1992) in their study on curry leaf cultivation in four villages of Guntur during four years of cultivation (1985 86 to 1988 89) have estimated costs and returns The cultivators received the net returns of Rs 65 322 Rs 62 320

Rs 69 324 and Rs 59 527 per hectare respectively The price oscillated from Rs 1 to 3 per kilogram

Nayar (1992) in his study on domestication of wild medicinal plants of Ayurvedic importance recommended some plants for cultivation on remunerative basis The plants are *Holostemma annulare Indigofera tinctoria Aloe vera Withania Somnifora Acorus calamus Adathoda barbadens Kaempferia galanga Kaempferia rotunda* The package of cultivation practices and processing techniques have been standardised in the case of *H annulare* and *I tendoria*

Brahmaiah and Naidu (1993) in their studies on chillies crop reported that labour is one of the major constitutents of total cost incurred in farm business and therefore has a direct impact on farm earnings It shows that there was a direct relationship between size of the farm and total labour cost Cost components for small large and overall farms indicated that manures and fertilizers took the largest share in total expenditure followed by other inputs like rent of land plant protection human labour and bullock labour on all size groups Their findings indicated that chillies crop in general was a fertilizer and manure responsive and labour intensive crop Productivity was the highest on large farms with an average yield of 34 15 quintal per hectare and it decreased with decrease in farm size

Latha (1994) in her study on evaluation of Kacholam (*Kaempferia galanga* L) types for morphological variability and yield showed that fresh rhizome yield per hectare varied from 9 11 tonnes to 13 99 tonnes and the dry rhizome yield varied from 2 44 tonnes to 3 68 tonnes under open conditions Under shaded conditions the yield varied from 5 82 tonnes to 9 6 tonnes per hectare and dry rhizome yield 1 9 tonnes per hectare to 3 31 tonnes per hectare

Jayesh (1994) in his study on economics of production and marketing of ginger in Kerala with special reference to Idukki district reported that average yield of ginger was 13 783 08 kilogram per hectare and average cost of cultivation per hectare Rs 20 088 10 Input wise cost of cultivation per hectare of ginger showed that human labour was the largest single item of expenditure accounting for 45 60 per cent of total cost Operation wise cost of cultivation of ginger per hectare showed that seed and sowing constituted the largest item accounting for 34 46 per cent of total cost followed by fertilizers manure and manuring preparatory cultivation harvesting weeding and earthing up and mulching

Section II

Production function analysis

Heady (1946) derived production function for a random sample of 738 Iowa farms which was the first empirical estimate of production function for agricultural farms in United States Function were derived both for types of farmers and areas of the state In all cases the inputs were land labour power equipment livestock feed and operational expenses

Heady and Shaw (1954) conducted a study on resource returns and productivity coefficients in selected farming areas of Alabama Iowa and Montana of United States Cobb Douglas production function was tried for crops and livestock in each area It was found that the coefficients of neither crops nor livestock differ significantly among the four areas Marginal capital productivity was higher for crops than for livestock in Montana as compared to other areas under question

Dhondyal (1958) found out the input output relationship between the amount and kind of fertilizers used and yields obtained in the production of maize at the Agricultural College Kanpur Of the input factors land and capital were scarce and labour was relatively abundant There was no effective combination of inputs but there existed scope of adjusting variable factors such as amount of irrigation water fertilizers improved seeds number of spraying to a given size of farm at low cost combination

Patel *et al* (1968) studied about the productivity and allocation of resources in the production of hybrid Bajra in Delhi territory Cobb Douglas production function was used for estimation and comparison of marginal value products of inputs and determination of economic optimum levels It was found that three input variables namely hired labour seed manures and fertilizers explained more than 50 per cent of variation in the output of hybrid Bajra Low value of marginal product of manaures and fertilizers revealed that farmers were using them near optimum levels

Prabhakaran and Venugopalan (1971) conducted studies on the resource use efficiency of different size of paddy farms in Kerala Stratified samplmg tech nique was used for the selection of sample Cobb Douglas production function was used and the results indicated great emphasis on the use of fertilizers and manures In small farms labour was a significant ingredient which accelerated production Gross output per acre was found to decrease as the size of the farm increased

Sastri (1977) in a study on resource use and productivity in sugarcane cultivation in Krishnarajasagar area found that total cost of cultivation yield and

gross returns per acre were Rs 31 260 82 44 04 tonnes and Rs 4 899 45 respectively Modified Cobb Douglas production function were filled for planted ratoon and combined crops with yield as dependent variable and sugarcane area (in acres) crop duration in months bullock labour in pair days human labour in mandays and fertilizers in rupees as independent variables Marginal value product to opportunity cost ratios indicated excess use of all resources with the exemption of land

Rao (1985) studied the factors affecting milk production in the comand area of Nagarjuna Sagar Project Andhra Pradeesh Marginal value products computed at the geometric mean level when compared with their respective factor costs showed that marginal value product associated with green fodder and concen trates were greater than unity and that these two inputs were under utilised in farms

Thomas and Gupta (1987) studied the economics of production of banana based on information collected from 47 banana cultivators of Kottayam district in Kerala Cobb Douglas type of production function was used to find out the productivities of labour manures and fertilizers and working capital More than 91 per cent of the variation in total income from banana was explained by these variables

Muraleedharan (1987) conducted a study on resource use efficiency of rice in Kole lands in Thrissur Functional analysis using output of rice as dependent variable and farm size human labour bullock labour fertilizers and manures as independent variables revealed that use of human labour and fertilizers and manures were higher than their optimum levels

Randhir and Krishnamoorthy (1990) studied the productivity variation and water use in farms of Madurantakam Tankfed area of Chengalpattu district Tamil Nadu using Cobb Douglas form of production function The results of the study showed a clear picture of the inter farm variations in farm productivity There was productivity variation due to farm size even under homogenous irrigation situations

Reddy *et al* (1990) studied the resource use efficiency in Betelvine cultivation in Cuddaph district of Andra Pradesh The fitted function revealed that there was scope for further use of labour manures and fertilizers upto optimal levels Increase in the expenditure on seeds and miscellaneous costs was desirable as revealed from insignificant elasticity coefficients

Sunandini *et al* (1992) studied the input use efficiency on paddy farms in west Godawari district of Andhra Pradesh Cobb Douglas function was fitted to the data collected from a sample of 108 small and large farmers for rabi season during 1988 89 Marginal value product to factor cost ratio associated with each input factor under study was higher than unity indicating inefficiency in the use of these inputs on both small and large farms in the rabi season

Thomas *et al* (1993) assessed the performance of rice production in the light of co operative credit flow A multi stage random sampling technique was adopted for selecting sample cultivators Input wise cost of cultivation had shown that human labour alone accounted for more than 40 per cent of the cost followed by manures and fertilizers Benefit cost ratio was 1 42 Resource productivities were estimated with the help of Cobb Douglas production function

Section III

Marketing

Kahlon and Singh (1968) in a study of marketing of groundnut in Punjab examined the price spread price fluctuations storage and grading problems They found that arrivals of groundnut caused some fluctuation in its prices in different seasons of the year They also found that the correlation between monthly prices and arrivals was negative in all market The study concluded that factors other than arrivals contributed to the price variation m groundnut in a significant manner It was also seen that producer s share in consumer s rupee was only 65 41 per cent

Sikka (1976) examined the price spread and marketing problems in ginger trade The study found that nearly 31 51 per cent and 51 27 per cent of the consumer s price in export trade and internal trade respectively formed payments for moving the produce through marketing channels A total of 36 04 per cent of the consumer s price was taken by intermediaries in the internal trade against seven per cent in the export trade Profit margins of commission agent in the internal trade was very high The study pointed out that price spread can be reduced and producer s income increased considerably provided the producer retain the commodity after proper drying and cleaning and supply to different markets according to demand and price situation The study recommended the formation of co operative sale societies and establishment of ginger curing and processing units

Govardhana (1979) studied the marketing of dry chillies in Karnataka Marketing cost of producer was Rs 61 34 per quintal of dry chillies The

transporting cost per quintal per kilometre was 45 paise by bullock cart The market intermediaries namely co operative societies commission agents and traders on an average received a profit per annum of Rs 10 988 Rs 4 498 and Rs 28 098 respectively at Hubli market Important marketing channels identified were Producer Trader Producer Co operative society Trader and Producer Commission Agent Trader The producer s share in trader s sale price and price spread were 90 23 per cent and 9 77 per cent m channel I 80 09 per cent and 19 91 per cent m channel II 83 16 per cent and 16 84 per cent in channel III

Gupta and Ram (1979) studied the behaviour of marketing margins of vegetables The analysis revealed that producer received a very low share (38 per cent) of the consumer s price where as retailer s margin and the marketing cost were quite substantial each appropriating about one fourth of the consumer s rupee Location played an important role in influencing retailers margin Transport packing and labour expenses were the major components of the marketing cost Co operative endeavour at the levels of producers and consumers and facilities for cold storage and processing would help in improving the marketing performance

Nagaraj *et al* (1985) made a market appraisal for a few fruits and vegetables in Karnataka Producer Commission agent Retailer Consumer was identified as the major marketing channel for beans cabbage brinjal and tomato Out of the total marketing cost retailers appropriated the highest share of 26 per cent Lack of storage facilities undue delay in getting cash from the intermediaries high rate of commission and improper weighment were identified as the major problems in marketing of vegetables

Tewari *et al* (1987) studied the economics of ginger cultivation in Himachal Pradesh They examined trends in area production and productivity cost of cultivation problems faced by growers marketing channels and government effort in developing the crop

Sidhu (1988) in a study on new thrusts in agricultural marketing in Punjab opined that there should be right type of market infrastructure correct Government policies and a sound net work of input supply system for marketing of agricultural commodities It was found that 30 per cent of fruits and vegetable production was lost due to lack of processing and cold storage facilities

Sambhar *et al* (1990) examined the marketing cost marketing margin and price spread for green and dry ginger produced in Himachal Pradesh Two pockets one for green and another for dry ginger were selected from Sremaur district The total sample consisted of 19 producers for green ginger and 20 producers for dry ginger Information collected from market intermediaries comprising five village traders six wholesalers and three market officials at Solan Chandigarh and Delhi markets The study showed that higher net price for producers and a high share of the consumer price can be ensured by encouraging group sales through producer s co operatives The wholesaler s net margin appeared to be high which can be reduced by creating competition at the wholesaler s level

Fattimuddin (1991) attempted to study the dynamics of the producer s share and market margin for important food grains in India The statistical and analytic method used to estimate marketing margins are evaluated and trend in producers share are examined between 1975 76 and 1985 86 for wheat rice maize and chick peas It was found that the producer s share in total revenue has increased

for all the important commodities While wholesaler s margins have declined slightly retailers margins have increased

Paturam *et al* (1995) in their studies on ginger reported that the farmers can get an average of Rs 50 000/ha irrespective of expenditure The gap between wholesale and retail prices vary from 100 to 150 per cent The wastage and losses ranges between three and six per cent during transportation It was reported that 83 per cent of the total produce was marketed and about 14 per cent is retained by producers for seed purpose Of the remaining three per cent a little is utilized for domestic consumption and the rest goes as waste at producers level

Area of Study

CHAPTER III

AREA OF STUDY

Thrissur district located in the central region of Kerala is rich in history and cultural tradition It is bounded on the north by Malappuram and Palakkad districts on the east by part of Palakkad district and Coimbatore district of Tamil Nadu on the south by Idukki and Ernakulam districts and on the west by the Arabian sea The district lies between North latitude 10 and 10 4 and East longitude 75 57 and 76 54

3 1 Area

Total geographical area of the district is 299390 hectares which is 7 8 per cent of the total area of the State Land utilisation pattern in Thrissur district is given in Table 3 1

The district is divided into five Taluks viz Kodungallur Chavakkad Thalappilly Mukundapuram and Thrissur Taluks There are seven Municipalities 17 Community Development blocks spread over 98 Panchayats 251 revenue villages and 1074 wards in the district

The district can be divided into high land mid land and low land based on its natural physiography

3 2 Population

According to 1991 provisional census reports Thrissur district supports a total population of 27 34 lakhs of which 13 09 lakhs are males and 14 25 lakhs

Table 3 1 Land utilisation pattern in Thrissur district for the year 1994

Description	Area (in hectares)
Geographical area	299390
Forest	103619
Land put to non agricultural uses	27692
Barren and uncultivable land	1411
Permanent pastures and other grazing land	72
Land under miscellaneous tree crops not included in net area sown	751
Cultivable waste	2904
Fallow other than current fallow	3684
Current fallow	4812
Net area sown	154445
Area sown more than once	66574
Total cropped area	220747

