ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF CASHEW NUT IN KERALA

By

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THESIS

Submitted in partial fulfilment of the requirement for the degree of

Master of Science in Agriculture

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Faculty of Agriculture

Kerala Agricultural University

Department of Agricultural Economics

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VELLANIKKARA, THRISSUR 680 656

KERALA, INDIA

2001

DECLARATION

I hereby declare that this thesis entitled **'Economic analysis of production and marketing of cashew nut in Kerala'** 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 fellowship or other similar title of any other University or Society

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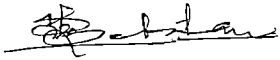

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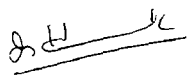

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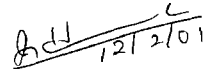

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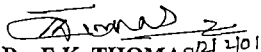

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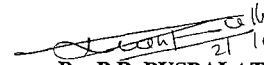

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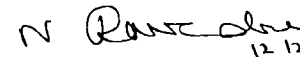

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Dedicated to
the fond memory
of my beloved mother

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SHIBU SEBASTIAN

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Introduction

1 INTRODUCTION

Cashew (*Anacardium occidentale* L) a native of eastern Brazil was introduced to India by the Portugese about five centuries ago In the early years t was only a crop for afforestation and soil conservation In fact only from the early part of the previous century its commercial value for export and foreign exchange earnings was realised The cashew tree is hardy and drought resistant thriv ng in a variety of soil and climatic conditions

The cashew kernels are used in confectionery and dessert It s a versatile nut with many health advantages It is a zero cholesterol nut as 82 per cent of the fat content in cashew is unsaturated fatty acids It has 21 per cent proteins and 22 per cent carbohydrates with a right combination of am no acids minerals and vitamins and is nutritionally on par with milk egg and meat w thout the disadvantages of the food of animal origin (Nayar 2000) The shells contain a high quality oil known as cashew nut shell liquid (CNSL) which has got wide industrial uses Cashew apples can be distilled to produce alcoholic drinks (Fenni)

The major cashew growing countries in the world include India Brazil Vietnam Indonesia and several African countries such as Tanzania Mozambique Ivory coast etc In the global scenario India accounts for 51 11 per cent of the total production followed by Brazil (17 78 per cent) Tanzania (8 89 per cent) and Vietnam (7 78 per cent) Cashew kernels are one of the most important item of international trade In the global market India s share is 65 5 per cent followed by Brazil with 15 per cent The major consumers of Indian cashew kernels are U S A (37 per cent) Netherlands (24 per cent) Japan (8 per cent) UK (6 pe cent) Australia (4 per cent) and the U A E (3 per cent) For tl e rest of the countries like Singapore Germany and others Indian exports is below 2 per cent (Directorate of Cashew nut and Cocoa Development 2000)

Cashew cultivation in India confines mainly to the peninsular area It is grown in Kerala Karnataka Goa and Maharashtra along the west coast and Tamil Nadu Andhra Pradesh Orissa and West Bengal along the east coast To a limited extent Madhyapradesh Manipur Tripura Meghalaya and the Andaman and Nicobar islands also take part in the cultivation and production of cashew With regard to area Kerala ranks first with 1 22 000 ha closely followed by Maharashtra with 1 21 000 ha Regarding production of raw nut Maharashtra which ranks second in respect of area is the largest producer with 1 25 lakh MT contributing 24 04 per cent of the national production Kerala and Andhra Pradesh which occupy the first and third position in respect of area are the second largest producer with 1 lakh MT contributing 19 23 per cent of total production In the case of productivity Maharashtra ranks first (1470 kg/ha) followed by Andhra Pradesh (1100 kg/ha) West Bengal ranks third (900 kg/ha) and Kerala ranks only fourth with a productivity of 850 kg/ha (Directorate of Cashew nut and Cocoa Development 1999)

The Indian cashew industry mainly centred in southern Kerala Mangalore region of Karnataka and the Kanyakumari district of Tamil Nadu has an installed processing capacity of about 10 lakh tonnes The record productio n of raw cashew nut at 5 2 lakh tonnes obtained from an area of 6 86 lakh ha during 1999 2000 could barely meet 50 per cent of the demand of about 825 cashew processing unit in the country (Economic Survey 2000 2001) This shows that the production of raw cashew nuts is far below the demand of the processing sector and necessitated the import of raw nuts from African and South Asian countries The availability of raw cashew nuts from imported sources is likely to su ffer drastically in the years to come as more and more producing countries resort to the processing and export of cashew kernels International development agencies have recognized cashew cultivation and processing as an effective poverty alleviation measure in less developed and developing countries They are providing grants a d

loans to the countries in Africa and South East Asia for the development of cashew industry The development of cashew processing in these countries is bound to affect the availability of raw nuts for import by India

Cashew processing is a labour intensive industry The Governments in various states have realised the potential for developing cashew not only as a major foreign exchange earner but as a vehicle for economic and social change More than 3 lakh persons are directly employed in cashew industry of whom 95 per cent are women from socially and economically backward communities in rural areas Any effort in increasing the production of raw cashew nuts in India would not only generate high levels of employment in farms and factories but also save foreign exchange outflow of at least Rs 700 crore per annum on raw nut imports

Thus the cashew industry in India has assumed a very important and vital role in building the national economy The efforts for the development of cashew in India was started with the establishment of the Directorate of Cashew nut Development in 1966 This marked the first step towards the integration and co ordination of cashew development in association with the development agencies of the state and research institutions Since the formation of the Directorate of Cashew nut Development the cashew development programmes got integrated into Five Year Plan activities The developmental projects were formulated implemented and monitored with the objective of increasing the area and production of cashew improving the marketing and pricing structure and exploitation of by product utilisation

As explained earlier Kerala has a predominant role in the cultivation of cashew in India Eventhough concerted efforts are being made to increase the production and productivity through research limited efforts have been made to study the economic aspects of production and marketing An investigation into the

supply aspects of the cashew industry in Kerala is also necessary because price is one of the most important determinants of the producers decision about planting output employment etc So an empirical understanding of the response of area and yield to price will be immensely useful in evolving suitable policies directed at better predictions of supply This is of utmost importance in a free economy where the price mechanism is allowed to operate as a balancing factor between s pply and demand It is perhaps even more important in our economy where the price mechanism is used deliberately as a method of directing production In fact we cannot without some estimates of the elasticity of supply make any judgement about the effects of price on supply of a particular commodity Hence some knowledge of supply response is essential to a rational discussion of agricultural problems

Marketing policies also play a crucial role in ensuring reasonable price to the producer thereby increasing the area under cashew to meet growing domestic demand of raw nuts In this context the present study is designed to evaluate the degree of response of the producers to price and non price factors and to analyse the economic aspects of production and marketing of cashew nut in the state The specific objectives of the study were

1) to examine the supply response of cashew nuts
2) to study the marketing channels and marketing margins and
3) to identify the constraints in cashew nut production and marketing in Kerala

1 1 Limitations of the study

A part of the study is based on the farm level data generated through interviewing farmers and traders Since the farmers do not maintain records on the cultivation practices adopted responses were drawn from their memory which may

be subjected to recall bias However every effort was made to minimise the errors by cross questioning and cross checking

1 2 Plan of work

This thesis consists of seven chapters including the present one A review of relevant literature is given in chapter two A brief description of the area of study is given in chapter three The fourth chapter deals with the materials and methods used in the study Results of the study are presented in chapter five while chapter six deals with discussion The summary of major findings of the study is given in the final chapter

Review of Literature

2 REVIEW OF LITERATURE

A comprehensive review of past studies is highly essential for proper understanding of the concepts research design and method of analysis of any research Hence a review of studies related to the objectives of the study is presented in this chapter For the purpose of convenience and clarity this chapter is divided into three sections as given below

2 1 Growth rate studies

2 2 Supply response studies

2 3 Production and marketing studies

2 1 Growth rate studies

Chatterji (1966) in a study on agricultural growth in India during 1950 1963 opined that linear trend fitting is the most appropriate tool to measure agricultural growth which would avoid any effect due to seasonal and cyclical variations He used linear model to estimate the growth rates of important cereals pulses and non food crops

Rath (1980) in his study on growth of agricultural production in India during 1955 to 1978 examined the performance of agricultural production using exponential function and found that agricultural production had not exceeded three per cent rate of growth and cereal production had not reached 3 5 per cent growth

Lal and Singh (1981) examined the trends in area production and productivity of sugarcane in Uttar Pradesh during the period 1950 51 to 1974 75 Growth rates were estimated by taking time as the independent variable and index numbers of area production and productivity as dependant variable Exponential function was fitted to estimate growth rates The study found that area production

and productivity of sugarcane in different regions increased significantly over the years

Sawant (1983) investigated the hypothesis of deceleration in Indian agriculture by examining the growth of major food grain and nonfood grain crops for the post independent period The compound growth rates were worked out by employing exponential function In order to confirm the emergence of either acceleration or deceleration in growth in different periods a quadratic equation of the form $\log y = a + bt + ct^2$ was also fitted to the data

Boyce (1986) developed a kinked exponential model and suggested that these provide a better basis than conventional estimates for inter temporal and cross sectional growth rate comparison He used this model to compare the estimates of agricultural output growth rates in Bangladesh and West Bengal before and after the advent of the new seed fertilizer technology in the mid 1960s

In their study on the agricultural performance in Kerala during the period 1962 63 to 1985 86 Kannan and Pushpangadan (1988) used second degree exponential function and kinked exponential function to find out the growth rates of area production and productivity of important crops They found that agricultural sector in Kerala showed stagnat on in production during the study period

Salam *et al* (1992) analysed the trend in the area production and productivity of cashew in the state of Kerala during the period 1961 62 to 1987 88 The study revealed that the area under cashew increased rapidly from 1975 76 to 1983 84 and declined thereafter The productivity showed a declining trend in the late seventies and eighties The cashew production in the state showed a steady increase from 1962 to 1975 after which there was a declining trend The study also

identified lack of sufficient clonal planting materials of improved genotype and pests like tea mosquito and stem borer as the major constraints in production

An attempt was made by Jeromi and Ramanathan (1993) to examine the growth and instability of world pepper market during the period 1975 to 1990 and the export performance of Indian pepper in terms of growth direction competitive position and terms of trade To estimate decade wise growth rate kinked exponential function was used The study revealed that though India s export performance has substantially improved during the first half of eighties it started declining since 1987 88 The direction of India s export showed that the share of the market economies has declined over the year and that of non market economies has increased

Grover *et al* (1996) made an attempt to study the performance of agro processing industries in Haryana state during the period 1966 67 to 1994 95 in terms of production and employment creation The compound growth rates of production (in value terms) employment (in number of persons) and capital outlay (government aid and loans) were worked out The growth rates of production employment and capital have been significantly positive in almost all the agro industries The study revealed that agro industrialisation was a viable proposition to increase employment in the state of Haryana

In their effort to examine the present status and future prospects of export of rice from India Shende *et al* (1998) examined the trend in production export and import of rice in the country Compound growth rates were calculated by fitting the exponential function to production quantity and values of export as well as import in respect of India and world The growth rates of rice production in India and world were almost the same and highly significant at one per cent level

The study concluded that the rice export is expected to rise very significantly by AD 2010

2 2 Supply response studies

The studies relating to supply response of crops have been presented in two subsections viz supply response of annual crops and perennial crops

2 2 1 Supply response studies of annual crops

In one of his pioneering works Nerlove (1956) estimated the supply response of cotton wheat and maize in the United States over the period 1909 1932 The role that farmers expectations of future relative price played in shaping their decisions as to how many acres to be devoted to each crop was analysed The basic expectation model in linear form was extended to include a trend variable and thus the final estimating equation included lagged prices and lagged area The price elasticities were found to be positive and significant

The price response of major crops in pre partition Punjab during the period 1914 1945 was estimated by Rajkrishna (1963) In addition to the relative price he used three shifter variables The elasticities for cotton and maize were positive and comparable with those of the United States All crops except jowar showed positive and significant responses The coefficients ranged from 0 1 to 0 2 in case of wheat and bajra 0 2 to 0 4 in case of maize and sugarcane and 0 6 to 0 7 in case of cotton The corresponding long term elasticities ranged from 0 15 to 0 16

Dantwala (1967) examined the trend in production and prices of agricultural commodities and inputs for the first three five year plan periods In spite of a rising trend in prices absolutely as well as in relation to non agricultural prices the increase in production lagged behind the demand He concluded that

prices alone cannot increase production and it is the technology that increases the production

The impact of price changes on farmers decisions to allocate land under two different crops viz wheat and gram in Punjab was measured by Sud and Kahlon (1969) The study revealed that for the state as a whole the response of wheat acreage to price was significant with an elasticity of 0 898 while the price of gram on wheat acreage was insignificant In the case of gram the coefficient of yield per acre was significant but the coefficient of price of the competing crop (wheat) was negative and insignificant indicating that as the price of wheat increased acreage under gram declined

Maji *et al* (1971) studied the supply response of three major cereals grown in Punjab over the period 1948 1965 using a variant of the Nerlovian area adjustment model with an explicit measure of risk in the form of standard deviation of prices over the last three preceding production periods as one of the explanatory variables Other determinants were harvest prices both relative and absolute relative yield and a trend variable The estimates obtained were positive and significant for all crops

In a detailed multi crop study for Tamil Nadu supply of food crops such as rice ragi and sorghum and cash crops such as cotton groundnut sesamum and sugarcane over the period 1947 65 was analysed The adjustment lag model was of the Nerlovian type expressed in logarithms in which lagged relative price lagged yield and acreage of the crops and the competing crop and the rainfall index were the independent variables considered The price coefficients estimated turned out statistically significant in the supply of all crops except rice Further price elasticities were high when both the crop considered and competing crops came from the commercial crop group and low when both were from the cereal gro p

For groundnut yield was found to be most important factor influencing acreage while for sesamum relative price was found more important than yield in its influence on acreage (Madhavan 1972)

Cummins (1975) estimated the supply elasticities of Indian farmers in the post independence period using Nerlovian model He covered cereals like rice wheat and barley oil seed crops like groundnut sesamum and mustard and cash crops like jute cotton and tobacco Positive elasticities were obtained for four largest rice states like West Bengal Andhra Pradesh Tamil Nadu and Assam For wheat the state level elasticities were positive but insignificant in Punjab and Rajasthan While barley showed positive response the response was negative for cotton in Assam and Southern regions including Tamil Nadu

The responsiveness of Haryana farmers to change in price over the period 1960 73 with respect to the important crops of the state viz wheat rice and bajra was examined Nerlovian lagged adjustment model was used for the study Lagged yield lagged price average rainfall during the pre sowing season one year lagged irrigated area and a trend variable were the determinants selected for the study Of the two types of function considered viz linear and logarithmic the latter was the better specification The analysis also revealed that the farmers in the study area were responsive to the changes in relative prices yield price variability and yield variability (Singh and Kumar 1976)

Jhala (1979) analysed the inter regional behaviour in groundnut supply response during the period 1951 1971 using Nerlovian lagged adjustment model Relative prices of groundnut average yield of groundnut and competing crops and rainfall in sowing period were the variables selected Lagged acreage was significant in most cases indicating very slow adjustment on the part of farmers The coefficient of yield variable was positive and significant in most cases while

that of competing crops showed mixed pattern and most were not significant Negative price response was noted for nearly half the acreage under groundnut in India In such cases the coefficient of rainfall during sowing period turned out positive and significant suggesting that in regions of highly uncertain rainfall weather during sowing period seemed to dominate decision making rather than the price factor

The short run and long run elasticities in hectareage allocation under a crop for major staple food (wheat and rice) in Allahabad district over the period 1961 62 to 1977 78 was examined by Kumar and Srivastava (1982) The model included current planted area under the crop as the dependent variable and one year lagged area price yield pre sowing/sowing period rainfall competing crops price and price variability as the dependent variables The variables which affected significantly on the supply were pre sowing rainfall and lagged per hectare yield in the case of wheat and sowing period rainfall for rice

The impact of price variability in acreage allocation of five important crops of Kerala viz rice tapioca coconut pepper and cashew nut over a period of 30 years starting from the year 1952 53 was analysed using Nerlovian model Lagged area and farm price were taken as the independent variable The values of the Nerlovian coefficient of adjustment for the five crops were comparatively low and nearer to zero indicating that in general farmers in Kerala were less responsive to price fluctuations and were slow in adjusting their acreage according to expectations (Prabhakaran 1987)

Sidh i and Sidhu (1988) exam ned the changes in the composition and growth of commercial crops like cotton sugarcane oil seeds and potato in Punjab and factors responsible for determining the area under these crops The study revealed that the importance of commercial crops such as cotton oil seeds

sugarcane and potato has diminished over time Paddy and wheat have emerged as major commercial crops in Punjab due to the introduction of new seed irrigation fertiliser technology supported by remunerative pricing policy In spite of relative improvements in prices and yield the area under these crops declined and it has become an economically inferior one In all other traditional commercial crops relative price and price stability were the most important factors that influence the area under these crops

The impact of relative prices and other related variables on tur acreage was analysed by Sarup and Pandey (1990) They estimated short run and long run elasticities of tur acreage response to relative prices Nerlovian adjustment lag model was utilised for analysis The study revealed that the impact of price on acreage response of tur was too weak It was further observed that the magnitude of responsiveness of farmers has varied from state to state The low values of short run elasticities and high value of long run elasticities indicated the long time period required to realise the price effect

The supply response of banana in Kerala over the period 1970 to 1987 in terms of area and yield was worked out using Nerlovian adjustment lagged models in linear and double log forms The study revealed that the regression coefficients and their level of significance were found to be superior in linear model over the double log model It was also found that the price risk variable measured as the standard deviation of prices over the last three production period was found to be positive and significant while the absolute price and the rainfall during planting periods did not exercise any significant influence on acreage allocation of this crop (Indiradevi *et al* 1990)

Chandrabhanu (1991) analysed the supply response of sesamum and groundnut both at district and state levels using the time series data over the period

1961 62 to 1987 88 Supply response in terms of area and yield was studied using Nerlovian lagged adjustment model Response of aggregate sesamum area to price appeared positive though not significant However non price factors like pre sowing rainfall and lagged yield seemed to exert a strong influence on aggregate acreage There was no significant relationship between area and price movements

An analysis of the growth and output response of tapioca in Kerala during the period 1960 61 to 1986 87 by Thomas *et al* (1991) revealed that though the growth rate of area was negative the positive growth rate in productivity had offset the negative impact of area Area and yield models were developed separately on the basis of Nerlovian lagged adjustment model The study concluded that the acreage under tapioca was determined primarily by price in sixties Since then competing crops like natural rubber has assumed more importance among tapioca cultivators and its highly remunerative price had an adverse effect on the area allocated under tapioca

Janaiah *et al* (1992) assessed the area response of selected commercial crops viz cotton sugarcane and tobacco for selected regions of Andhrapradesh The study revealed that a remunerative price favoured more area allocation under the crops Price of competing crops also showed the desired sign

The influence of price and non price factors on the yield of groundnut in the selected districts of Karnataka was examined by Dixit *et al* (1993) They evaluated the short run and long run elasticities of yield with reference to price and non price factors The analysis revealed that relative price had positive and significant influence on the yield of groundnut in almost all districts The deviation of absolute rainfall from its normal level showed its negative influence on productivity in most of the cases The price of fertilisers showed its inverse influence on groundnut yields in many districts

The impact of both price and non price factors on supply (acreage) of edible oil seeds in the major growing states in the country on selected oil seeds viz groundnut rape seed and mustard was analysed For each state the Nerlovian adjustment lag supply response model excluding and including risk variables were estimated considering one competing crop at a time The results of the study revealed that supply price relationships of oil seeds was positive but weak in most of the states The farmers supply response to risk caused by price as well as yield of oil seeds and their competing crops was very weak in most of the cases (Singh and Lal 1993)

The impact of minimum support price while making decisions about acreage allocation to paddy crop in India was examined by Singh and Singh (1998) The analysis was based on the time series data on area price and yield from 1971 72 to 1994 95 Nerlovian adjustment model was used for the estimation The results indicated that the productivity did exercise a significant influence on acreage allocation of paddy crop in the country Minimum support price did not emerge significant in making decision for allocation of acreage under paddy

Ramaswami *et al* (1999) examined the supply response of cane producer to price and non price factors and discerned out the decision process relating to allocation of cane between jaggery and white sugar production by Tamil Nadu farmers The short run and long run elasticities were estimated as 0 7424 and 1 089 The study concluded that the price could be a useful policy instrument to manage s igar production

2 2 2 Supply response studies Perennial crops

The earliest work on supply response of perennials to price changes dates back to 1949 when Ady analysed the data on cocoa for the period 1920 1940

in Ghana She hypothesised that planting in any one year is determined by price of cocoa deflated by the price index of imported consumer goods The form of relationship established was log linear and the elasticity estimated was 0 36 When climatic factors were included in the model the short run price elasticity declined considerably thereby indicating the dominant role of climatic factors influencing the production of cocoa

Chan (1963) studied the supply response of natural rubber in Malaysia over the period 1948 1961 Output in any one year was postulated as a linear function of prices age composition of trees mature acreage and a trend variable The analysis was carried out separately for the estate and small holdings using annual and monthly data The annual data showed that the price elasticity of output for the estates was negative but insignificant while that of small holdings was positive and significant The short run elasticities estimated for the monthly data were insignificant in case of the estates while that for the small holdings was positive and significant