Source Farm Guide 1996

females Growth rate in population during the last decade was 12 08 per cent in the district Density of population is 902 persons per square kilometre Sex ratio shows that there are 1 088 females for every 1000 males Literacy is 79 3 per cent Educational status of males and females showed that literacy was more among males (81 7 per cent) than females (77 09 per cent)

Agriculture provides employment to 45 7 per cent of the total working force and contributes 41 6 per cent of the total income of the district Total working population of the district is 8 04 738 of which 74 064 are cultivators and 1 83 588 are agricultural labourers Household industry workers and other workers are 35 898 and 5 11 188 respectively Occupational distribution of population in Thrissur district is given in Table 3 2

3 3 Climate and rainfall

Thrissur district experiences a tropical humid climate Annual rainfall of 3 130 mm was received during 1994 and most of the annual precipitation is received during the south west monsoon season from June to September The average monthly distribution of rainfall for the district during 1994 is given in Table 3 3 Average daily maximum temperature is 31 32°C in the coastal regions and 36 C to 37°C in the interior

3 4 Soil

Soil is mainly of laterite origin even though sandy alluvial and forest soils are also seen in certain belts Sandy soil deficient in almost all major plant nutrients is seen in the coastal taluks of Chavakkad and Kodungallur Forest soil is confined to parts of Thalappilly Thrissur and Mukundapuram taluks Alluvial soils

Table 3 2 Occupational distribution of population in Thrissur district 1994

Particulars	No of persons
Total main workers	804738
Cultivators	74064
Agricultural labourers	183588
Household industry workers	35898
Other workers	511188

Source Farm Guide 1996

Table 3 3 Monthly rainfall in Thrissur district for the year 1994

Months	Rainfall (in mm)
January	7
February	10
March	27
April	86
May	296
June	769
July	759
August	443
September	257
October	301
November	144
December	31
Total	3130

Source Farm Guide 1996

rich in organic matter is generally seen in the low lying areas of Thrissur and Mukundapuram taluks

3 5 Water resources

The district has many water resources such as canals tanks wells major minor and lift irrigation projects Canoli canal Shanmugan canal and Puthenthode canal are the three main canals in the district Important rivers flowing through the district are Chalakkudy Karuvannur and Kechen rivers Bharathapuzha flows westwards at the northern boundary and Periyar flows westwards at the southern boundary Major irrigation projects operating in the district are Peechi dam Mangalam dam Chalakkudy Diversion Scheme Vazhani Scheme and Cheerakuzhy irrigation project Source wise irrigated area in the district is shown in Table 3 4

3 6 Cropping pattern

Major crops grown in the district are rice coconut arecanut banana vegetables and rubber Rice is an important food grain crop of the district Tea coffee rubber and cocoa are the major plantation crops grown in the highland Coconut is the main crop in the sandy coastal belts which stretches over a length of 51 5 km from Kodungallur to Chavakkad Vegetables and banana occupy a small per cent of the total cropped area mainly cultivated in the homesteads and medicinal plants also occupy a place among them

The district is well connected by roads and rail It has 3802 73 km of metallic roads and 4517 06 km of non metallic roads The National Highways 17 and 47 passes through the district

Table 3 4 Area under irrigation in Thrissur district (source wise) 1994

Particulars	Area (in hectares) irrigated
Government canals	18152
Private canals	758
Government tanks	586
Private tanks	10708
Government wells	241
Private wells	17244
Minor and lift irrigation	4820
Others	18781
Total	71290

Source Farm Guide 1996

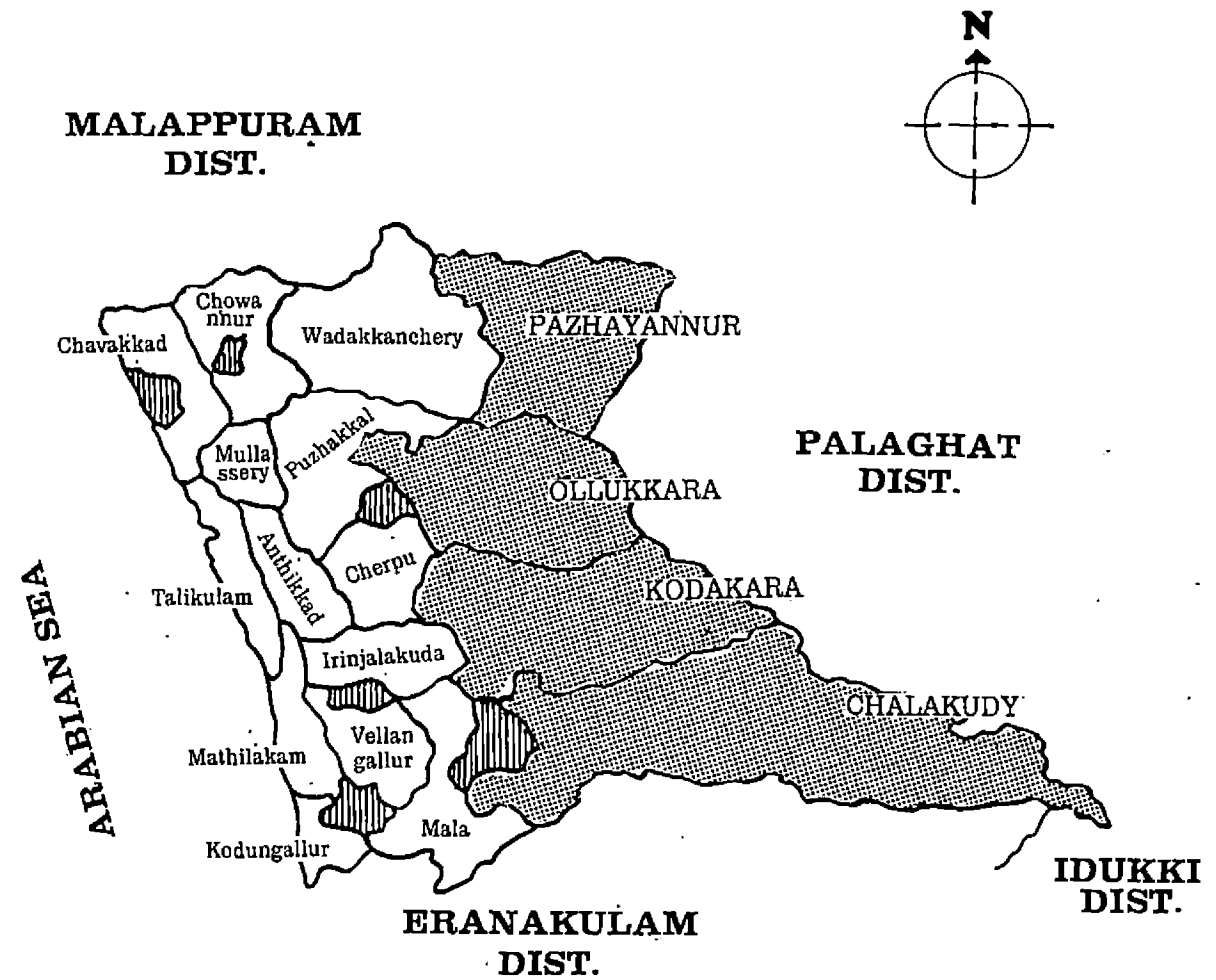
The district has a well developed marketing system for agricultural produce There are 43 public markets and 47 private markets in the district

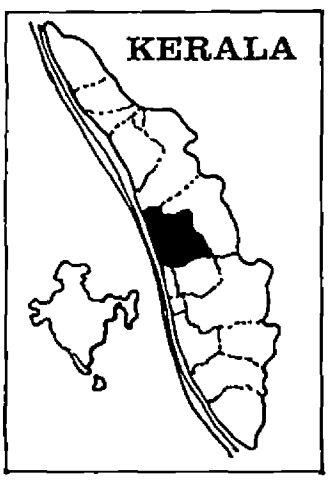
The map of Thrissur district showing community development block is shown in Fig 1

Fig. 1.

THRISSUR DISTRICT MAP

SHOWING COMMUNITY DEVELOPMENT BLOCKS





Material and Methods

CHAPTER IV

MATERIALS AND METHODS

This study on production and marketing of selected medicinal plants conducted in Thrissur district was confined to two major medicinal plants namely Kacholam (*Kaempferia galanga*) and Chethikoduveli (*Plumbago rosea*) Data required for the study have been generated mainly through sample survey

Thrissur district has 17 community development blocks The blocks in the district were classified in the descendmg order of area under cultivation of each of the selected medicinal plant Three blocks having the highest area under the crops were selected for the study Block wise study showed that Ollukkara Kodakara Chalakudy and Pazhayannur had the highest area under medicinal plants The list of panchayats in these blocks were obtained and two panchayats each were selected randomly from these blocks From each selected panchayat ten farmers were randomly selected from the list of medicmal plant growers Thus for the two medicmal plants namely Kacholam (Blocks Chalakudy Ollukkara Pazhayannur) and Koduveli (Blocks Kodakara Ollukkara Pazhayannur) a total of 120 farmers (60 each) were selected A multi stage random sampling design was employed for the collection of data with blocks as primary units panchayats as secondary units and individual farmers as the ultimate units

Farm level data were collected from the respondents by personal interview method using a well structured and pre tested interview schedule The information collected included the family composition educational status of the family members occupation family income area under selected medicmal plants

costs associated etc Reference period of the study was the year 1994 A specimen of interview schedule is attached as Appendix

Analytical frame work

Costs and returns

The profitability of a crop enterprise can be estimated by finding the relationship between the costs incurred and the returns obtained from the crop production

Cost concepts

In the farm management studies various concepts of costs viz Cost A_1 Cost A_2 Cost B_1 Cost B_2 Cost C_1 and Cost C_2 have been used (Dhondyal 1989)

i) Cost A_1 approximates the actual expenditure incurred in cash and kind and it includes the following items of costs

1 Value of hired human labour (permanent and casual)

The actual wages paid for labour engaged in crop production was considered as value of hired labour The item human labour included the labour employed in land preparation sowing weeding, application of manures irrigation and harvesting

2 Value of seed (both farm produced and purchased)

Purchased seeds were evaluated on the basis of their purchase price The same price was also used for evaluating farm produced seeds

3 Value of manures and fertilizers (farm produced and purchased)

Expenditure on purchased quantities of manures and fertilizers has been evaluated by multiplying the physical quantities of different manures and fertilizers used with their respective prices Farm produced items were also evaluated at the market prices

4 Depreciation of farm implements

Depreciation rates of 10 per cent for implements and 20 per cent for temporary dead stock such as baskets and sacks were used for the computation of cost Depreciation on such items were worked out and apportioned to medicinal plants cultivation on the basis of area under them in relation to total cropped area

5 Interest on working capital

Interest on working capital was charged at the rate of 11 5 per cent per annum This was the rate of interest charged by State Bank of Travancore for short term agricultural loans

6 Land revenue

This was taken as the actual rate paid to the revenue department which was Rs 20 per acre in the area

ii) Cost A_2 Cost A_2 is equal to Cost A_1 plus rent paid for leased in land No case of leasing in was observed in the samples and hence Cost A_1 and Cost A_2 are the same

iii) Cost B_1 It is equal to Cost A_1 plus interest on own fixed capital The item fixed capital included iron and wooden implements machineries such as diesel and electric motors and temporary dead stocks

iv) Cost B_2 It is equal to Cost B_1 plus rent paid for leased in land plus rental value of owned land Rent was imputed in the case of owned land based on the prevailing rent of Rs 10 000 per acre This was understood by local enquiry

v) Cost C_1 It is equal to Cost B_1 plus imputed value of family labour

vi) Cost C_2 It is equal to Cost B_2 plus imputed value of family labour

The cost of family labour was imputed based on the prevailing wage rates paid to hired labour in the area during the period The wage rates were Rs 65 per day for men and Rs 35 per day for women Rental value of land was taken as 10 000 per acre on leasing based on the existing rate under medicinal plant cultivation in Thrissur district

Cost of cultivation per hectare both operation wise and input wise was worked out for both the crops separately

Income measures

In order to study the efficiency of medicinal plants cultivation the following income measures associated with different cost concepts were used

1 Gross income

It is the total value of a farm activity and includes the total value of product and byproduct

2 Farm business income

It was calculated by taking the difference between gross income and cost A_1 This represents income to the farmer when only production expenses are considered as costs