Bateman (1965) developed an improved model for estimating an aggregate and regional supply function for cocoa in Ghana He postulated that the area planted in any year t was a function of the mean value of the discounted future prices of cocoa and coffee that the farmer expects to prevail The price expectations were assumed to follow Nerlovian adjustment model The study covered five main cocoa growing regions of Ghana The results showed that the elasticity was positive and significant for all the five regions

The impact of relative changes in price on the cropping pattern of Kerala during the decade 1952 53 to 1960 61 was analysed by George (1965) Paddy coconut sugarcane tapioca cashew and rubber which aggregately covered 73 per cent of the total cropped area were selected for the above analys s The

results showed that the cropping pattern had undergone a shift from food crops to cash crops during the reference period and that the acreage response to price has been positive in most cases He concluded that the increase in area under rubber and cashew was the result of a relative increase in their prices

The price response of Malayan rubber supply over the period 1953 1960 was examined using quarterly production data after eliminating seasonal and cyclical factors Output was the dependent variable and weighted average prices of RSS I and III grades deflated by an index of wage rates a trend variable and the ratio of inventories in the beginning of a year to sales were the explanatory variables In the case of small holdings output was assumed to be a function of deflated prices (deflator being the index of wages) of rubber and rice and the trend variable The results showed that the regression coefficient of deflated rubber price was significant and positive in the case of small holding while in the case of estates the price coefficient was insignificant (Stern 1965)

Ady (1968) studied the supply functions for coffee in Uganda and cocoa in Ghana and put forth a model using planted area as the dependent variable but somewhat different from the Bateman model The model explicitly took into account the perennial nature of cocoa and the change in the structure of price expectations She hypothesised that the actual output differed from the potent al output due to agronomic and economic factors A capital stock model was also developed in which the size of the existing stand of trees was assumed to be an important determinant to further planting The ordinary least square estimates of the above models showed positive response both for coffee in Uganda and cocoa in Nigeria But cocoa in Ghana showed strong inverse relationship between output and current prices

Nair (1970) studied the acreage response of important crops in Kerala for the period 1951 52 to 1968 69 Cashew gave a negative area response to price However in case of coconut acreage was found to be affected by the price significantly

French and Mathews (1971) developed a model to explain the new plantings replantings crop removals year to year changes in area and the yield relationships Basically the model postulated that the desired production in any one year is a function of the profitability expected out of it The model explicitly considered the lags in the production of perennials and the desired production relationship was converted into an area relationship The new plantings and replanting relationships were derived based on the premise that the farmers in the long run will adjust actual bearing area to the desired area The average yield was assumed to be a function of non bearing area and the trend variable The model thus developed was applied to the U S Asparagus industry in the three principal producing areas The results showed positive and significant response coefficients

An attempt to derive supply functions for Nigeria s main commodity exports cocoa palm oil palm kernels groundnut rubber and cotton was made by Olayide (1972) using ordinary least square regression The exponential function has been selected as the lead equation for each of the three models developed From the estimating equations price elasticities of supply have been calculated for each of the three models The coefficients showed that if the Commodity Marketing Board (CMB) pricing policies could be modified to allow world market prices to influence production higher responses will be obtained from commodity producers The study revealed that commodity producers rationally respond to better prices and like to increase supply if prices are good

In a study on supply response of rubber using several formulation of prices Ghoshal (1975) concluded that elasticities may be low because of technical conditions which prevent producers from increasing their production due to price changes and probably because producers are not profit maximisers His study revealed that producers do not respond to lagged price

Umadevi (1977) derived supply response functions for Indian natural rubber using the data over the period 1948 49 to 1972 73 Separate functions were used to estimate short run response with average yield output and monthly production as the dependant variables The short run elasticities estimated from the annual data ranged from 0 59 to 0 814 while that from the monthly data was 0 203 Long run elasticities were determined by the method of compound variables put forth by Fisher (1937) and stage least square method The Fisherian compound variable technique yielded long run elasticities ranging from 0 163 to 0 812 while those obtained from the SLS ranged from 0 176 to 1 04

The price responsiveness of Indian tea was studied by Chowdhary and Ram (1978) considering broadly three models They were (1) area as a function of the lagged acreage relative price and trend variable (2) industrial yield as a function of non bearing area relative price of last year rainfall and trend variable and (3) employment as a function of current relative price yield area under tea and trend variable An additional model for output was derived from area model and yield model The model considered here was similar to Bateman (1965) The study showed that tea planters respond to price not in terms of acreage but in terms of yield The employment of labourers was adversely affected by favourable price position and this perhaps occurred due to labour substituting mechanisation

Alston *et al* (1980) in their study of supply response of Australian orange growing industry observed that expected profitability of growing oranges

significantly influenced planting Price was not used as an explanatory variable in the yield model on the assumption that grower tended to standardise cultural practices thereby allowing for very little scope for yield to respond to changes in price

Prakash (1986) studied the supply response of coffee in India for the period 1960 61 to 1979 80 and found that coffee planters response to price in terms of area was non significant Yield response function showed that price significantly influenced the yield of Robusta coffee but not Arabica and total

Ipe (1986) developed estimates of supply response of natural rubber to price changes over the period 1953 54 to 1983 84 and analysed the structure and market performance of rubber market in Kerala The analysis showed that the response to one year lagged price was positive though not significant with an elasticity of 0 0468 In the case of long term supply response the response of new planted area to the expected price of rubber was positive with an elasticity of 0 5492

The acreage response behaviour of apple growers in Himachal Pradesh was studied using two types of multiple regression model i e linear and double log with different combinations of independent variable Last year s wholesale price simple average of last two years wholesale prices expected profitability parity prices and trend were the variables identified for the study The analysis revealed that apple growers in Himachal Pradesh are responsive to raw prices as has been noticed in the case of cash crops grown in other parts of the country (Nadda 1987)

Mini (1996) in her study on the time series modelling and forecasting the yield of cashew in Kerala worked out the major determinants of yield

variations in cashew and formulated a suitable model for forecasting cashew production She also worked out the estimates of short run and long run elasticity of area and yield

2 3 Production and marketing of cashew nut

A study on the marketing channels and price spread of the agricultural produce in India conducted by Sivaswamy (1949) revealed that the middlemen formed a control with the producers and sold the produce to wholesalers in big assembling centres In cashew nuts marketing village traders deducted 3 5 per cent of the weight as trade allowance The wholesalers sold through brokers to the factories The factory owners formed a group and sold to certain companies in the USA He suggested the need for exploring new markets to avoid monopsony and the formation of proper organisation for collection of nuts to reduce excessive merchandising charges

The report of the marketing survey on cashew nut in Kerala (1975) discussed the channels of distribution of rawnuts marketing margin processing costs etc Seventy five farmers were selected randomly with eight growers from each village Two round surveys were conducted and channels of distribution were identified with corresponding shares of different intermediaries The cultivators got the highest price in March and April during the peak season of the crop This type of paradoxical price level was noticed for rawnuts because dealers engaged in the collection of nuts rushed to the market to collect as much nuts as possible and consequently price increased Marketing margins and processing cost were also worked out Finally the report suggested the formation of growers cooperative societies to enhance the efficiency in marketing

In a study on marketing pattern practices and problems of cashew growers in Srikakulam district Balamohandas and Rao (1982) found that 77 per

cent of cashew growers sold their produce to village traders while the remaining 23 per cent sold the produce to processing units directly Two channels were identified viz Farmer village trader processing unit and Farmer processing units Marketing costs and margins in these channels have also been worked out The growers net share in the processing units total price was 95 22 per cent in the first and 96 53 per cent in channel II The margin of profit of the village trader was 1 58 per cent

Ipte and Borude (1982) studied the existing method of marketing of cashew nuts and worked out the economics of processing and estimated the costs of marketing processing marketing margin and price spread in Maharashtra Three channels were identified in the study The value added due to processing of raw nuts was 52 66 per cent

The market structure and marketing margin of cashew nuts in Kerala was analysed by Rajasekharan (1987) and the impact of changes in marketing organisation and structure on pricing efficiency was examined Multistage random sampling was adopted for the selection of samples Two panchayats from northern districts and one panchayat from southern districts were selected and a total of 72 farmers were interviewed Among the various marketing channels operating in each panchayat producer village merchant wholesaler processor was identified as the main channel Marketing costs marketing margin were also worked out The study revealed that the net share of producer was found to be 59 50 per cent of the total income of the processor The marketing margin ranged between 40 to 43 per cent in various channels identified Net profit of the processors averaged at 18 57 per cent of the total realization of the processor

Sivanatham *et al* (1990) estimated the cost of establishment and maintenance cost of local and improved varieties of cashew The study revealed

that the total labour cost for local variety accounted 50 72 per cent of the aggregate maintenance cost In improved variety it accounted 40 24 per cent For improved variety material cost contributed 51 88 per cent of the annual maintenance cost Gross return by the sale of nuts and apple were Rs 12110 and Rs 1515 per hectare respectively

Senthilnathan and Balamohan (1992) estimated the cost of cultivation and cash flow for one hectare of cashew plantation The study worked out establishment cost and annual maintenance cost separately and revealed that labour cost accounted 50 79 per cent of the aggregate maintenance cost The share of material cost was 38 68 per cent and other cost like depreciation interest etc contributed 10 6 per cent

In the economic analysis of cashew nut production in Prakasom district of Andhrapradesh Srinivas *et al* (1994) estimated the cost of maintenance per hectare of cashew The study revealed that the labour cost contributed 63 70 per cent of the aggregate maintenance cost while the material cost accounted 36 30 per cent

In a study on the marketing channels and price spread in marketing of cashew nuts in Dakshina Kannada district of Karnataka Ravi *et al* (1995) found that as many as six channels were used in marketing of raw cashew nut The pre harvest contractors village merchants commission agents and wholesalers were the major intermediaries involved in handling cashew as the produce moved through various channels

Area of study

3 AREA OF STUDY

Kannur district forms the major cashew growing region in Kerala state with an area of about 29780 ha The district plays a unique role in the production of cashew nuts in Kerala Hence the present study Economic analysis of production and marketing of cashew nut in Kerala was confined to this district A map of the study area is presented in Fig 3 1

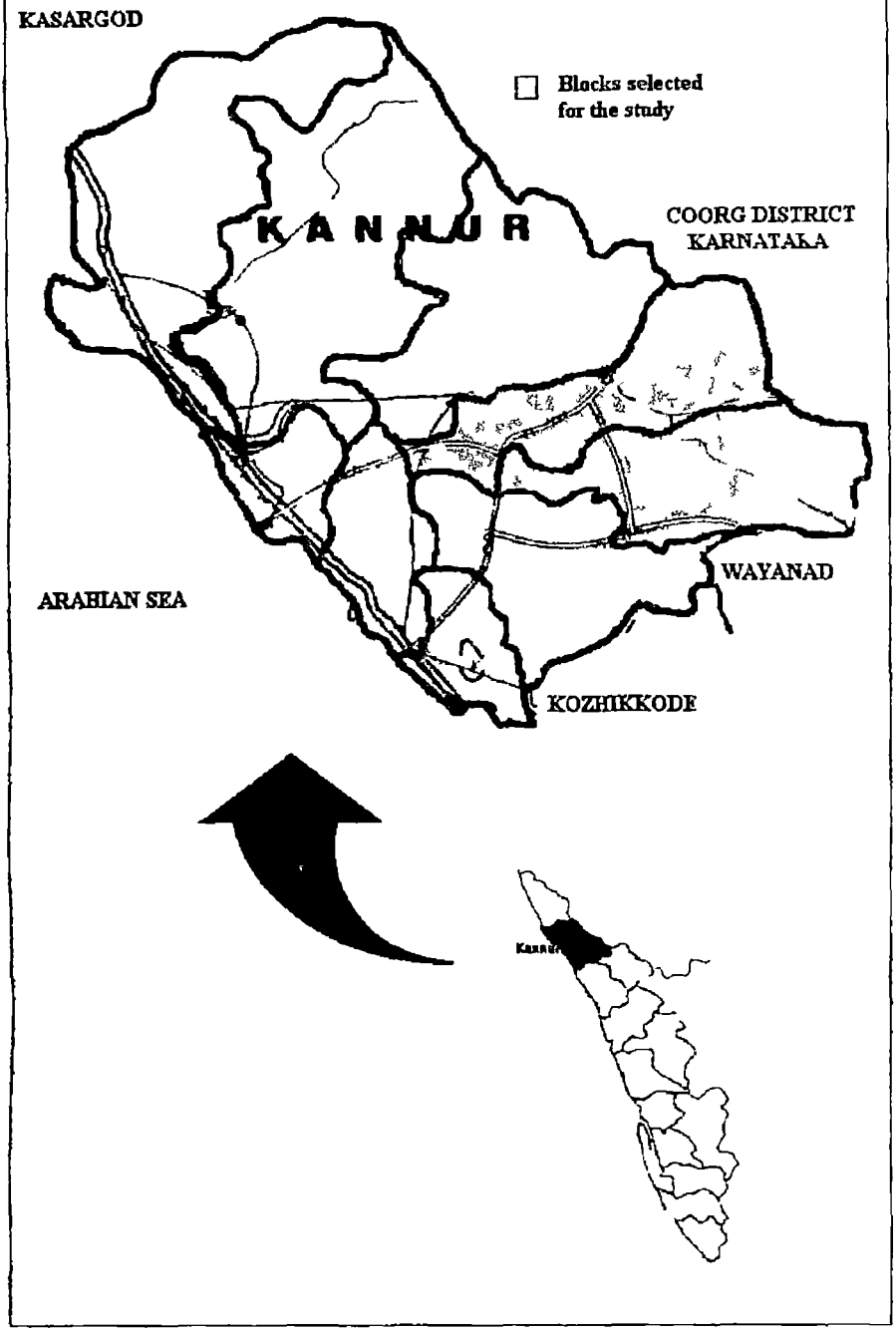
3 1 Location

Kannur district located in Northern Kerala, lies between latitudes 11°40 to 12°48 North and longitudes 74°52 to 76°27 East The district is flanked by the Western Ghats in the east (Coorg district of Karnataka state) Kozhikkode and Wayanadu districts in the south the Arabian sea in the west and Kasargod the northern most district of Kerala in the north The district is divided into three taluks viz Kannur Taliparamba and Talassery The taluks are subdivided into nine development blocks and 129 panchayats

3 2 Demographic features

Total geographical area of the district is 2 96 797 ha which is about 7 6 per cent of the total geographical area of the state The district is in the eighth position among districts of Kerala m terms of the total population According to the 2001 census report the district supports a total population of 24 21 lakh which is about 7 57 per cent of the total population of the state Of this 11 52 lakh are male and 12 58 lakh are female Kannur ranks ninth in the state with regard to the density of population which is 819 persons per square kilometre while the state average is 813 The literacy rate is 92 8 per cent Sex ratio shows that there are 1090 females for every 1000 males Educational status of males and females showed that literacy was more among males (96 38 per cent) than females (89 57 per cent)

Fig 3 1 Map showing study area



3 3 Occupational pattern

The total working population of the district is 590387 of which 53 986 are cultivators and 122207 are agricultural labourers Household industry workers and other workers are 7 851 and 4 06 343 respectively The distribution of working population in the district as well as in the state and the relative shares of each to the total is summarised in Table3 1

Table 3 1 Distribution of working population in Kannur district and Kerala state

Particulars	Kannur (No)	Kerala (No)	Percentage of the state
1 Cultivators	53986 (9 14)	1015983 (12 24)	5 31
2 Agricultural labourers	122207 (20 77)	2120452 (25 54)	5 70
3 Household industry worker	7851 (1 47)	214146 (2 58)	3 67
4 Other workers	406343 (68 62)	4950506 (59 64)	8 20
Total	590387 (100)	8301087 (100)	7 11

Figures in parentheses are the percentage to the total
Source Farm Guide 2001

3 4 Climate and rainfall

The district experiences a humid climate with an oppressive hot season from March to the end of May This is followed by the South West monsoon which continues till the end of September October and November form the post monsoon or retreating monsoon season The North East monsoon which follows extends up to the end of February although the rain generally ceases after December

During the months of April and May the mean daily maximum temperature is about 35°C Temperature is low in December and January about 20°C

The average annual rainfall is 3038 1 mm and more than 80 per cent of it occurs during the period of south west monsoon The rainfall during July is very heavy and the district receives about 68 per cent of the annual rainfall during this month

Table 3 2 Average monthly rainfall in Kannur district (1999)

Month	Rainfall (mm)
January	0 0
February	0 0
March	0 6
April	11 8
May	431 4
June	754 4
July	972 4
August	414 9
September	66 0
October	348 9
November	38 3
December	0 0
Annual	3038 1

Source Farm Guide 2001

3 5 Soil

Based on the genesis morphology and physico chemical characteristics the soils of the district can be classified into five major groups They are laterites and associated soils forest loams coastal alluvium riverine alluvium and hydromorphic saline In some parts of the district where laterite crest formations are visible surface cultivation of common crops has become difficult and hence they are kept uncultivated or brought under cashew plantations

3 6 Land utilisation

Kannur constitutes 7 63 per cent of total geographical area of the state The percentage of net area sown to the total geographical area is 68 63 and the cropping intensity is 133 which are greater than the corresponding state average

(58 13 and 129 respectively) More information regarding the land utilisation pattern of the district and of the state is given in Table 3 3

Table 3 3 Land utilisation pattern in Kannur district and Kerala state (1998 99)

Particulars	Kannur	Percentage to the total	Kerala	Percentage to the total
Geographical area	296797	100 00	3885497	100 00
Forests	48734	16 42	1081509	27 84
Land put to non agricultural purpose	28553	9 62	333822	8 59
Barren and cultivable land	3798	1 28	28341	0 73
Permanent and pastoral grazing land	83	0 02	682	0 01
Land under tree crops	81990	0 68	20200	0 52
Cultivable waste	5335	1 79	62710	1 61
Fallow other than current fallow	1449	0 48	31537	1 81
Current fallow	3175	1 06	68022	1 75
Net area sown	203680	68 63	2258674	58 13
Area sown more than once	67307	22 67	657931	16 93
Total cropped area	270987	91 30	2916505	75 06
Cropping intensity	133		129	

Source Farm Guide 2001

3 7 Water resources

Kannur district is endowed with a five river system Except for a few minor ones most of the rivers are perennials and provide good scope for irrigation Important rivers flowing through the districts are the Anjarakandy the Mahe the Thalassery and the Perumba rivers The district does not have any major or minor irrigation schemes The two irrigation projects viz Pazhassi and Kattampilly projects are incomplete The Pazhassi project is expected to irrigate 16 200 hectares of land when completed Kannur district has 21760 hectares of land under irrigation which is only 5 8 per cent of the net irrigated area in the state Source wise area under irrigation is presented in Table 3 4

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

Particulars	Irrigated area (in hectares)	Percentage to the total
Government canals	96	0 44
Private canals	878	4 03
Government tanks	117	0 53
Private tanks	1933	8 88
Government wells	29	0 15
Private wells	10624	48 82
Minor lift irrigation	79	0 36
Other sources	8002	36 79
Total	21760	100

Source Farm guide 2001

3 8 Cropping pattern

Major crops grown in the district are paddy coconut cashew pepper tapioca, arecanut and plantation crops like rubber Paddy occupies the largest area among annual crops It is cultivated in 15419 hectares of land which is 3 5 per cent of the total cropped area Coconut is extensively grown in the district its cultivation spread over an area of 98630 hectares Cashew is another important cash crop grown in the district The district plays a unique role in its cultivation and production It is grown in 29780 ha of land The vast stretches of suitable waste lands with low fertility status extends scope for expansion of cashew cultivation and its allied industries Rubber and pepper also are important crops grown in the district Tuber crops like tapioca sweet potato and seasonal crops like ginger turmeric etc are also grown The cropping pattern for the district is given in Table 3 5

Table 3 5 Cropping pattern of Kannur district (1999 2000)

Crop	Area (in ha)	Percentage to the total cropped area
Paddy	15419	4 65
Other food grains	1860	0 57
Spices and condiments	31138	9 40
Fruits	96830	29 22
Drumstick	1938	0 58
Tubers	6202	1 88
Vegetables	9640	2 90
Coconut	98630	29 76
Cashew	29780	9 00
Rubber	28420	8 58
Cocoa	279	0 08
Fodder crops	195	0 05
Green manure crop	846	0 22
Other nonfood crops	10304	3 11
Total	331381	100 00

Source Annual Credit Plan 2000 2001 Syndicate Bank Kannur

Iritty and Pervaoor blocks have been selected based on probability proportional to area under cashew These are the two major cashew growing areas in the district Iritty block consists of eight panchayats and one municipal area while Peravoor block consists of seven panchayats The lists of the panchayats of the selected blocks are given in Table 3 6

Table 3 6 List of panchayats in Iritty and Peravoor blocks

Iritty block	Peravoor block
*Keezhur Chavassery	Kanichar
Aralam	*Kelakom
*Ayyankunnu	Muzhakkunnu
Keezhallur	Kolayad
Thillenkery	Malur
Koodali	Peravoor
Payam	*Kottiyoor

Source Vikasanarekha 1996 Planning Board Thiruvananthapuram

* Indicates panchayats selected for the study

Kelakom and Kottıyoor were the panchayats selected from Peravoor block whıle those selected from Irıtty block were Ayyankunnu and Keezhur Chavassery General ınformatıon on selected panchayats ıs gıven ın the Table 3 7