3 Family labour income

It was calculated by adding the imputed wages for family labour to the net income or the difference between gross income and cost B_2

4 Net income

This is the difference between the gross income and cost C_2

Functional analysis

Cobb Douglas production function was fitted to describe the input-output relationship From the fitted production functions elasticities of production of various inputs were worked out

Specification of the production function model

Cobb Douglas production function was applied for studying the relationship between the output and the various input variables used Since it is the best method of measuring the nature of resources used in agriculture and it allows

best method of measuring the nature of resources used in agriculture and it allows diminishing marginal productivity increasing or decreasing returns to scale It assumes a constant elasticity of production over the entire range of inputs The function is logarithmically linear and can be estimated by applying ordinary least square technique For both Kacholam and Chethikoduveli the function has been fitted separately for the samples as a whole

Specification of the model fitted for Kacholam

$$\text{Log } y = \text{Log } a + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + u$$

and the model fitted for chethikoduveli

$$\text{Log } y \quad \text{Log } a + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + u$$

where the dependent variable y represents production in kilogram in both cases

a is the intercept u is the random error

b_1 b_2 b_3 b_4 are partial regression coefficients or elasticities of production corresponding to each variable input

The explanatory variables used in the function are

x_1 Area in cents

x_2 seeds in kilogram/planting materials in numbers

x_3 – manures in kilogram

x_4 = labour in man days

The parameters of the functional model were estimated using the ordinary least square technique Coefficients of multiple determination (R^2) was

calculated to decide the adequacy of the fitted model and their significance was tested by applying F test As the number of explanatory variable increases R^2 invariably increases and never decreases To correct the above defect R^2 is adjusted by taking into account the degrees of freedom which gets decreased with the inclu sion of additional explanatory variables in the model Returns to scale (Σb_i) was tested using t and F values

Marketing costs and margins

Marketing connotes a series of activities involved in moving the goods from the point of production to the point of consumption In the present study important marketing channels in marketing of Kacholam and Chethikoduveli were identified Marketing efficiency was measured in terms of marketing costs and margins Marketing margin is the difference between the price paid by Ayurvedic medicine manufacturer and the price received by the producer for an equivalent quantity of farm produce The method of Concurrent Margin is used in the present study for estimating marketing margin Concurrent margin refers to the difference between the prices prevailing at successive stages of marketing at a given point of time

Economic efficiency of marketing was measured as follows

$$ME = \frac{V}{I} - 1$$

where ME is marketing efficiency V is the total value of goods marketed and I is the marketing cost including the marketing margins (Shepherd 1965)

Results and Discussion

CHAPTER V

RESULTS AND DISCUSSION

This chapter is divided into six sections which deals with the results of the study and discussions there on The first section is about the general socio economic characteristics of the sample cultivators studied and section two deals with methods of cultivation of selected medicinal plants namely Kacholam and Koduveli Section three includes the operation wise and inputwise cost of cultivation of Kacholam and Koduveli according to different cost concepts income measures in relation to different cost concepts yield and returns from the Kacholam and Koduveli cultivation Section four deals with resource use efficiency of the two medicinal plants selected for this study Section five deals with marketing and various usage of selected medicmal plants Finally section six deals with problems encountered m medicinal plants cultivation

5 1 General economic and social conditions of the sample

A brief idea about the social and economic conditions in which farmers operate would be very useful for proper understanding of their farming activities In this section therefore an attempt is made to present salient features of the social and economic conditions viz family size age and sex literacy occupation ownership holding cropping pattern and area of medicinal plants of the sample respondents The discussion is done separately for the two crops

5 1 1 Koduveli cultivation

5 1 1 1 Land holding

The respondent farmers were classified based on their holding size and given in Table 5 1 It was found that 88 3 per cent of the total respondents were having 84 20 per cent of total area The farmers in the size group of area 0 10 to 0 49 acres and area between 1 5 to 2 49 acres were having 2 32 and 13 48 per cent of total area respectively Average size of holding was 0 80 acre

5 1 1 2 Family size

The respondent farmers were classified based on their family size and their distribution is given in Table 5 2 It is interesting to note that 50 per cent (30 numbers) of the sample families came under the size group of three to five members and the remaining 50 per cent came under six to eight members The respondents (three numbers) having an area between 0 10 and 0 49 acres came under the size group of three to five members alone Out of the fifty three farmers 47 17 per cent came under the size group of three to five members and 52 83 per cent in the size group of six to eight members The respondents having an area between 1 5 and 2 49 acres had 50 per cent (two numbers) in the size group of three to five members and 50 per cent (two numbers) in the age group of six to eight members

5 1 1 3 Age and sex

Classification of the members of respondents families on the basis of age and sex is given in Table 5 3

As much as 37 79 per cent of total members came under the age group

Table 5 1 Distribution of Koduveh cultivators according to size of ownership holding

Size group Area in acres	No of farmers in each group	Area in acres	
		Total area	Average size of holding
0 10 0 49	3 (5 00)	1 12 (2 32)	0 37
0 50 1 49	53 (88 30)	40 60 (84 20)	0 77
1 50 2 49	4 (6 70)	6 50 (13 48)	1 63
Total	60 (100)	48 22 (100)	0 80

(Figures in parentheses show percentages to total)

Table 5 2 Classification of Koduveli cultivators according to family size

Size group	Family size and number of families		
Area in acres	3 5	6 8	Total
0 10 0 49	3 (100)		3 (100)
0 50 1 49	25 (47 17)	28 (52 83)	53 (100)
1 50-2 49	2 (50 0)	2 (50 0)	4 (100)
Total	30 (50 0)	30 (50 0)	60 (100)

(Figures in parentheses show percentages to total)

Table 5 3 Age and Sex distribution of family members of Koduveli cultivators

Size group Area in acres	Age group (years)										Grand total
	0 17		18 39		40 59		60 and above		Total		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
0 10 0 49	2	1	2	3	1	1			5	5	10
	(40 0)	(20 0)	(40 0)	(60 0)	(20 0)	(20 0)			(50 0)	(50 0)	(100 0)
0 50 1 49	48	26	42	62	45	50	2	1	137	139	276
	(35 0)	(18 71)	(30 66)	(44 6)	(32 85)	(35 97)	(1 4)	(0 7)	(49 64)	(50 36)	(100 0)
1 50 2 49	3		4	3	2	7	2		11	10	21
	(27 27)		(36 36)	(30 0)	(18 18)	(70 0)	(18 18)		(52 38)	(47 62)	(100 0)
Total	53	27	48	68	48	58	4	1	153	154	307
	(34 60)	(17 53)	(31 40)	(44 16)	(31 40)	(37 66)	(2 65)	(0 65)	(49 84)	(50 16)	(100 0)

(Figures in parentheses show percentages to total)

of 18 to 39 and 34 53 per cent came under the age group of 40 to 59 About 1 63 per cent was in the age group of 60 and above Out of the total family members 26 05 per cent was below eighteen years of age Males accounted for 49 84 per cent of the total members and females accounted 50 16 per cent Sex ratio (number of females for thousand males) was 1006

5 1 1 4 Literacy

Classification of respondents accordmg to their educational status is given m Table 5 4 Analysis showed that none of the farmer was illiterate Out of the total respondents 68 33 per cent (41 numbers) was educated below S S L C 21 67 per cent up to S S L C 5 00 per cent up to Pre degree and 5 00 per cent at degree level

5 1 1 5 Occupation

Distribution of respondents according to their occupation is shown m Table 5 5 Agriculture is the sole occupation for 38 33 per cent of the sample farmers Respondents (41 51 per cent) in the size group of 0 5 to 1 49 acres shows agriculture as the sole occupation while it is 25 per cent in the size group of area 1 5 to 2 49 acres It was also found that agriculture is the main occupation for 28 33 per cent of all farmers In this group 28 30 per cent respondents came under the size groups of 0 5 to 1 49 acres and 50 per cent under the size group of 1 5 to 2 49 acres Agriculture served as a sub occupation for 33 33 per cent of total farmers In this group 100 per cent of the respondents came under the size group of area 0 10 to 0 49 acres 30 19 per cent under the size group of area 0 52 to 1 49 acres and the rest 25 per cent came under the size group of area 1 5 to 2 5 acres

Table 5 4 Classification of Koduveli cultivators according to educational level

Size group Area in acres	Below S S L C	S S L C	Pre Degree	Degree	Total
0 10-0 49	1 (33 33)	2 (66 67)			3 (100)
0 50 1 49	38 (71 70)	11 (20 75)	3 (5 67)	1 (1 88)	53 (100)
1 50 2 49	2 (50 00)			2 (50 00)	4 (100)
Above 250					
Total	41 (68 33)	13 (21 67)	3 (5 00)	3 (5 00)	60 (100)

(Figures in parentheses show percentages to total)

Table 5 5 Classification of Koduveli cultivators according to occupation

Size group Area in acres	Agriculture as the only occupation	Agriculture as main occupation	Agriculture as sub occupation	Total
0 10 0 49			3 (100)	3 (100)
0 50 1 49	22 (41 51)	15 (28 30)	16 (30 19)	53 (100)
1 50 2 49	1 (25 00)	2 (50 00)	1 (25 00)	4 (100)
Above 250				
Total	23 (38 33)	17 (28 33)	20 (33 33)	60 (100)

(Figures in parentheses show percentage to total)

5 1 1 6 Cropping pattern

Cropping pattern of the respondents is given in Table 5 6 The major crops grown in the area were paddy vegetables annual crops (banana ginger and turmeric, perennial crops (coconut and nutmeg) and kacholam Gross cropped area of respondent farmers was 46 93 hectares Paddy was grown in 11 72 per cent of gross cropped area and is the important food grain crop in the area Vegetables occupied 15 20 per cent of the gross cropped area Koduveli was grown in 13 42 per cent (6 30 acres) of the gross cropped area Annual crops and perennial crops occupied 12 78 per cent and 46 88 per cent respectively of total cropped area The cropping pattern thus reveals strong commercialization of agriculture in spite of the fact that holding sizes are small

5 1 1 7 Area under Koduveli cultivation

Respondents were classified according to area under Koduveli cultivation (Table 5 7) Out of the total respondents 81 67 per cent was having an area more than 10 cents and they had 92 21 per cent of total Koduveli cultivated area The percentage of respondents having an area of five to ten cents was 15 Total koduveli cultivated area with them was 7 15 per cent of the sample total Farmers who owned an area between one to five cents was 3 33 per cent of total farmers and they had only 0 64 per cent of the total area of the sample as a whole The average cropping size of Koduveli for the sample as a whole was only 10 48 cents

5 1 2 Kacholam cultivation

5 1 2 1 Land holding

The respondent farmers were classified based on their holding size and the same is given in Table 5 8 It was found that 58 33 per cent of the total

Table 5 6 Cropping pattern of Koduveli cultivators

Crops	Area (in acres)	Percentage of gross cropped area
Paddy	5 50	11 72
Vegetable	7 13	15 20
Koduveli	6 30	13 42
Annual crops	6 00	12 78
Perennial crops	22 00	46 88
Gross cropped area	46 93	100 00

Table 5 7 Distribution of respondents according to area under Koduveli

Size group Area in cents	Number of farmers	Area in cents	
		Total area under Koduveli	Average area
1 5	2 (3 33)	4 (0 64)	2 00
5 10	9 (15 0)	45 (7 15)	5 00
> 10	49 (81 67)	580 (92 21)	11 84
Total	60 (100 00)	629 (100 00)	10 48

(Figures in parentheses show percentages to total)

Table 5 8 Distribution of Kacholam cultivators according to size of ownership holding

Size group Area in acres	No of farmers in each group	Area in acres	
		Total area	Average size of holding
0 10-0 49			
0 50 1 49	35 (58 33)	25 85 (29 85)	0 74
1 50-2 49	16 (26 67)	28 50 (32 91)	1 78
Above 2 50	9 (15 0)	32 25 (37 24)	3 58
Total	60 (100)	86 60 (100)	1 44

(Figures in parentheses show percentages to total)

respondents were having only 29 85 per cent of total area The farmers in the size group of 1 50 to 2 49 acres and more than 2 50 acres were having 32 91 and 37 24 per cent of the total area respectively Average size of holdmg was 1 44 acres