Table 3 7 General ınformatıon of panchayats selected for the study

Particulars	Irıtty block		Peravoor block	
	Keezhur Chavassery	Ayyankunnu	Kottıyoor	Kelakom
Number of wards	9	10	9	9
Area	102 2 sq km	122 8 sq km	155 87 sq km	77 92 sq km
Populatıon	26547	23168	16608	15787

Source Vıkasanarekha,1996 Plannıng Board, Thıruvananthapuram

The croppıng pattern of panchayats mentıoned above ıs depıcted ın Tables 3 8 and 3 9

Table 3 8 Croppmg pattern of Keezhur Chavassery and Ayyankunnu panchayats

Crop	Keezhur Chavassery		Ayyankunnu	
	Area (ha)	Percentage to gross cropped area	Area (ha)	Percentage to gross cropped area
Paddy	273	5 00	7	0 05
Pulses	63	0 21	3	0 02
Sesamum	2	0 03		
Vegetables	35	0 64	10	0 08
Coconut	1545	28 34	1399	10 74
Banana	760	13 94	45	0 35
Tapıoca	40	0 73	30	0 23
Pepper	600	11 00	125	0 96
Jack	10	0 18	23	0 18
Cashew	1550	28 44	5026	38 72
Mango	26	0 48	40	0 31
Rubber	114	2 18	6125	47 21
Arecanut	380	6 97	70	0 54
Pmeapple	15	0 28	10	0 08
Gınger	12	0 23	35	0 27
Turmerıc	25	0 45	35	0 26
Total	5450	100	12973	100

Source Vıkasanarekha,1996 Plannıng Board Thıruvananthapuram

Table 3 9 Cropping pattern of Kottiyoor and Kelakom panchayats

Crop	Kottiyoor		Kelakom	
	Area (ha)	Percentage of gross cropped area	Area (ha)	Percentage to gross cropped area
Paddy	67 94	1 05	28	0 38
Pulses	8 00	0 12	10	0 14
Cashew	1494 68	23 08	3072	41 10
Rubber	1834 38	28 32	1998	26 73
Coconut	1222 92	18 88	1272	17 01
Pepper	815 28	13 59	110	1 48
Arecanut	271 76	4 20	758	10 25
Banana	285 30	4 40	141	1 88
Ginger	171 18	2 98		
Turmeric	38 04	0 59		
Amorphophallus	66 57	1 03		
Colocasia	28 53	0 44		
Tapioca			22	0 30
Clove nutmeg kacholam etc	19 02	0 29		
Cocoa	38 04	0 59		
Fruits (Mango jack etc)	28 53	0 44	55	0 73
Total	6477 17	100 00	7474	100 00

Source Vikasanarekha 1996 Planning Board Thiruvananthapuram

The above tables show that cashew occupies a predominant place in the cropping pattern of all the panchayats contributing above 20 per cent of the gross cropped area

Methodology

4 METHODOLOGY

Appropriate research design is a pre requisite to draw meaningful inferences about any study The present study on the Economics of product on and marketing of cashew nut aims to estimate trends in area product on and productivity of cashew in Kerala and to work out the supply response of cashew nuts along with an analysis of the market structure marketing margin and other aspects related to marketing of cashew nuts in Kerala For analysing trends and supply response secondary data have been made use off For the other aspects of the study primary data have been generated through sample survey method A brief description of procedure followed in the selection of sample collection of data analytical techniques employed and the concepts used in the study are presented in this chapter under the following heads

4 1 Location of study and sampling design

4 2 Analysis of data

4 3 Concepts used in the study

4 1 Location of study and sampling design

4 1 1 Selection of study area

The study was undertaken in Kerala State Kannur district was purposively selected for gathering information on the production and marketing aspects of cashew considering the importance of cashew cultivatio n in the district Cashew is one of the most important plantation crops grown in Kannur district The district occupies the first position in terms of area and production of cashew in the state It accounted for 30 6 per cent of area and nearly 50 per cent of total production in the state

4 1 2 Sampling design

Multistage random sampling technique was adopted for the selection of respondent farmers with block as the primary unit panchayat as the secondary unit and the respondent farmers as the ultimate unit Two blocks were selected among the list of nine blocks in the district based on probability proportional to the area under cashew The selected blocks were Iritty and Peravoor From the selected blocks the two panchayats were selected randomly viz Ayyankunnu and Keezhur Chavassery from Iritty block and Kottiyoor and Kelakom from Peravoor block The list of cashew growers was collected from the Krishibhavans of respective panchayats From each panchayat 25 farmers were selected making a total sample size of 100 farmers The distribution of sample is presented in Table 4 1

Table 4 1 Distribution of sample respondents

District	Block	Panchayat	Number of farmers
Kannur	Iritty	Ayyankunnu	25
		Keezhur Chavassery	25
	Peravoor	Kottiyoor	25
		Kelakom	25
Total	2	4	100

The selected respondents were grouped into three classes on the basis of area under cashew Those farmers having an area less than one hectare formed class I those with area between one and two hectares were grouped in class II and those who possessed more than two hectares formed class III In order to collect information on market structure and other marketing aspects of cashew nuts five respondents each belonging to the different categories of intermediaries viz village traders and primary wholesalers from each block have also been included as the sample along with five secondary wholesalers from the study area In addition to this five processors in the state were also interviewed for gathering information on processing and exports

4 1 3 Collection of data

Both primary and secondary data have been used for the study The secondary data (from 1952 53 to 1999 2000) were collected from the various publications of the State Planning Board and Directorate of Economics and Statistics Thiruvananthapuram The primary data on production and marketing aspects of cashew nuts from the selected respondents were collected through personal interview method using a pre tested interview schedule This was done during May June 2001 keeping the cashew nut production season 2001 (January to May) as the reference period The information on marketing aspects such as marketing channels marketing costs and marketing margin was collected using a separate interview schedule The details on processing and export aspects were also collected from the selected processors

4 2 Analysis of data

The analytical tools used have been presented in three sections The first section deals with the methodology involved in the analysis of primary data The second section deals with the methodology adopted for the trend analysis and estimation of growth rates in area production and productivity of cashew in Kerala The procedures followed in the analysis of supply response of cashew nut using time series data have been presented in the third section

4 2 1 Primary data

The primary data collected was tabulated and analysed using averages and percentages For the analysis of constraints the response of each constraint was obtained on a five point continuum as most important important somewhat important less important and least important with scores 5 4 3 2 1 For each constraint the frequency of response under each category was multiplied with its

respective score and added to get a cumulative score for that particular constraint The constraints were ranked based on this cumulative score

4 2 2 Trend analysis and estimation of growth rates

The index numbers of area production and productivity of cashew in Kerala have been constructed with triennium ending 1955 56 as the base to analyse the trend Compound growth rates of area, production and productivity of cashew in Kerala were estimated by fitting an exponential function (equation 4 1) to the time series data

$$Y_t \quad ab \qquad 4\ 1$$

Taking logarithms

$$\log Y - \log a + t \log b \qquad 4\ 2$$

$$Y \quad A + Bt \qquad 4\ 3$$

where

$$Y - \log Y_t \quad A \quad \log a \text{ and } B \quad \log b$$

thus the compound growth rate in percentage is calculated by

Compound growth rate (CGR) = (Antilog B 1) x 100

The entire period under study i e 1952 53 to 1999 2000 has been divided into two subperiods viz Period I (1952 53 to 1975 76) and Period II (1976 77 to 1999 2000) and compound growth rates of the whole period and each subperiod were estimated using the equation 4 1

Exponential function is the commonly employed form to estimate compound growth rates However the exponential model gives only discontinuous growth rates which may not give a true picture for comparison among the different periods Hence kinked exponential model was also adopted for estimation since the present study intends to make comparison between growth rates in the two sub periods The kinked exponential model has a distinct advantage that it is possible

to estimate continuous growth rates as it makes use of full set of available information from the outset of estimation exercise (Boyce 1986)

Discontinuous growth rate estimates for the two sub periods can be derived by fitting the single equation of the following form

$$\ln Y = \alpha_1 D_1 + \alpha_2 D_2 + (\beta_1 D_1 + \beta_2 D_2)t + U \qquad 4\,4$$

where D_j is a dummy variable which takes the value 1 in the j^{th} sub period and 0 other wise Y is the respective variable and U_t is the error term In order to estimate continuous growth rates of the two sub period discontinuity between two trend lines is eliminated by a linear restriction such that they intersect at the breakpoint k

$$\alpha + \beta_1 k \quad \alpha_2 + \beta_2 k \qquad 4\,5$$

Substituting for α_2 and taking $\alpha_1 D + \alpha_2 D_2 - \alpha_1$ an exponential model with a single kink will be obtained

$$\ln Yt \quad \alpha_1 + \beta_1 (D\,t + D_2 k) + \beta_2 (D_2 t - D_2 k) + U \qquad 4\,6$$

The OLS estimates of the respective coefficient β_1 and β_2 would give the exponential growth rates for the two sub periods The growth rates are then computed by using the formula

CGR (antilog ß 1) x 100

4 2 3 Supply response models of cashew

Two general approaches used to study supply response problems empirically are (1) constructive methods which involve the derivation of supply functions from data relating to production functions and (2) statistical analysis of

the time series data Because of the nature limitation and type of data available for the area selected for the study the statistical analysis of the time series data has been preferred

4 2 3 1 Specification of model

In the specification of supply schedule for empirical analysis perennial crops can be meaningfully distinguished from annuals by incorporating distinguishing characteristics of perennials such as (i) long gestation period between the initial planting and the first output (ii) an extended period of output flowing from the initial output and (iii) the eventual gradual deterioration of the productive capacity of the plants This distinction led French and Mathews (1971) to contend that the supply response model for perennials has to explain the planting process the removal replacement of the plants the lags between inputs and outputs and the effects of populations of bearing plants on production This contention would lead to an estimation of a system of simultaneous equations The model suggested by French and Mathews though suitable for cashew was not employed in the present study due to lack of data on the relevant variables Hence ordinary least squares (OLS) regression method was used for the present study Olayide (1972) opined that OLS will give results nearly the same as that of a system of simultaneous equations if the model is specified using the most appropriate variables with most appropriate lags as a means of capturing gestation and response relations Hence the traditional multiple regression model has been made use of for estimating supply response of cashew

In order to examine whether the producers respond to price variation or not it could be desirable to explore how the planned production responds to price But planned production is a vague concept and difficult to quantify This constraint has led to the consideration of other measures of the same One possible alternative is the actual output But actual output especially in the case of an agricultural

commodity like cashew nut is likely to show large deviation from planned output on account of climatic factors Hence it cannot be considered a proxy for planned output

Considering the relation

$$Q \quad A \times Y$$

where Q – quantity of output

A – Area in hectares under cashew

Y – Yield per hectare

It would be possible to study output more realistically by taking the variable on the right hand side of the equation Thus the area planted under the crop being decided by the grower would be a better index of planned production

Yield another component of production is dependant to a very great extent on weather and other factors like pests or disease incidence Though studies by Alston (1980) have suggested that price does not influence this component due to standardisation of cultural practices it will be worthwhile exploring price influence on yield This hypothesis is based on the contention that during the years of favourable prices farmers would adopt better management practices This is likely to influence yield in different years So in the present study an attempt has been made to estimate the supply response with respect to area and yield for the period from 1976 77 to 1999 2000

4 2 3 2 Selection of variables

The explanatory variables considered for area and yield response functions are the following

1 *Price of cashew nuts*

Since the producers generally dispose their produce immediately after harvest farm harvest prices have been assumed to have a direct bearing on the

decision of the producer For area response function the average of the prices of previous three years has been made use of considering the wide fluctuations in cashew prices In the case of yield response functions instead of current prices price of cashew nut lagged by one year was taken based on the assumption that per hectare yield of cashew could be influenced by the previous year prices as the producer may take up better management practices in the current year

2 *Price of rubber*

Rubber was considered a competing crop for cashew in Kerala A competing crop is considered to be one that really competes for the same resources and is grown within the same piece of land Rubber which showed a high inverse relationship with cashew acreage was selected as the competing crop A three year average of the prices of rubber was included as explanatory variable in area response model for the same reasons as mentioned above

3 *Relative price*

Relative price is the ratio of the price of the cashew to the price of the competing crop viz rubber Cashew being a perennial crop which requires long term commitments of land labour and capital any decision to change the area under cashew would be based on the price received in the past few years Considering this a three year average relative price was included as a variable in the area response model

4 *Relative yield*

Relative yield is the ratio of the yield of the cashew to the yield of the competing crop viz rubber The relative yield of cashew lagged by one year was included as a variable in the yield response model

5 *Rainfall*

Cashew is a hardy crop which can fairly well tolerate water stress condition It needs a climate with at least four to five months well defined dry season to produce best yields Unusual heavy rainfall during January March may encourage heavy incidence of pest like Tea mosquito causing loss in yield (Rao and Gopakumar 1994) So the amount of rainfall ranging from December to March was considered a variable in the yield response model

6 *Price risk*

Price risk was represented by standard deviation of farm harvest prices of immediately preceding three years This represents the risk taking behaviour of the growers and can influence the allocation of area and hence has been included as one of the explanatory variables in acreage response functions

7 *Yield risk*

Yield risk was measured by standard deviation in the yields of preceding three years and indicates the variation in yield in the previous years which might influence both acreage and yield decisions Hence yield risk has been included as a variable in both the functions

8 *Trend*

The most difficult problem in time series analysis of supply is the quantification of technology It is presumed that the effect of technology is spread uniformly over time and hence a trend variable has been used to represent its influence

4 2 3 3 Yield response model

The specification of the yield response function in the implicit form is as follows

$$Y - f(PC \quad YR \; T \; RY_{1} \; RF)$$

where

Y — Yield of cashew nuts in kg per hectare

PC — Price of cashew nuts per quintal lagged by one year

YR — Yield risk

T — Trend

$RY_{t\,1}$ = Relative yield lagged by one year

RF — Rainfall

Variant forms of the above function considered are the following

$$Y_t = a_1 + b_1 PC_{t\,1} + b_2 YR + b_3 RY \quad + b_4 RF + U_t \qquad 4\,7$$

$$Y_t = a_1 + b_1 PC \quad + b_2 YR + b_3 RY \quad + b_4 RF + b_5 T + U \qquad 4\,8$$

where a is the constant term and b b_2 b_3 b_4 and b_5 are regression coefficients of the corresponding variables and U represents the error term

4 2 3 4 Area response model

Specification of the area response function in the implicit form is as follows

$$A = f(APR \; ARELP \; PR \; YR \; Trend)$$

where

A — Area under cashew in hectare in the year t

APR — Average of the price of sheet rubber per quintal in the preceding years t_1 t_2 and t_3

ARELP — Average of the relative prices in the year t t_2 and t_3

PR — Price risk

YR — Yield risk

T — Trend

Variant forms of the above function considered are represented by the following equations

$A_t \quad a_1 + b \ ARELP + b_2 PR + b_3 YR + b_4 T + U$ 4 9

$A - a + b \ APR + b_2 PR + b_3 YR + b_4 T + U$ 4 10

$A \quad a + b_1 ARELP + b_2 PR + b_3 YR + U_t$ 4 11

$A - a_1 + b \ APR + b_2 PR + b_3 YR + U_t$ 4 12

4 2 4 Elasticities of area and yield

The elasticities of area and yield were calculated from the first derivative of the respective function (with respect to relevant price variables) as

$$e_p \qquad \frac{\partial X}{\partial P}\left(\frac{P}{\overline{X}}\right)$$

where

e_p elasticity of area or yield

X = area or yield in year t

P relevant price variable

P the arithmetic mean of the relevant price variable computed over the reference period

X − the arithmetic mean of the yield or area computed over the reference period

4 3 Concepts used in the study

a *Supply response*

It is the response of agricultural output to movements in price It is the reallocation of the total acreage as between crops in response to movements in relative prices (Lim 1975)

b *Growth rate*

Growth rate of a variable may be defined as the rate of change per unit of time usually a year

c *Marketing*

The definition of marketing which is most applicable to agriculture is given by Kohls and Uhl (1980) They defined marketing is the performance of all business activities involved in the flow of goods and services from the point of initial agricultural production until they are in the hands of the ultimate consumer

d *Market structure*

Market structure means the organisational characteristics which determines the relations of sellers in the market to each other of buyers in the market to each other of sellers to buyers and of sellers established in the market to other actual or potential suppliers of goods including potential new firms which might enter the market (Clodius and Mueller 1961) Market structure for practical purposes means those characteristics of a market which seem to influence strategically the nature of competition and pricing within the market The characteristics of market structure are the degree of seller and buyer concentrations the degree of product concentrations the degree of product differentiation and the conditions of entry into the market

e *Marketing channel*

Marketing channels are routes through agricultural products move from producers to consumers (Acharya and Agarwal 1987)

f *Marketing costs*

Marketing costs consist of all items of expenditure incurred in transferring goods from the producer to the consumer These are the costs incurred

in performing marketing functions such as transporting storing processing selling and other related activities

g *Price spread*

Price spread is the difference between the price paid by the consumer and the price received by the producer for an equivalent quantity of farm produce It includes all the costs and profits involved in moving the produce from the initial point of production till it reaches the ultimate consumer (Acharya and Agarwal 1987)

h *Net margin*

The difference between gross margin and marketing costs is defined as net margin It consists of profits of various intermediaries in the marketing chain There are two types of marketing margins

i *Concurrent margin*

It refers to the difference between the prices prevailing at success ve stages of marketing at a given point of time This method is adopted in the study

j *Lagged margins*

It is the difference between the price received by a seller at a particular stage of marketing and the price paid by him at the preceding stage of marketing during an earlier period

k *Marketing efficiency*

Marketing efficiency is directly related to the cost involved to move goods from the producer to the consumer and the quantum of services provided or

desired by the consumers If the cost compared with the services involved is low then it will be an efficient marketing system and vice versa An improvement that reduces the cost of a particular function without reducing consumers satisfaction indicates improvement in the marketing efficiency (Chahal and Gill 1991) In the present study marketing efficiency in various channels were computed by Shepherd s formula Shepherd (1965) has suggested that the ratio of the total value of goods marketed to the marketing costs may be used as a measure of efficiency Marketing efficiency is measured as follows

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

ME – Index of marketing efficiency

V – Value of goods marketed

I = Marketing cost involved

Results

5 RESULTS

The present study Economic analysis of production and marketing of cashew nuts in Kerala is based on both primary and secondary data The primary rata were gathered from the cashew growers of Iritty and Peravoor blocks of Kannur district The secondary data were collected from the various publications of the Directorate of Economics and Statistics Thiruvananthapuram Keeping the objectives in view the data collected were subjected to analysis and the results obtained are presented in seven sections as detailed below

5 1 Trends in area production and productivity of cashew
5 2 Growth rates in area production and productivity
5 3 Supply response of cashew
5 4 General socio economic features of sample respondents
5 5 Production and cost of maintenance
5 6 Marketing
5 7 Constraints in production and marketing

5 1 Trends in area production and productivity of cashew

An attempt has been made in this section to analyse the growth pattern of cashew in Kerala with respect to area production and productivity across time The time series data on area production and productivity of cashew in Kerala during the period 1952 53 to 1999 2000 have been graphically presented in Figures 5 1 to 5 3 The index numbers of the data presented in these figures have been constructed with triennium ending 1955 56 as the base and the same have been illustrated graphically in Figure 5 4 to have an idea about the simultaneous change in area production and productivity

Fig 5 1 Trend in area under cashew(1952-53 to 1999 00)

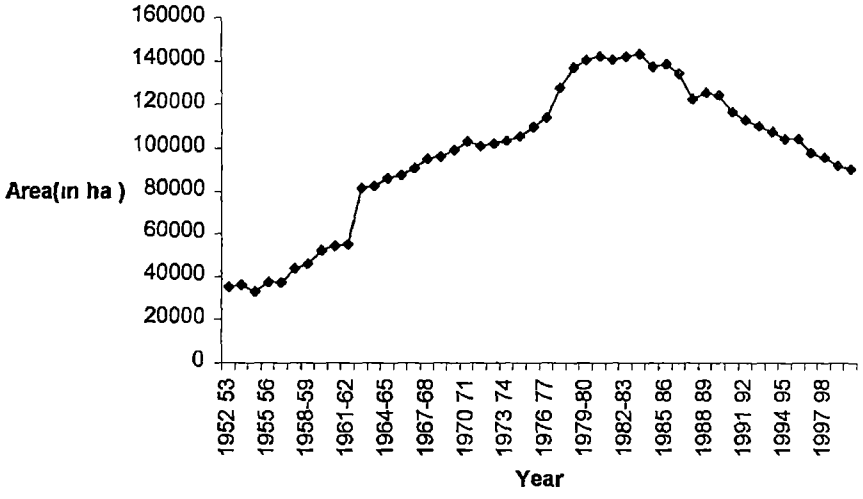


Fig 5 2 Trend in production of raw cashew nuts (1952-53 to 1999 00)