5 1 2 2 Family size

The respondent farmers were classified based on their family size and their distribution according to it is given in Table 5 9 It can be seen that 76 67 per cent of the total sample farmers was under the family size group having three to five members and the remaining 23 33 per cent had six to eight members Of the respondents in the farm size group of 0 5 to 1 49 acres 82 86 per cent was in the family size group of three to five and the rest 17 14 per cent came under the size group of six to eight Out of the 6 respondent farmers of area 1 5 to 2 49 acres 68 75 per cent had three to five members and 31 25 per cent had six to eight members Among the farmers in the size group of area more than 2 50 acres 66 67 per cent belonged to the family size group of three to eight and the rest 33 33 per cent belonged to the size class of six to eight members

5 1 2 3 Age and sex

Classification of all the members of respondent families on the basis of age and sex is given m Table 5 10 As much as 41 29 per cent of the total members was under the age group of 18 to 39 and 22 58 per cent was under the age group of 40 to 59 About 1 61 per cent was in the age group of 60 and above Out of the total family members 34 52 per cent was below 18 years of age Males constituted 49 68 per cent of the total members and the remaining 50 32 per cent females Sex ratio (number of females per thousand males) was 1012

Table 5 9 Classification of Kacholam cultivators according to family size

Size group Area in acres	Family size and number of families		
	3 5	6 8	Total
0 10 0 49			
0 50 1 49	29 (82 86)	6 (17 14)	35 (100)
1 50 2 49	11 (68 75)	5 (31 25)	16 (100)
Above 250	6 (66 67)	3 (33 33)	9 (100)
Total	46 (76 67)	14 (23 33)	60 (100)

(Figures in parentheses show percentages to total)

Table 5 10 Distribution of respondent family members according to age and sex (Kacholam cultivation)

Size group Area in acres	Age group (years)										Grand total
	0 17		18 39		40 59		60 and above		Total		
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
0 10 0 49											
0 50 1 49	34 (38 64)	26 (30 23)	38 (43 18)	42 (48 84)	16 (18 18)	18 (20 93)			88 (50 57)	86 (49 43)	174 (100 0)
1 50 2 49	16 (38 1)	18 (38 30)	14 (33 33)	17 (36 17)	10 (23 81)	11 (23 4)	2 (4 76)	1 (2 13)	42 (47 19)	47 (52 81)	89 (100 0)
Above 250	7 (29 17)	6 (26 09)	8 (33 33)	9 (39 13)	7 (29 17)	8 (34 78)	2 (8 33)		24 (51 06)	23 (48 94)	47 (100 0)
Total	57 (37 01)	50 (32 05)	60 (38 96)	68 (43 60)	33 (21 43)	37 (23 71)	4 (2 60)	1 (0 64)	154 (49 68)	156 (50 32)	310 (100 0)

(Figures in parentheses show percentage to total)

5 1 2 4 Literacy

Classification of the respondents according to their educational status is given in the Table 5 11 All the sample farmers were literate Out of the total respondents 58 33 per cent was educated below secondary school level 35 per cent attained secondary school level 5 per cent attained pre degree (higher secondary) level and the rest 1 67 per cent was degree holders

5 1 2 5 Occupation

Distribution of respondents according to their occupation is shown in Table 5 12 Though the respondents were all farmers agriculture was neither the sole occupation nor the main occupation in many cases Agriculture was the sole occuption for 33 33 per cent of the sample farmers For as much as 34 29 per cent of the respondents in the farm size group of 0 5 to 1 49 acres 31 25 per cent of the respondents in the size group of 1 50 to 2 49 acres and 33 33 per cent of the respondents in the size group of more than 2 50 acres agriculture was the sole occupation Agriculture was the main occupation for 35 00 per cent of the respondents As much as 28 57 per cent of respondents in the size group of area between 0 50 and 1 49 acres 31 25 per cent of respondents in the size group of area between 1 50 and 2 49 acres and 66 67 per cent of the respondent in the size group of area more than 2 50 acres reported agriculture as the main occupation Agriculture served as a sub occupation for another 31 67 per cent of total respondents As much as 37 14 per cent of the respondents in the size group of area between 0 50 and 1 49 and 37 50 per cent of the respondents in the size group of area between 1 50 and 2 50 acres reported agriculture as the subsidiary occupation

5 1 2 6 Cropping pattern

Cropping pattern of the respondent farmers is given in Table 5 13 The

Table 5 11 Classification of Kacholam cultivators according to educational level

Size group Area in acres	Below S S L C	S S L C	Pre Degree	Degree	Total
0 10 0 49					
0 50 1 49	18 (51 43)	13 (37 14)	3 (8 57)	1 (2 86)	35 (100)
1 50 2 49	12 (75 00)	4 (25 00)			16 (100)
Above 250	5 (55 56)	4 (44 44)			9 (100)
Total	35 (58 33)	21 (35 00)	3 (5 00)	1 (1 67)	60 (100)

(Figures in parentheses show percentages to total)

Table 5 12 Classification of Kacholam cultivators according to occupation

Size group Area in acres	Agriculture as the only occupation	Agriculture as main occupation	Agriculture as sub occupation	Total
0 10-0 49				
0 50 1 49	12 (34 29)	10 (28 57)	13 (37 14)	35 (100)
1 50 2 49	5 (31 25)	5 (31 25)	6 (37 50)	16 (100)
Above 250	3 (33 33)	6 (66 67)		9 (100)
Total	20 (33 33)	21 (35 00)	19 (31 67)	60 (100 0)

(Figures in parentheses show percentages to total)

Table 5 13 Cropping pattern of Kacholam cultivators

Crops	Area (in acres)	Percentage of gross cropped area
Rice	11 78	13 60
Vegetables	8 73	10 08
Kacholam	22 65	26 15
Annual crops	1 95	2 25
Perennial crops	41 50	47 92
Gross cropped area	86 61	100 00

major crops grown in the area were rice vegetables kacholam annual crops (banana turmeric and ginger) and perennial crops (coconut and nutmeg) Gross cropped area of all the respondent farmers growing kacholam was 86 61 acres Rice was grown in 13 60 per cent of the gross cropped area and is the important food grain crop in the area Vegetables occupied 10 08 per cent of the gross cropped area Kacholam was grown in 26 15 per cent of the gross cropped area Annual crops (banana turmeric and ginger) and perennial crops (coconut and nutmeg) occupied 2 25 per cent and 47 92 per cent of gross cropped area respectively

5 1 2 7 Area under Kacholam

The respondents were classified according to area under kacholam and the distribution is given in Table 5 14 Sixty per cent of the respondents were having an area between 1 and 0 49 acres and they had 40 00 per cent of total area under kacholam cultivation Thirty five per cent respondents were having an area of 0 5 to 1 00 acres and they had 46 80 per cent of area Five per cent of the total respond ents who belonged to the category of more than 100 cents had 13 20 per cent of the total Kacholam area for the sample as a whole

5 2 Methods of Medicinal plant cultivation

A brief account of the cultivation practices of both Kacholam and Koduveli will be helpful while studying the costs and returns involved in the cultivation of these crops

5 2 1 General practices of Kacholam cultivation

Kacholam (*Kaempferia galanga* L) is suited for cultivation in Kerala as the humid tropical climate of the state is conducive for its growth The crop requires

Table 5 14 Distribution of respondents according to area under Kacholam

Size group Area in acres	Number of farmers	Area in acres	
		Area under Kacholam	Average area
0 10 0 49	36 (60)	9 05 (40 00)	0 25
0 50-1 00	21 (35)	10 60 (46 80)	0 50
Above 1 00	3 (5)	3 00 (13 20)	1 00
Total	60 (100)	22 65 (100 00)	0 37

(Figures in parentheses show percentage to total)

Plate 1 Kacholam plant (*Kaempferia galanga*)

Plate 1. Single plant of Koduveli (*Plumbago rosea*)

simple cultivation and management practices The economic part of the plant the underground stem the rhizome which finds an important place in indigenous medicines as stimulent expectorant diuretic and carminative

Kacholam is grown as rainfed crop The planting season April May when some pre monsoon showers occur The land is repeatedly ploughed and brought to good tilth during March Depending on the size of the field and topography of the area beds of convenient length width and height about 25 cm are prepared Rhizomes are planted in shallow pits in the bed with a spacing of 20 cm x 20 cm to 25 cm x 25 cm At the time of planting farm yard manure and bone meal are applied Manuring is followed by earthing up Weeding is carried out three to four times during the cropping season Irrigation is given normally Rhizomes are harvested from November to January Drying of the leaves is an indication of harvesting time

5 2 2 General practices of Koduveli cultivation

Koduveli (*Plumbago rosea* L) commonly known as Chethi koduveli perennial shrub the roots of which possess immense medicinal properties and being used extensively in Ayurvedic medicines

The field is thoroughly ploughed in the month of May to get a uniform soil condition After the on set of south west monsoon rooted cuttings are planted in the field during the second fortnight of July Planting materials are semi hard wood cuttings Planting is done in flat beds of convenient size and 25 cm height spacing of 50 cm x 15 cm Bone meal and farm yard manure are given at the time of planting Weeding is carried out three to four time during the application

Manuring is followed by earthing up Harvesting is done 11 to 12 months after planting Some farmers prefer to harvest after 18 months Plants are dug separately taking care to keep the roots in tact Then the roots are separated and cleaned with water to remove soil particles

5 3 Cost of cultivation of medicinal plants

The observations and the collection of data regarding the total returns were made during the year 1994 95 The observations on production aspects are presented and discussed here

5 3 1 Operation wise cost of cultivation of Kacholam

Operation wise cost of cultivation per hectare of Kacholam for the sample as a whole was computed and is presented in the Table 5 15 Operation wise cost include mainly the cost associated with land preparation seeds and sowing manures and manuring weeding (after cultivation operation) and harvesting

Operation wise cost of cultivation is given in Table 5 15 In the case of Kacholam cultivation seeds and sowing was the most important item of cost It accounted for 41 93 per cent of the total cost (Rs 31 696 63) Rental value of own land came next is 33 06 per cent of the total cost (Rs 25 000) Interest on working capital constituted 5 50 per cent (Rs 4159 79) of total cost The next major item of operation was weeding (after cultivation) which accounted for 4 36 per cent of the total cost Manures and manuring was another major item of operation Medicinal plants cultivation is largely a low input enterprise at present with minimum use of agro chemicals Expenditure on this item formed 4 28 per cent of the total cost All other items individually constituted less than five per cent of the total cost

5 3 2 Operation wise c st f cultivation f Kc duveli

Operation wise cost of cultivatic n of Koduveli per hectare f r the sat ple as a wh le was computed and is presented in the Table 5 15 Operat n w sc t include land preparation seeds amd sowing (stem cuttings was used f r plant g manures and manuring weeding (after cultivation operati n) irrigati n and harvestii g

In the case of Koduveli cultivation rental value of own land was the i s important item of cost This was because of the fact that the rental valu f medicinal plant cultivation of leasing land in Thrissur district was verv h gh (Rs 10 000 per acre) The same rate was imputed for wn lands Expend ture incurred on weeding was the next major item and constituted 11 51 per cent of tota cost The third item was manures and manuring which formed 10 16 per cent t ta cost The fourth major item of operation was harvesting which constituted 9 64 pc cent of total cost Harvesting involves careful uprooting of the cr p with mini nur root damage and hence require more labour employment Land preparation wa al as important as harvest because the percentage share of it n the t tal c st wa 9 4 per cent Interest on working capital constituted 5 48 per cent f t tal c st All th other items individually constituted less than 5 per cent of total c st