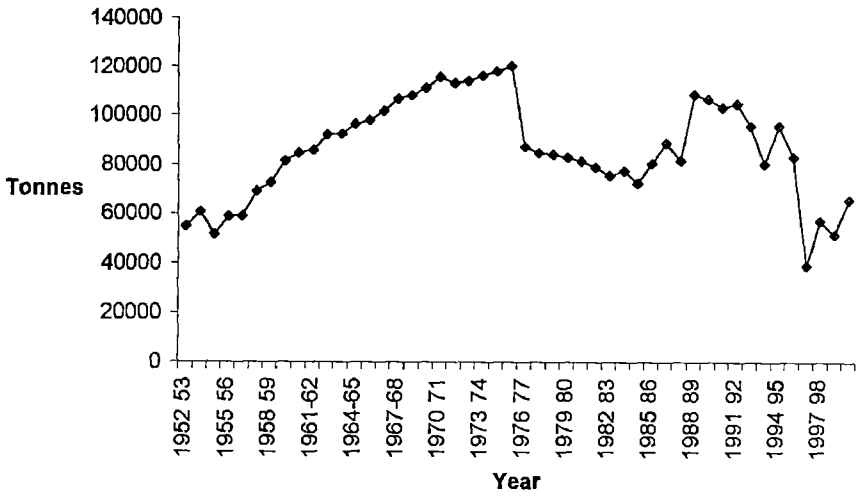


Fig 5 3 Trend in productivity of raw cashew nuts(1952 53 to 1999 00)

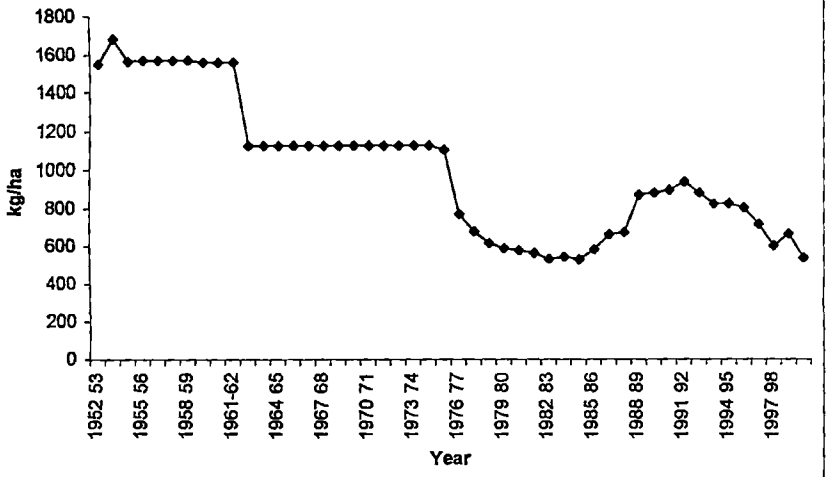
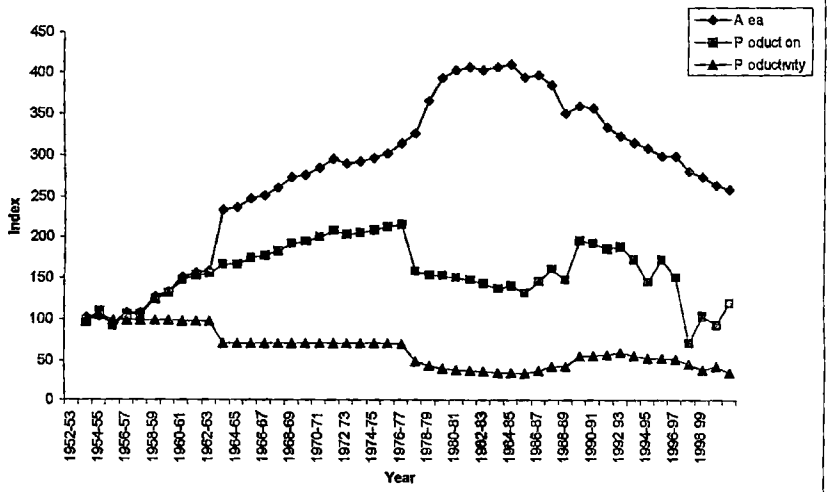


Fig 5 4 Index numbers of area production and productivity of cashew (triennium ending 1954-55=100)



An analysis of the Figure 5 4 revealed that the area under cashew was showing an increasing trend till the year 1983 84 and thereafter a gradual decline has been noticed The increase in area was more or less steady till 1974 75 and it registered a rapid growth during the period 1975 76 to 1983 84 and reached its peak in 1983 84 bringing the index of area to 409 The decline in the area from 1983 84 onwards caused the index to drop down to 257 in 1999 2000

The production showed a steady increase from 1952 53 and attained the maximum level with index 216 points then it showed a declining trend sharply to 130 points in 1984 85 Thereafter an upward trend has been noticed till the year 1988 89 causing the index to rise to 191 points From 1989 90 a steady declining trend in production was noticed till 1995 96 to reach an index of 149 points and a rapid decline below base period level to 70 points in 1996 97 From next year onwards the production picked up at a slow pace The productivity showed a stagnation between two successive sub periods i e 1952 53 to 1961 62 and 1962 63 to 1975 76 Thereafter a sharp decline in productivity was exhibited causing the index to reach the lowest value of 33 points in 1984 85 A slight increasing trend in productivity was observed from 1984 85 to 1991 92 along with a rise in index from 33 to 58 points Thereafter a steady declining trend was exhibited till 1999 2000 to attain an index of 34 points

5 2 Growth rates in area production and productivity

The results of the trend analysis using index numbers have provided an overview of the changes in respective variable in comparison with the base year In order to incorporate the year to year variation in variables its growth rate has been computed

Growth rate of a variable may be defined as the rate of change per unit of time usually a year Two statistical functions viz exponential and kinked

exponential were fitted to the time series data on area production and productivity The whole period under study (1952 53 to 1999 2000) has been divided into two sub periods period I extending from 1952 53 to 1975 76 and period II extending from 1976 77 to 1999 2000 It may be mentioned that a concerted effort for the development of cashew was started only from the Fourth Five Year Plan onwards This is the period which has witnessed the formation of an All India Co ordinated Cashew nut Improvement Project to take up intensive research in cashew (Balasubramanian 1996) So the choice of the year 1975 76 as the trend break was purposively done to examine the impact of various cashew development programmes in terms of expansion in area production and productivity Regressions were run using exponential functions for the two sub periods as well as the whole period and the growth rates in area production and productivity were estimated

5 2 1 Growth rates of area, production and productivity using exponential model

The estimated growth rates of area production and productivity for the whole period and sub periods using exponential model are shown in Table 5 1 It was found that during the whole period annual compound growth rate of area was estimated at 2 22 per cent Periodwise analysis revealed a significant positive growth rate of 5 97 per cent per annum for period I w th a declining trend in period II (1 82 per cent) This was in line with the results of the earlier analysis using index numbers wherein throughout the study period the area indices were above the base year level with wide fluctuations in certain years

Regarding production a stagnation in growth was noticed (0 02 per cent) The first period recorded a positive and significant annual compound growth rate of 3 76 per cent while the second period registered a decline by 1 18 per cent per annum It may be mentioned that the decline in the second period has

contributed towards the stagnation in the whole period In the case of productivity there was a decline in growth during the whole period under study recording 2 11 per cent per annum Period I also recorded a negative growth (2 08 per cent) while period II registered a low but positive growth rate of 0 87 per cent

Table 5 1 Compound growth rates of area production and productivity of cashew

Particulars	Growth rate(%)	t value	R^2
I Whole period (1952 53 to 1999 00)			
a Area	2 22	7 35	0 54
b Production	0 02	0 06	0 10
c Productivity	2 11	9 52	0 66
II Period I (1952 53 to 1975 76)			
a Area	5 97	14 32	0 90
b Production	3 76	15 25	0 91
c Productivity	2 08	8 08	0 74
III Period II (1976 77 to 1999 2000)			
a Area	1 82	7 50	0 72
b Production	1 18	1 79	0 13
c Productivity	0 87	1 59	0 13

5 2 2 Growth rates using kinked exponential models

The kinked exponential model was also fitted to the data on area production and productivity with a kink at the mid point of the time series (i e k 24 or at year 1975 76) in order to estimate the continuous growth rate The estimates obtained are presented in table 5 2

Table 5 2 Periodwise growth rates of area, production and productivity of cashew(using kinked exponential model)

Particulars	Period I	Period II	R^2
a Area	6 35	1 43	0 9288
	(22 16)	(5 45)	
b Production	2 62	2 37	0 4597
	(5 6)	(5 46)	
c Productivity	3 54	0 76	0 7365
	(7 82)	(1 74)	

* Figures in parenthesis represent the t value of the regression coefficients

The estimates indicated that in the period I area registered a growth rate of 6 35 percent which is higher than that estimated by exponential model The sub period II recorded a negative growth rate of 1 43 per cent which was also slightly higher than the growth rate estimated by exponential model for the same period In the case of production the first period showed an increase with 2 62 per cent per annum while the second period registered negative growth rate of 2 37 per cent Both the values deviated from the growth rates estimated by exponential function Regarding productivity the estimates showed that during the first sub period productivity declined by 3 54 per cent per annum and in the second period also it followed the same trend with a growth rate of 0 76 per cent At the same time exponential growth rate estimation yielded positive growth rate for the sub period II

5 3 Supply response of cashew

In order to evaluate the producers response to price and non price factors it was envisaged to study the response in terms of area and yield (productivity) The study used time series data of area and yield for the period 1976 77 to 1999 2000 The results obtained are presented below

5 3 1 Yield response

The traditional multiple regression model with appropriate lags has been used to estimate the degree of responsiveness in yield with respect to price and non price factors The variation in the yield was sought to be explained by certain independent variables like price of cashew lagged by one year yield risk relative yield lagged by one year trend and rainfall Different combinations of these variables have been tried as explained in chapter three and the following results were obtained

I $Yt - 223 + 0\ 9938\ PC_t$ * $0\ 2143\ YR + 4493\ 87\ RY_t$ * $0\ 2423\ RF + U$
(1 27) (2 58) (0 371) (3 045) (0 573)

R^2 0 3997 Dw – 0 75

II $Yt - 10\ 98\ \ 0\ 1326\ PC + 0\ 3559\ YR + 593\ 46\ RY_{t-1}$* + 41 09 T* 0 210 R F + U
(0 103) (0 636) (1 03) (6 25) (6 25) (0 864)

R^2 – 0 8108 Dw 1 92

where

Yt – Yield of cashew nuts in kg/ha in the year t

PC_{t-1} – Price of raw cashew nuts per quintal lagged by one year

YR Yield risk

RY Relative yield lagged by one year

T – Trend

R F Rainfall

Ut – Error term

Figures in parenthesis represent the t value of respective coefficients

* Significant at 5 per cent level

In the first model a positive and significant relationship was found between price of cashew lagged by one year and yield The yield risk indicated negative influence which was insignificant also Relative yield lagged by o ie year

showed a positive and significant influence on yield Rainfall factor showed a negative impact which was in accordance with the expectation that a high amount of rainfall would adversely affect on production due to increased infestation of pests The total explanatory power of the model was low as evident from the low R^2 value (0 3997) and there was significant auto correlation among the disturbance term This called for additional investigation and additional variables in the analysis