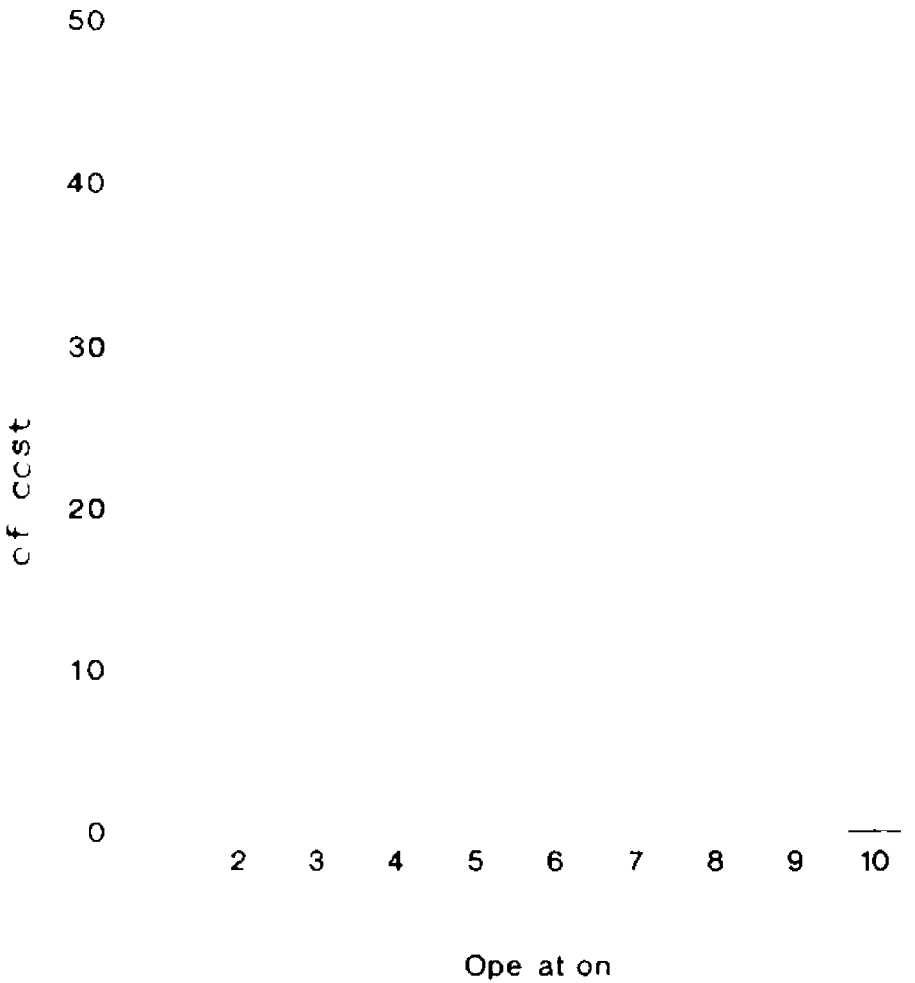
5 3 3 Input wise cost of cultivation of Kacholam

Input wise cc st of cultivation was als w rked out f r Ka h lam lat 5 16) This will help to have an idea ab ut the relative imp rtanc f va i u in general

Table 5.15 Operation wise cost of cultivation of Kacholam and Kuduvel Rice

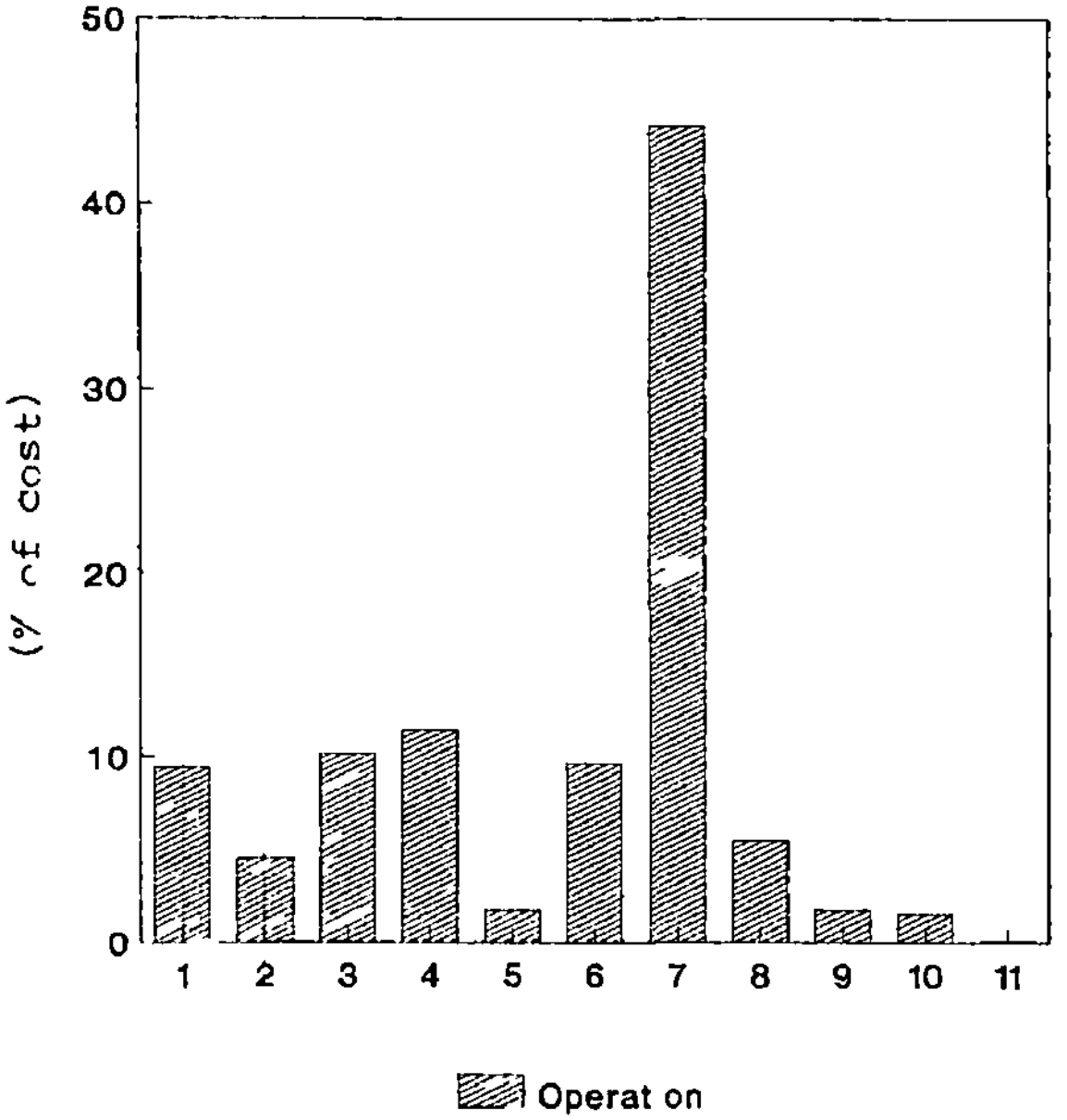
Sl No	Operation	Kacholam	Percentage	Kuduvel	Percentage
1	Land preparation	2645.32	3.50	5345.96	9.45
2	Seeds and sowing	31696.63	41.92	2557.0	4.5
3	Manures and Manuring	3237.07	4.28	5742.90	10.16
4	After cultivation operation	3295.82	4.36	6506.57	11
5	Irrigation	Nil	0.00	961.87	1.70
6	Harvesting	2670.67	3.53	5453.27	9.64
7	Rental value of own land	25000.00	33.06	25000.00	44.20
8	Interest on working capital	4159.79	5.50	3096.50	5.48
9	Depreciation	1578.00	2.09	980.00	7
10	Interest on fixed capital	1276.80	1.69	856.80	5
11	Land Revenue	50.00	0.07	50.00	0.0
	Total	75609.30	100.00	56550.89	100.00

Fig 2 Operation wise cost of cultivation of Kacholam



1 Land preparation
2 Seeds and sowing
3 Manures and manuring
4 After cultivation operation
5 Harvesting
6 Rental value of own land
7 Interest on working capital
8 Depreciation
9 Interest on fixed capital
10 Land Revenue

Fig 3 Operation wise cost of cultivation of Koduveli



1 Land preparation
2 Seeds and sowing
3 Manures and manuring
4 After cultivation operation
5 Irrigation
6 Harvesting
7 Rental value of own land
8 Interest on working capital
9 Depreciation
10 Interest on fixed capital
11 Land Revenue

The inputs involved in the cultivation of Kacholam crop was grouped into three viz Labour input material and other items The labour inputs involve human labour only which included both hired and family labour Here in Kacholam cultivation family labour is not involved There was only hired labour for cultivation The material costs include the cost on seeds and manures Other items consisted of rental value of own land interest on working capital depreciation interest on own fixed capital and land revenue The farmers were not using chemical fertilizers because according to them it increases rodents attack In the total cost the sub group others accounted for the highest share and it accounted for 42 41 per cent of the total cost With in this subgroup rental value of own land formed the major share (33 06 per cent of total) The sub group material cost was the second major group accounting for 42 35 per cent of total cost Within this sub group seed material formed the major item (39 59 per cent of total cost) The average cost of seed material was Rs 110 Labour cost was the third sub group which accounted for 15 24 per cent of total cost

The respondent farmers used own seeds and the average seed rate used was 42 08 kilogram per 38 58 cents The average quantity of manure used was 448 75 kg Most of the farmers purchased manure for meeting their requirements

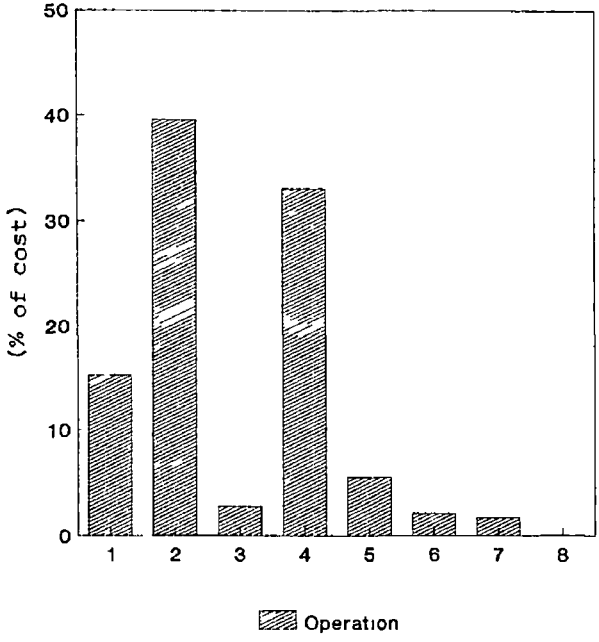
5 3 4 Input wise cost of cultivation of Koduveli

Input wise cost of cultivation per hectare of Koduveli cultivation was computed and presented in the Table 5 16 As in the case of kacholam the inputs involved in the cultivation of Koduveli crop was grouped into three viz labour input materials and other items The labour involves human labour only which

Table 5 16 Input wise cost of Kacholam and Koduveli (Rs/ha)

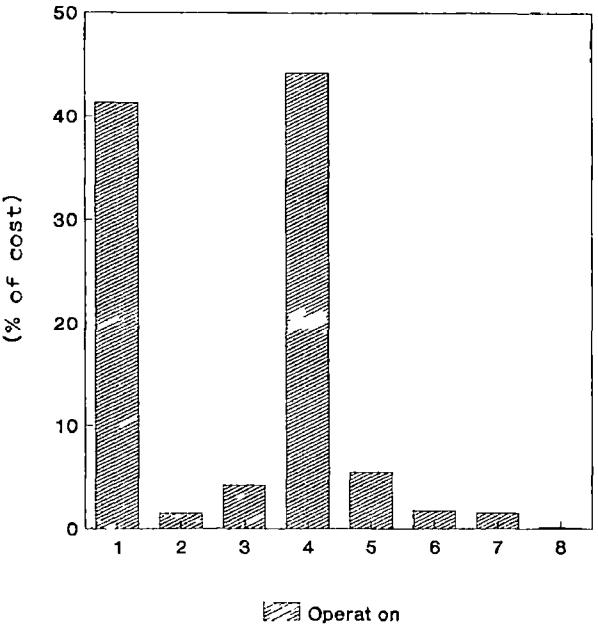
Sl No	Inputs	Kacholam	Percentage	Koduveli	Percentage
A	Labour				
1	Human labour				
	a) hired	11526 00	15 24	19332 73	34 19
	b) Family	Nil		4020 03	7 11
Sub total		11526 00	15 24	23353 76	41 30
B	Materials				
2	Seed/planting material	29935 00	39 59	832 00	1 47
3	Manures	2083 71	2 76	2381 83	4 21
Sub total		32018 71	42 35	3213 83	5 68
C	Others				
4	Rental value of own land	25000 00	33 06	25000 00	44 21
5	Interest on working capital	4159 79	5 50	3096 50	5 48
6	Depreciation	1578 00	2 09	980 00	1 73
7	Interest on fixed capital	1276 80	1 69	856 80	1 52
8	Land revenue	50 00	0 07	50 00	0 08
Sub total		32064 59	42 41	29983 30	53 02
Grand total		75609 30	100 00	56550 59	100 00

Fig 4 Input wise cost of cultivation of Kacholam



1 Human labour
2 Seed
3 Manures
4 Rental value of own land
5. Interest on working capital
6 Depreciation
7 Interest on fixed capital
8 Land revenue

Fig 5 Input wise cost of cultivation of Koduveli



1 Human labour
2. Planting material
3 Manures
4 Rental value of own land
5 Interest on working capital
6 Depreciation
7 Interest on fixed capital
8 Land revenue

included both hired and family labour Material costs include the cost of planting material and manures Other items consisted of rental value of own land interest on working capital depreciation interest on fixed capital and land revenue In the total cost sub group others accounted for the highest share 53 02 per cent of the total cost Within this sub group rental value of own land formed the major share (44 21 per cent of total cost) This was followed by labour cost and material cost Expenditure on these items were 41 30 per cent (Rs 23 353 76) and 5 68 per cent (Rs 3213 83) respectively Among human labour hired labour accounted for 34 19 per cent (Rs 19 332 73) and family labour 7 11 per cent (Rs 4020 03) of total cost

The average size of holding of koduveli cultivation was 10 48 cents and average number of planting materials (stem cuttings) used was 140 The average quantity of manure used was at the rate of 266 25 kilogram The average labour used was 14 mandays

5 3 5 Cost of cultivation of Kacholam under different cost concepts

Cost concepts refers to the classification of cost which regroups the components so as to distinguish between constituents that are price determining from those that are price determined

The cost concepts used in this study are cost A_1 cost A_2 cost B_1 cost C_1 and cost C_2 (Table 5 17) The different costs based on these concepts are worked out for the sample as a whole For the sample as a whole cost A_1 A_2 B_1 B_2 C_1 and C_2 per hectare were Rs 49 332 50 Rs 49 332 50 Rs 50 609 30 Rs 75 609 30 Rs 50 609 30 and Rs 75 609 30 respectively Cost A_1 and Cost A_2 are same for this crop because hiring in of land by the respondents was not observed Similarly cost

B_1 and cost C_1 and cost B_2 and cost C_2 are the same because family labour is not used in Kacholam cultivation

5 3 6 Cost of cultivation of Koduveli under different cost concepts

Costs on the basis of different cost concepts were also worked out for Koduveli cultivation and the information is given in the Table 5 17 Cost A_1 A_2 B_1 B_2 C_1 and C_2 per hectare were Rs 26 678 09 Rs 26 678 09 Rs 27 534 09 Rs 27 534 09 Rs 52 534 09 Rs 31 549 59 and Rs 56 550 59 respectively

5 3 7 Input output ratio Kacholam cultivation

Input output ratio indicates value of output for rupee of input cost This ratio will serve as a measure which would indicate as to whether the costs incurred commensurate with the returns obtained Input output ratio of Kacholam is given in Table 5 18 Returns generated from a rupee invested was found to be greater than one for the two crops Input output ratios based on Cost A_1 A_2 B_1 B_2 C_1 and C_2 for the sample as a whole were 2 62 2 62 2 55 1 71 2 55 and 1 71 respectively Input output ratio for the sample as a whole showed that a rupee invested returned Rs 2 62 Rs 2 62 Rs 2 55 Rs 1 71 Rs 2 55 and Rs 1 71 based on Costs A_1 A_2 B_1 B_2 C_1 and C_2 in Kacholam

5 3 8 Input output ratio Koduveli cultivation

Input output ratio of Koduveli is given in Table 5 18 Input output ratio for the sample as a whole showed that a rupee invested returned Rs 5 10 Rs 5 10 Rs 4 9 Rs 2 59 Rs 4 3 and Rs 2 4 based on Costs A_1 A_2 B_1 B_2 C_1 and C_2

Table 5 17 Cost of cultivation of Kacholam and Koduveli under different cost concepts

Cost	Kacholam (Rs /ha)	Koduveli (Rs /ha)
1 Cost A_1 (At actual expenses incurred in production)	49 332 50	26 678 09
2 Cost A_2 (Cost A_1 + rent for leased in land)	49 332 50	26 678 09
3 Cost B_1 (Cost A_1 + interest on own fixed capital)	50 609 30	27 534 09
4 Cost B_2 (Cost B_1 + rental value of own land + rent paid for leased in land)	75 609 30	52 534 09
5 Cost C_1 (Cost B_1 + imputed value of family labour)	50 609 30	31 549 59
6 Cost C_2 (Cost B_2 + imputed value of family labour)	75 609 30	56 550 59

Table 5 18 Input output ratio of Kacholam and Koduveli

Input output ratio based on	Kacholam	Koduveli
Cost A_1	2 62	5 10
Cost A_2	2 62	5 10
Cost B_1	2 55	4 90
Cost B_2	1 71	2 59
Cost C_1	2 55	4 30
Cost C_2	1 71	2 40

Comparison of input output ratio of Kacholam and Koduveli showed that returns generated from a rupee invested was always higher for Koduveli than to Kacholam For Koduveli a rupee invested returned Rs 2 4 on Cost C_2 basis while a rupee invested returned only Rs 1 71 in the case of Kacholam

5 3 9 Income measures in relation to different cost concepts Kacholam cultivation

Gross income was estimated for the sample as a whole at Rs 1 30 400 69 Farm business income of farmers of Kacholam cultivation was Rs 81 068 19 Family labour income was also worked out and it was estimated as Rs 54 791 39 Net income at cost C_1 was Rs 79 791 39 and at cost C_2 it was Rs 54 791 39 (Table 5 19)

5 3 10 Income measures in relation to different cost concepts Koduveli cultivation

Gross income was estimated as Rs 1 36 003 Farm business income of the farmers was Rs 1 09 325 Family labour income was worked also out and it was estimated as Rs 83 469 Net income at cost C_1 and C_2 were Rs 1 04 454 and Rs 79 452 respectively (Table 5 19)

5 3 11 Yield and returns of Kacholam cultivation

Yield and value of Kacholam per hectare presented in Table 5 20 The table shows that the yield of Kacholam was 1862 9 kg per hectare In terms of economic units per hectare value of the product was Rs 1 30 400

Table 5 19 Income measures in relation to different cost concepts (per hectare)

Sl No	Particulars	Kacholam (Rs)	Koduveli (Rs)
1	Gross income	130400 69	136003 69
2	Farm business income (GI Cost A_1)	81068 19	109325 60
3	Family labour income (GI Cost B_2)	54791 39	83469 60
4	Net income at cost C_1 (GI Cost C_1)	79791 39	104454 10
5	Net income at cost C_2 (GI Cost C_2)	54791 39	79452 80

Table 5 20 Yield and returns of Kacholam and Koduveli

Medicinal plants	Yield/ha kg	Returns/ha Rs
Kacholam	1862 9	130400 69
Koduveli	6476 3	136003 69

5 3 12 Yield and returns of Koduveli cultivation

Table 5 20 shows that the yield of Koduveli was 6476 3 kg (6 476 tonnes) per hectare and in terms of economic units per hectare value of the product was Rs 1 36 003

5 3 13 Cost of production of Kacholam

Cost comparison on the basis of per hectare cost is strictly not relevant and meaningful What is more relevant is cost per unit of output The Table 5 21 gives cost of production of Kacholam in relation to various cost concepts Cost of production per kilogram on cost C_2 was Rs 40 59 Cost of production per kilogram for the sample based on cost A_1 A_2 B_1 B_2 and C_1 were 26 48 26 48 27 17 40 59 and 27 17 respectively

5 3 14 Cost of production of Koduveli

Table 5 21 gives particulars on cost of production Cost incurred for producing one kilogram of Koduveli on cost C_2 basis was Rs 8 73 Cost of production based on costs A_1 A_2 B_1 B_2 and C_1 were Rs 4 12 Rs 4 12 Rs 4 25 Rs 8 10 and Rs 4 87

A comparison of cost of production of Kacholam and Koduveli cultivation based on various cost concepts showed that cost incurred in producing one kilogram of Kacholam was higher than the cost incurred in producing one kilogram of Koduveli The higher cost of production of Kacholam than Koduveli can be explained by high seed cost of Kacholam compared to low rate of stem cuttings of Koduveli

Table 5 21 Cost of production of Kacholam and Koduveli (Rs /kg)

Particulars	Kacholam	Koduveli
Cost A_1	26 48	4 12
Cost A_2	26 48	4 12
Cost B_1	27 17	4 25
Cost B_2	40 59	8 10
Cost C_1	27 17	4 87
Cost C_2	40 59	8 73

5 4 Resource use efficiency

5 4 1 Kacholam cultivation

The production function fitted for kacholam cultivation is given below

$$\log Y = \log 0\ 9540 + \underset{(0\ 19837)}{0\ 74582^{**} \log x_1} + \underset{(0\ 14407)}{0\ 4206^{**} \log x_2} \quad \underset{(0\ 16602)}{0\ 1863 \log x_3} + \underset{(0\ 07637)}{0\ 0722 \log x_4}$$

$$R^2 = 0\ 738$$

(Figures in parenthesis are standard errors)
**Significant at 1 per cent level of probability

The function fitted for Kacholam has an R^2 value of 0 738 indicating 74 per cent of the variation in Kacholam production could be explained by the independent variable x_is The production elasticities of inputs for Kacholam cultivation were 0 7458 for area (x_1) 0 4206 for seeds (x_2) 0 0722 for labour and 0 1864 for manure The sum of regression coefficients (Σbi) of all the input variables indicate the return to scale In the present study the sum of the regression coefficients is almost equal to one (1 052) and indicating constant returns to scale Attempts were also made to conduct multiple regression analysis after deleting non significant explanatory variables from the model

The production function selected for further economic analysis in kacholam is given below

$$\log Y = \log 0\ 6934 + \underset{(0\ 14589)}{0\ 6205^{**} \log x_1} + \underset{(0\ 13895)}{0\ 4658^{**} \log x_2}$$

$$R^2 = 0\ 73$$

(Figures in parenthesis are standard errors)
**Significant at 1 per cent level of probability

From the Table 5 22 it can be observed that the value of R^2 was 0 73 The elimination of the variables (manure and labour) from the functional analysis has not affected the R^2 value substantially The value of R^2 was found quite satisfactory in that the independent variables chosen in the equation have explained 73 per cent of the variation in the dependent variable In the present analysis the adjusted R^2 was 0 72

Positive sign for the area confirm the obvious expectation that more gross income in a farm if the area under this crop is high Positive sign for seeds show a high gross income from a farm if quantity of seeds used is more

5 4 2 Koduveli cultivation

For facilitating discussions the results of the estimated parameters of Koduveli cultivation is given below

$$\log Y - \log 1\ 4379 + \underset{(0\ 060501)}{1\ 0307^{**}} \log x_1 + \underset{(0\ 038075)}{0\ 078^{*}} \log x_2 \quad \underset{(0\ 0627)}{0\ 10775} \log x_3 + \underset{(6\ 0970)}{0\ 0327} \log x_4$$

R^2 0 978

(Figures in parenthesis are standard errors)
* Significant at 5 per cent probability
** Significant at 1 per cent probability

The function fitted for Koduveli had an R^2 value of 0 978 indicating that 98 per cent of the variation in koduveli production could be explained by the independent variable x_is The production elasticities of inputs for Koduveli cultivation were 1 0307 for area (x_1) 0 077939 for planting material (x_2) 0 10775 for manure (x_3)

Table 5 22 Estimation of parameters of the Cobb Douglas production function for Kacholam

Estimates	Variables	
	Area x_1	Seeds x_2
Regression coefficients	0 6205**	0 4658**
t value	4 253	3 352
Standard error	0 1459	0 1390
Intercept	0 6934	
R^2	0 730	
Adjusted R^2	0 720	
F value	76 92	
Returns to scale	1 0863	

**Significant at 1 per cent probability

and 0 032698 for labour The sum of regression coefficient was one (1 0336) indicating almost constant returns to scale The varaible labour and manure have been eleminated from the final model since standard error of this particular variable was greater than the value of the partial regression coefficients

The production functions selected for further economic analysis in koduveh is given below

$$\log Y = \log 1\ 3392 + \underset{(0\ 0307)}{0\ 9785^{**}} \log x_1 + \underset{(0\ 0315)}{0\ 04428} \log x_2$$

$R^2 = 0\ 977$

(Figures in parenthesis are standard errors)

**Significant at 1 per cent level of probability

The results of the estimated parameters of the Cobb Douglas production function for Koduveli cultivation is given in Table 5 23 It can be seen that the value of R^2 is 0 977 The elimination of variables from the functional analysis has not affected the R^2 value substantially The value of R^2 was found to be high and significant In the present analysis the adjusted R^2 was 0 976

5 5 Marketing

Marketing is as critical to better performance in agriculture as farming itself and should be treated with equal care Effort to increase production may go waste unless the product is efficiently marketed Marketing should therefore be rightly considered as much an essential aspect like good seeds and fertilizers in modern agriculture Marketing system as a whole is divided into three broad segments viz producers consumers and middle man each with apparently conflicting interests Producer farmers wants the marketing system to purchase the

Table 5 23 Estimation of parameters of the Cobb Douglas production function for Koduvelı

Estimates	Variables		
	Area x_1		Planting material x_2
Regression coefficients		0 9785**	0 0443
t value	31 912		1 406
Standard error		0 0307	0 0315
Intercept		1 3392	
R^2		0 977	
Adjusted R^2		0 976	
F value		1186 55	
Returns to scale		1 0228	

**Significant at 1 per cent probabilities

product without loss of time and provide the highest possible price Consumer interest is to get required quantities of goods of proper quality at lowest possible price while middle mean aim at realizing maximum profit from the deal As all these groups are indespensible to the society an efficient marketing system ought to aim at balancing this apparently conflicting interest in such a way that each segment will get a fair deal

In the present study an attempt has been made to identify the important marketing channels and also to analyse the marketing efficiency of Kacholam and Koduveli as indicated by marketing costs and margins Before marketing and immediately after harvest certain functions have to be performed by the farmers

5 5 1 Kacholam

Kacholam is an attractive rhizomatous spice plant used in various indegenous medicines It is traded in dry form The rhizome gets ready for harvest after seven to eight months of planting After harvesting the rhizomes are cleaned roots are removed and it is cut into small pieces and allowed to dry in the sun for seven to nine days When the rhizomes are dried well they are packed in gunny bags The produce is marketed depending upon the market price and the farmer s financial position

5 5 2 Koduveli

Chethikoduveli is a perennial shrub the roots of which possess immense medicinal properties and is being used extensively in Ayurvedic medicines The root is get ready for harvest 11 12 months after planting It is usually traded in green form Harvested medicinal plant root is cleaned in order to remove the adhering soil

particles After cleaning roots are tied in bundles and packed in gunny bags The produce is then transported to the market

The roots/rhizomes after harvest are transported either to the market or to the ayurvedic medicine manufacturing centres When only small quantities of roots/rhizomes are to be transported transportation is done in bus When large quantities are to be transported farmers in nearby areas collectively hire the vehicle and the produce is transported Transportation cost varied according to the mode of transportation and distance to the market from farm gate Sample farmers generally sold their produce at the Thrissur market or at Vaidhyarathnam Oushadha Sala/Oushadi

Market structure

The term market structure refers to those organizational characteristics of the market which influence the nature of competition and pricing and affect the conduct of business firm It also includes the manner of the operations of the market (Acharya and Agarwal 1987)

Medicinal plant cultivators of the study area in general take their produce either to Thrissur market or to the factory of famous ayurvedic medicine manufacturers of Thrissur district Vaidhyarathnam Oushada Shala/Oushadhi In the Thrissur market there are two famous medicinal plants dealers namely Immatty and Settu Apart from this there is Amrutha a voluntary organization set up by a group of medicinal plant growers of Thrissur district who purchase and sell the produce to Ayurvedic medicine manufacturers at a reasonable price The price prevailing in Cochin market is taken into account for fixing the price to be paid to the farmers

The growers and dealers depend on the market information provided by local newspapers and All India Radio broadcast

Marketing channels

Marketing channels are the routes through which products move from producers to consumers The different marketing channels identified in the marketing of Kacholam and Koduveli in this study are given below

1 Producer Dealer Ayurvedic medicine manufacturers
2 Procuer Amrutha Ayurvedic medicine manufacturers
3 Producer Ayurvedic medicine manufacturer (Vaidhya Rathnam Oushada Sala)

From the dealers the Ayurvedic medicine manufacturer buy their produce through open tender quotations

Among the channels identified the producer dealer-Ayurvedic medicine manufacturer is the channel through which bulk of the produce was marketed

Distribution of the farmer respondent according to the type of buyer is given in Table 5 24 Out of the total sample farmers of Kacholam 56 7 per cent sold their produce to medicinal plants dealers 33 3 per cent sold through Amrutha and the rest 10 per cent sold their produce directly to ayurvedic medicine manufacturers (Here it is Vaidhyarathnam Oushada Sala/Oushadi)

In the case of Koduveli out of the total sample farmers 58 33 per cent sold their produce to medicinal plant dealers 25 0 per cent sold through Amrutha and the rest 16 67 per cent sold their produce directly to ayurvedic medicine manufacturers

Table 5 24 Distribution of the farmer respondents according to the type of buyers

Product sold to	Kacholam	Koduvelı	Total
Dealer	34 (56 70)	35 (58 33)	69 (57 50)
Amrutha (voluntry agency dealing with medicinal plant)	20 (33 30)	15 (25 00)	35 (29 20)
Ayurvedic medicme manufacturers	6 (10 00)	10 (16 67)	16 (13 30)
Total	60 (100)	60 (100)	120 (100)

(Figures in parenthesis show the percentage to the total)

Marketing efficiency

In the present study marketing efficiency is assessed on the basis of marketing costs and margins In the marketing of agricultural commodities the difference between the price paid by the consumer and the price received by the producer for an equivalent quantity of farm produce is often known as farm retail spread or price spread (Acharya and Agarwal 1987)

The concept of concurrent margins is used in the present study in which the prices prevailing at successive stages of marketing at a given point of time are compared In this study average prices received by the medicmal plant growers in the Thrissur market is studied Marketing margins for Kacholam and Koduveli is given in Table 5 25 In the case of Kacholam out of Rs 72 00 per kilogram paid by manufacturers of ayurvedic medicmes Rs 70 00 (97 3) went to the producer seller The dealer reaped a net margin of Rs 1 25 per kilogram for Kacholam

In the case of Koduveli out of Rs 24 per kilogram paid by the manufacturers of Ayurvedic medicme Rs 21 went to the producer seller The dealer reaped a net margin of Rs 2 25 per kilogram

The producer s net share in dealers rupee was Rs 69 00 per kilogram (95 83 per cent) for Kacholam The producers net share in dealers rupees was Rs 20 per kilogram i e 83 3 per cent for Koduveli

The index of marketing efficiency was 11 5 for Kacholam and 7 for Koduveli The higher the ratio the higher the efficiency of marketing system The ratio which was higher for Kacholam indicated that the economic efficiency of marketing of Kacholam was more when compared to Koduveli

Table 5 25 Marketing margins and cost in (Rupees per kilogram) for Kacholam and Koduveli in Thrissur market

Sl No	Shares	Kacholam	Percentage	Koduveli	Percentage
1	Producers sale price or price paid by the dealer	70 00	97 30	21 00	87 50
2	Transportation cost incurred by the producer	1 00	1 33	1 00	4 16
3	Net price received by the producer	69 00	95 83	20 00	83 30
4	Fixed cost on investment for the dealer	0 50	0 60	0 50	2 08
5	Working cost of the dealer	0 25	0 30	0 25	1 04
6	Dealers net margin	1 25	1 74	2 25	9 37
7	Price received by the dealer or price paid by Ayurvedic medicine manufacturer	72 00	100	24 00	100

Thus we can conclude that the efficiency of marketing of two medicinal plants to Kacholam and Koduveli in Thrissur market was high This is the reason why the producers get remunerative prices for their produce

5 5 3 Economic importance of Kacholam

Medicmal properties of kacholam (*Kaempferia galanga*) have been described by many workers The herb is used as a flavouring for rice Rhizomes and leaves are employed as a perfume in hair washes powders and other cosmetics They are used by women for fragrance and also used for protecting cloths against insects They are also eaten along with betel as a masticatory (Burkill 1935 and Quisumbing 1951)

The rhizome is used as a stimulant expectorant carminative and diuretic They are used in the preparations of gargle They are administered with honey in coughs and pectoral affections In Philippines a decoction of rhizome is used for dyspepsia headache and malaria It cures skin or cutaneous disorders piles oedema fever epilepsy splenic disorders asthma and disease caused by mobility of vatha and kapha Boiled in oil the rhizomes are applied externally to remove nasal obstructions It is used in hair washes because of its antidandruff property and also used for relieving irritation produced by stinging caterpillars Mixed with oil rhizomes are used as a cicatricant Roasted rhizomes are applied hot for rheumatism and for hastening the ripening of inflamatory tumours Kachuradi thailam Kachuradi choornam are some of the ayurvedic preparations of Kacholam It is an ingredient of some of the general tonics like Chyavanaprasam and Dasamoolarishtam

Plate 3 Dried rhizome

Plate 4 Koduveli plant roots

The leaves are used in lotions and poultrices for sore eye sore throat swelling rheumatism and fevers (Kirthikar and Basu 1935 Burkill 1935 Brown 1941 and Quisumbing 1951) Recently larvicidal and anticancerous principles have been obtained from the rhizome extract of *K galanga* L (Kiuchi *et al* 1988) The hot water extract of *Kaempferia* rhizome showed strong larvicidal activity against the larvae of dog round worm *Toxocara canis* (Kiuchi *et al* 1988)

Steam distillation of rhizome yield 2 4 4 per cent volatile oil This oil is utilized in the manufacture of perfumes and curry flavourings Recently enquiry for the purchase of oil has come from France and UK for the manufacture of high quality perfumes

The Pharmaceutical Corporation Kerala Ltd (Oushadi) alone need 7 5 tonnes of dried rhizome per year for the preparation of ayurvedic medicines The projected requirement of dried rhizome in Kerala for the major ayurvedic medicine manufacturing industries is 145 tonnes per year

5 5 4 Economic Importance of Koduveli

The synonyms of fire like agnih vahnih etc attributed to this plant indicate the very caustic (burning) action of the root causing blisters on the skin The plant root is used only after adequate curing and purification

The roots are digestive stimulants and aid digestion The roots of plant contain an acrid crystalline principle called plumbagin upto the extent of 0 9 per cent It is pungent astringent diuretic germicidal vescicant and abortifacient It is used in the treatment of early cases of chronic skin diseases (like leucoderma) in the

treatment of baldness and for lowering blood pressure It overcomes flatulence oedema piles cough worms diseases due to vata and kapha predominance and haemorrhoidal and inflammation and colic It also cures enlargement of the abdomen anaemia diabetes leprosy diarrhoea dyspepsia anasarca and elephantiasis Root is the official part and it enters into the composition of preparations like *Citrakasavam Dasamularistam Gulgulutiktakam kasayam Yogarajachoornam* etc (Sivarajan and Indira Balachandran 1994)

Apart from its medicinal and antimicrobial properties plumbagin can also be used as preservative for non alcoholic drinks and wine

5 6 Problems encountered in medicinal plant cultivation

Medicmal plant growers are facing many difficulties both in the production and marketing front Here an attempt is made to analyse the major problems of medicinal plant cultivation

Medicmal plants are mostly cultivated by small and marginal farmers Poor to negligible extension and development services lack of seed production/planting material supply absence of demonstration farms herbal gardens unorganised trade poor banking support for processing the produce high post harvest losses in quality and potency and non existence of analytical facilities for produce as a service to farmers are the main constraints which do not allow growth and extension of cultivation of medicmal plants

Compared to other crops the area under medicmal plants is less Information about nursery techniques and package of practices on medicmal plants is not available So farmers in general lack scientific knowledge regarding technology

of cultivation All these in addition to poor to negligible extension and development services are problems in medicinal plant cultivation

Non availability of planting material in sufficient quantities is another problem in medicinal plant cultivation Now the source of supply is limited to Kerala Agricultural University Krishibhavans and Government farms

Most of the farmers are unaware of medicinal plants cultivation and its use and absence of demonstration plots and herbal garden adds to their ignorance

High post harvest losses in quality and potency caused by unscientific processing and storage techniques is also a problem m medicmal plant cultivation So the need for semi processing units for bulk requiring medicinal plants have to be started in growing centres Lack of good storage structures forces the producers to sell their produce immediately after harvest resulting in lower prices to their produce

Unorganised trade is observed in medicmal plants marketing This is because unlike food crop this group of plants have only a single buyer the ayurvedic medicine manufacturers So large scale cultivation of medicmal plants can be attempted only with the condition that the produce will be purchased by the industry at a cost which is above the cost of production The large scale cultivation of medicinal plants need to be undertaken only around major ayurvedic medicme manufacturing units with buy back arrangement

Poor banking support for processing the produce is also a problem for medicinal plant cultivation

Remedial measures taken by the Government

During the VIII plan period Government of India has accorded sanction to organise the cultivation of medicmal plants by establishing herbal gardens with special attention to rare plants species setting up of progeny gardens and nursery centre for production and distribution of quality planting materials To create awareness among the farming community on medicmal plants and for educating the farmers Government gave sanction for establishing field demonstration plots and modern processmg centres

Summary

CHAPTER VI

SUMMARY

The present study on the production and marketing of selected medicinal plants namely Kacholam and Koduveh in Thrissur district was undertaken during the year 1994 95 The study aimed at estimation of cost of cultivation cost of production analyse the market structure identity various uses to which these medicinal plants are put and to examine the problems encountered in cultivation and marketing of medicinal plants

The study is based on a sample of 120 farmers sixty each from Kacholam and Koduveli cultivators Multistage random sampling was adopted for selection of farmers with blocks as the primary unit panchayaths as secondary unit and individual farmers as utimate unit Data were collected by personal interview method with the aid of a well structured interview schedule Tabular analysis was used to estimate the per hectare cost of cultivation of Kacholam and Koduveli both input wise and operation wise Cobb Douglas production function was used to find out resource use efficiency of important input variables

Total cost incurred for Kacholam cultivation was Rs 75 609 30 and for Koduveli cultivation it was Rs 56 550 59 on per hectare basis Operation wise seeds and sowing was the most important item of expenditure in Kacholam and it accounted for 44 93 per cent of the total cost (31 696 63) In Koduveli cultivation weeding was the important item of expenditure which accounted for 11 51 per cent

of total cost (Rs 6506 57) Next major item of expenditure was on after cultivation operations for Kacholam which accounted 14 36 per cent of total cost (Rs 3294 84) and in Koduveli it was manures and manuring which accounted for 11 51 per cent of total cost (Rs 5742 90)

Input wise analysis of total cost of Kacholam revealed that seed material was the single major input accounting for 39 59 per cent of total cost This was followed by rental value on land Human labour accounted for only 15 24 per cent of total cost In Koduveli cultivation land rent was the major item of expenditure (44 21 per cent) Contrary to Kacholam cultivation human labour wages was accounted for 41 30 per cent of total expenses The cost of planting material was only 1 47 per cent

The total cost of cultivation on per hectare basis calculated on various cost concepts revealed that costs were higher for Kacholam than Koduveli cultivation The cost A_1 cost A_2 cost B_1 cost B_2 cost C_1 and cost C_2 for Kacholam were Rs 49 332 5 Rs 49 332 5 Rs 50 609 30 Rs 75 609 30 and Rs 75 609 00 respectively where as the corresponding figures for Koduveli were Rs 26 678 09 Rs 26 678 09 Rs 27 534 09 Rs 52 534 09 Rs 31 549 59 and Rs 56 550 59

The average per hectare yield in kilogram of Kacholam was 1862 9 kg and the same for Koduveli cultivation was 6476 3 kg Net income was Rs 1 30 400 69 for Kacholam and for Koduveli it was Rs 1 36 003 69

The income measures in relation to different cost concepts in Koduveli cultivation such as gross income farm business income net income at cost C_1 net

income at C_2 and farm investment income were Rs 1 30 400 69 Rs 81 068 19 Rs 81 668 19 Rs 54 791 39 Rs 79 791 39 Rs 54 791 39 and Rs 81 068 19 respectively for Kacholam and Rs 1 36 003 69 Rs 1 09 325 6 Rs 1 09 325 6 Rs 83 469 6 Rs 1 04 454 1 Rs 1 79 452 8 and Rs 1 05 310 1

Benefit cost ratio for Kacholam based on costs A_1 A_2 B_1 B_2 C_1 and C_2 were 2 62 2 62 2 55 1 71 2 55 and 1 71 respectively were as corresponding figures for Koduveli were 5 10 5 10 4 90 2 59 6 3 and 2 40 respectively

Production function analysis was also done for Kacholam and Koduveli crops separately Area in cents seeds/planting material manures and human labour were taken as the mdependent variables for analysis The independent variables in the functions could explain 73 8 per cent of the variation in the out put of Kacholam and 97 8 per cent variation in Koduveli Functional analysis has revealed that the major determinant of variables in gross income are acrage and seed cost

The sum of elasticities of the production function for Kacholam (1 05) and for Koduveli (1 02) was equal to one indicating constant returns to scale

The study on marketing aspects of the crops revealed that medicmal plant cultivators of Thrissur district in general take their produce either to Thrissur market or to the ayurvedic medicme manufacturing centres Out of the total sample farmers 57 5 per cent sold their produce to dealers 29 2 per cent sold their produce through Amrutha and 13 3 per cent sold their produce to ayurvedic medicme manufacturers

In case of Kacholam out of Rs 72 per kilogram paid by manufacturers Rs 70 (97 3 per cent) went to producer seller and in the case of Koduveli producer

share was Rs 21 per kilogram (87 5 per cent) out of Rs 24 per kilogram paid by Ayurvedic medicme manufacturers The producers net share on dealers rupee was Rs 20 per kilogram (83 3 per cent) for Koduveli and Rs 69 per kilogram (95 83 per cent) for Kacholam

The index of marketing efficiency was 11 5 for kacholam and 7 for koduveli The higher the ratio higher is the economic efficiency of marketing system Thus the marketing efficiency was more for kacholam compared to koduveli

Poor to negligible extension and development services lack of seed production/planting material supply absence of demonstration farms herbal gardens unorganised trade poor banking support for processing the produce high post harvest losses m quality and potency and non existence of analytical facilities for produce as a service to farmers are the main constraints of medicinal plants cultivation

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APPENDIX

PRODUCTION AND MARKETING OF SELECTED MEDICINAL PLANTS IN THRISSUR DISTRICT

Date of interview

1 Identification

1 1 Name of the Village

1 2 Name of the Panchayat

1 3 Name of the Block

1 4 Name of the farmer

1 5 Address

1 6 Actual or approximate location of the house

1 7 Name of the nearest market where the produce is sold

1 8 Distance to that nearest

2 Code No

3 Family size and composition

Name	Sex	Relation to the head of the house hold	Age	Literacy	Occupation		Annual income	
					Main	Sub	Other	MSO
1								
2								
3								
4								
5								
6								
7								
8								

4 Fixed assets

4 1 Particulars of land holding (in cents)

Sl No	Particulars	Total	Wet	Garden	Dry	Others
1 i	Area of owned					
ii	Area leased in					
iii	Area leased out					
iv	Operational area (1+2) 3					
2 i	Value of own land					
ii	Rent of leased out land					
iii	Rent of leased in land					
3 i	Land tax					
ii	Water tax					
iii	Panchayat tax					
iv	Income tax					
v	Others					

4 2 Implements and machineries

Sl No	Particulars	No	Value in Rs	Expected life	Maintenance cost Rs
	Implements				
1	Ploughs Wooden				
	Iron				
2	Sprayers				
3	Dusters				
4	Mammatties				
5	Crowbars				
6	Sickles				
7	Spades				
8	Pickaxe				
9	Carts				
10	Others				

Machineries

Sl No	Particulars	No	Value in Rs	Expected life	Maintenance cost Rs
1					
2					
3					
4					
5					
6					
7					

--

4 3 Temporary Dead Stock

Item	No	Value Rs	Expected life
1 Baskets			
2 Bags			
3 Muram			
4 Others			

5 Cropping pattern

Name of crop	Season	Area in cents		No of fragments
		Total area	Irrigated area	
Paddy				
Vegetables				
Rubber				
Coconut				
Medicinal plants				
Other perennial crop				
Annual crops				

Cost of cultivation of medicinal plants (including harvesting)

Name of the medicinal plant | Variety | Area in cents

Details of operation	Materials used			Labour used														
				Family labour									Hired labour					
				Male			Female			Child			Male			Female			Child		
	Name	Qty	Value	No	Hrs	Cost	No	Hrs	Cost	No	Hrs	Cost	No	Hrs	Cost	No	Hrs	Cost	No	Hrs	Cost

Particulars of sales

Details of harvest	Total Qty	Actual or approximate date	Mode of sale (in percentage)				Price received per quintal			
			Sale to pre harvest contractor	Sale to Village traders	Sale at the market	Others	Pre harvest contractors	Village traders	Sales in market	Others

MARKETING ASPECTS AT THE PRODUCER S LEVEL

1 Total quantity produced

2 Total quantity kept for seed purpose

3 Quantity used for processing

4 Quantity deteriorated during processing

5 Method of sale

Sl No	Method of sale	Quantity	Price Rs
1	Pre harvest contract		
2	Village merchant		
3	Direct sale to retail		
4	Sales in wholesale market		
5	Others (specify)		

6 Cost of marketing per (quintal)

7 Cost incurred by the farmer from farm to market

a) Preparation for market

b) Loading and unloading

c) Transport

i Mode of transport
ii Distance from the market
iii Transport/unit trip
iv Total charges

d) Cleaning and grading charges

8 Cost incurred by the farmer at the market

a Commission
b Brokerage
c Taxes

INTERMEDIARIES

1 Type of intermediary

2 Name and address

3 Type of medicinal plant handled

4 Fixed costs

Sl No	Particulars	Amount per month	Present value Rs	Depreciation
1	Rent			
2	Furniture used			
3	Permanent staff			
4	Licence fee			
5	Other items specify			

5 Working cost

Sl No	Particulars	Expenditure (Rs)
1	Casual labour charges	
	1 Wages paid	
	2 Pre requisites if any	
2	Electricity/month	
3	Water charges/month	
4	Taxes	
	1 Sales tax	
	2 Income tax	
	3 Local tax	
	4 Professional tax	

ECONOMICS OF PRODUCTION AND MARKETING OF SELECTED MEDICINAL PLANTS IN THRISSUR DISTRICT

BY

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ABSTRACT OF THE THESIS

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ABSTRACT

The present investigation on the production and marketing of selected medicinal plants (Kacholam and Koduveli) in Thrissur district was undertaken during the year 1994 1995 The study aimed at estimating the cost of cultivation cost of production benefit cost ratio study the market structure and look into to the various uses to which these medicinal plants are put and the problems encountered in medicinal plants cultivation

Multi stage random sampling design was adopted for the study

The largest single item of input was human labour in Koduveli and seeds in Kacholam Cost A_1 Cost A_2 Cost B_1 Cost B_2 Cost C_1 and Cost C_2 per hectare were Rs 26 678 09 Rs 26 678 09 Rs 27 534 09 Rs 27 534 09 Rs 52 534 09 Rs 31 549 59 and Rs 56 550 59 respectively for Koduveli and Rs 49 332 5 Rs 49 332 5 Rs 50 609 30 Rs 75 609 30 Rs 50 609 30 and Rs 75 609 30 respectively for Kacholam

The income measures in relation to different cost concepts in medicinal plants cultivation such as gross income farm business income family labour in come net income at Cost C_1 and Cost C_2 and were Rs 130400 69 Rs 81068 19 Rs 54791 39 Rs 79791 39 and Rs 54791 39 for Kacholam and Rs 136003 69 Rs 109325 6 Rs 83469 6 Rs 104454 1 and Rs 79452 8 respectively for Koduveli

Input output ratio based on Cost A_1 Cost A_2 Cost B_1 Cost B_2, Cost C_1 and Cost C_2 were Rs 2 62 Rs 2 62 Rs 2 55 Rs 1 71 Rs 2 55 and Rs 1 71 for

Kacholam and Rs 5 10 Rs 5 10 Rs 4 90 Rs 2 59 Rs 4 30 and Rs 2 40 for Koduveli respectively

The average per hectare yield in the district for Kacholam was 1862 9 kilogram (dried) and for Koduveli 6476 3 kilogram (green)

Production function analysis done separately for the two medicinal plants revealed that area and seeds towards gross income were found to have positive effect on gross income The sum of elasticities of production function for Kacholam (1 0862) and for Koduveli were (1 0228) respectively which indicated constant returns to scale

The major marketing channels identified in Thrissur market for marketing of medicinal plants was Producer dealer manufacturer The producers net share on dealer rupee was Rs 69 per kilogram (92 per cent) for Kacholam and Rs 20 per kilogram (83 3 per cent) for Koduveli The index of marketing efficiency was 11 5 for Kacholam and 7 for Koduveli The analysis of marketing efficiency revealed that the efficiency of marketing of Kacholam was higher when compared to Koduveli

Non availability of good materials in sufficient quantities unawareness of farmers about their cultivation high post harvest losses and unorganised trade are the main constraints encountered in medicinal plant cultivation