In the second model the trend variable was included as an additional variable It showed a positive and significant influence on yield Relative yield and rainfall retained the same sign The relative yield showed significant positive influence on yield while the impact of rainfall was negative as observed in the earlier model But contrary to the results obtained in the first model the coefficient of price of cashew was negative and significant It can be inferred that the price of cashew nuts does not have a significant influence on the yield The yield risk showed a positive influence but not significant

When the trend was included as an additional variable the R^2 value improved to over 81 per cent and Durbin Watson Statistic (1 917) showed no evidence of auto correlation among the disturbance term Hence the second model was found a better approximation for yield response and the elasticity of yield was worked out using this model

5 3 2 Area response

Area can be considered a better proxy for planned output The producer would adjust the area under cashew by taking prices of cashew nuts and rubber (competing crop) in previous years into consideration Various independent variables considered for the study are average relative prices of cashew nuts in the previous three years average price of rubber in the previous three years price risk

yield risk and trend Two sets of regression equations were fitted viz including trend and excluding trend and the results obtained are presented by the following equations

A Without trend

I At − 132599 16 + 236 61 ARELP* 64 33 PR* 34 56 YR + Ut
(18 07) (2 35) (2 018) (0 408)

R^2 0 7159 Dw 0 459

II At 137726 86 12 59 APR* + 16 0 PR + 128 86 YR* + Ut
(26 78) (5 164) (0 688) (4 849)

R^2 − 0 8420 Dw − 0 589

B With trend

III At 148561 09 + 2425 35 ARELP* + 0 499 PR 74 96 YR 2201 T* + Ut
(30 516) (7 204) (0 024) (1 528) (6 608)

R^2 − 0 9107 Dw 0 7013

IV At − 148687 62 13 53 APR* 17 08 PR 36 20 YR + 216 47 T* + Ut
(29 75) (6 99) (0 839) (0 740) (3 73)

R^2 0 906 Dw 0 55

Where

At Area under cashew in hectares in the year t

ARELP − Average of the relative prices of cashew nuts in the year t 1 t 2 and t 3

PR Price risk

YR Yield risk

T Trend

Ut Error term

F gures in parenthesis represent the t value of respective coefficients

* Significant at 5 per cent level

In the first model it could be seen that the average relative price showed a positive and significant influence on area under cashew Coefficients of yield risk and price risk were negative which showed the risk aversion behaviour of the producer In the second model average relative price was replaced with average price of competing crop (i e rubber) The results showed the negative relationship between the price of rubber and the area under cashew which was in accordance with the hypothesis that a high price of rubber would result in the decline in the area under cashew But in this model both price risk and yield risk showed a positive influence

When the trend was included as an additional variable the relative price retained the same sign and was significant The trend showed a negative significant influence on area Both price risk and yield risk did not show any significant influence

In the fourth model including average price of rubber trend price risk and yield risk as explanatory variables the price of rubber showed a negative and significant negative influence on area The regression coefficients of both price risk and yield risk were negative but not significant

On comparison of the above models it may be noted that when the trend was included there is an improvement in the overall explanatory power of the models with R^2 over 90 per cent All the models showed significant auto correlation among the disturbance term But it does not seem to arise due to the omission of any explanatory variables since the explanatory power of all the models are high

5 3 3 Elasticities of area and yield

Short run elasticities were worked out by multiplying the first derivative of the yield or area function with respect to the relevant price variable by the ratio

of mean price to mean yield/area The estimated elasticities of y eld and area w th respect to relevant price variable were presented in Table 5 3

Table 5 3 Estimated elasticity coeff cients of yield and area of cashew in relation to different price variables

Particulars	Price variable	Model No	Elasticity coeff cient
Yield	Price of cashew lagged by one year	II	0 2621
Area	Average of the relative price of cashew in the previous three years	III	0 0133
	Average of the price of rubber in the previous three years	IV	0 2343

The estimated elasticity of yield with respect to price of cashew lagged by one year was 0 2621 indicating practically no response of yield to price This showed that in the short run price of cashew does not have any influence on the yield The elasticity of area with respect to the average relative price of cashew nuts in the previous three years was worked out to 0 0133 The magnitude of the elasticity is low which indicates a very low response to the change in the relative price The elasticity of area with respect to price of rubber was estimated to –0 2343

5 4 General socio economic features of the sample cashew growers

Since the subsequent sections involve microlevel analysis with primary data collected from sample respondents it may be in the fitness of things to prov de some relevant informations about the sample households A brief description of the general socio economic features of the respondent farmers with respect to land holding family size age education occupation etc has been included in this section in order to serve as a background to the study

5 4 1 Land holding

The sample cultivators were grouped into three size groups on the basis of area under cashew Those cultivators having an area under cashew less than one hectare were grouped in class I those having an area between one and two hectares formed the class II while those who possessed more than two hectares of cashew were grouped in class III The distribution of respondents according to the area under cashew is presented in Table 5 4

Table 5 4 Distribution of respondents according to the area under cashew

Class	Holding size	Number	Area under cashew (ha)	Average size of holding (ha)
I	< 1 ha	44	30 16 (22 15)	0 69
II	1 2 ha	38	50 64 (37 19)	1 33
III	> 2 ha	18	55 38 (40 66)	3 02
	Total	100	136 18 (100)	1 36

*Figures in parenthesis are percentage to the total

The numbers of cashew growers under the three classes viz I II and III were 44 38 and 18 respectively The respondents had an aggregate of 136 18 hectares under cashew with an average size of 1 36 hectares per holding Class I accounted for 22 15 per cent of the total area with an average size of 0 69 ha per holding For class II average holding size was 1 33 hectares and this group contributed 37 19 per cent of the total area In the case of class III which contributed 40 66 per cent of the total area under cashew the average holding size was 3 02 hectares

5 4 2 Family size

The distribution of respondents according to their family size as shown in Table 5 5 revealed that at the aggregate level 45 per cent of cultivators had a family size up to four members 46 per cent with 5 6 members and only 9 per cent

with above six members Classwise analysis showed that for class I 54 6 per cent of the total had a family size up to 4 members 38 6 per cent had a family size of 5 6 members while only 6 8 per cent had above six members in the family For class II 44 80 per cent had family size up to 4 members while 50 per cent had 5 6 members in the family and the respondents with more than six members in the family were only 5 20 per cent For class III it was 22 22 55 56 and 22 22 percent respectively

Table 5 5 Distribution of respondents based on family size

Class	Family size			Total
	up to 4 members	5 6 members	Above six members	
I	24 (54 60)	17 (38 60)	3 (6 80)	44 (100)
II	17 (44 80)	19 (50 0)	2 (5 20)	38 (100)
III	4 (22 22)	10 (55 56)	4 (22 22)	18 (100)
Total	45 (45)	46 (46)	9 (9)	100 (100)

*Figures in parenthesis are percentage to the total

5 4 3 Age and sex

Distribution of respondents family on the basis of age and sex is presented in Table 5 6

Of the total members 237 were males and 248 were females The sex ratio was worked out to 1 046 which revealed that there were 1046 females for every 1000 males As much as 38 76 per cent of the total members belonged to the age group of 15 30 years which is closely followed by the age group 30 60 years with 37 73 per cent of the total members The percentages of total members within the age group 0 6 7 14 and above 60 years were 6 18 9 90 and 7 43 respectively All the three classes showed higher number of females than males Average family size was found to be 4 9 which was the largest (5 0) in class II

Table 5 6 Classification of respondents family based on age and sex

Age Group	Sex	Class I		Class II		Class III		Total	
		No	%)	No	%	No	%	No	%
0 6	Male	5	2 45	4	2 07	3	3 41	12	2 47
	Female	7	3 43	7	3 63	4	4 55	18	3 71
	Total	12	5 88	11	5 70	7	7 96	30	6 18
7 14	Male	9	4 41	8	4 14	3	3 41	20	4 12
	Female	11	5 39	12	6 22	5	5 68	28	5 77
	Total	20	9 80	20	10 36	8	9 09	48	9 90
15 30	Male	39	19 12	41	21 24	13	14 77	93	19 17
	Female	43	21 08	38	19 69	14	15 91	95	19 59
	Total	82	40 20	79	40 93	27	30 68	188	38 76
30 60	Male	38	18 63	33	17 10	19	21 59	90	18 55
	Female	36	17 65	37	19 17	20	22 73	93	19 18
	Total	74	36 28	70	36 27	39	44 32	183	37 73
>60	Male	9	4 41	8	4 15	5	5 68	22	4 54
	Female	7	3 43	5	2 59	2	2 27	14	2 89
	Total	16	7 84	13	6 74	7	7 95	36	7 43
Aggregate	Male	100	49 02	94	48 70	43	48 86	237	48 85
	Female	104	50 98	99	51 30	45	51 14	248	51 15
	Total	204	100	193	100 00	88	100 00	485	100 00
Average family size		4 6		5 0		4 9		4 9	

5 4 4 Education

Classification of respondents according to their educational status as given in Table 5 7 revealed that 96 per cent of the total sample cultivators were literate

Table 5 7 Classification of respondents according to educational status

Class	Illiterate	Primary school	Middle school	High school	Pre Degree	Degree	Total
I	2 (4 55)	16 (36 36)	14 (31 81)	8 (18 18)	2 (4 55)	2 (4 55)	44 (100)
II	2 (5 26)	12 (31 58)	12 (31 58)	9 (23 69)	2 (5 26)	1 (2 63)	38 (100)
III	0	6 (33 33)	6 (33 33)	4 (22 22)	1 (5 56)	1 (5 56)	18 (100)
Total	4 (4)	34 (34)	32 (32)	21 (21)	5 (5)	4 (4)	100 (100)

*Figures in parenthesis are percentage to the total

Out of the total respondents 34 per cent were educated up to primary school level 32 per cent up to middle school level 21 per cent up to high school level 5 per cent up to pre degree and only 4 per cent had an education of degree and above Classwise analysis also revealed the same pattern with each class having a higher percentage of respondents with education up to primary level only

5 4 5 Occupation

Distribution of respondents according to their occupation is given in Table 5 8

Table 5 8 Classification of respondents according to their occupation

Category	Agriculture as the only occupation	Agriculture as the main occupation	Agriculture as the sub occupation	Total
I	26 (59 09)	12 (27 27)	6 (13 64)	44 (100 00)
II	22 (57 89)	11 (28 95)	5 (13 16)	38 (100 00)
III	11 (61 11)	5 (27 78)	2 (11 11)	18 (100 00)
Total	61 (61)	26 (26)	13 (13)	100 (100)

*Figures in parenthesis are percentage to the total

It can be observed that agriculture was the only occupation for 61 per cent of the sample cultivators It was the main occupation for 26 per cent while it served as subsidiary occupation for the remaining 13 per cent of the total respondents All the classes followed the similar pattern in occupation The percentages of sample cultivators having agriculture as the only occupation (61 11) was the highest in class III

5 4 6 Family income

The distribution of respondents based on family income is presented in Table 5 9

Table 5 9 Distribution of respondents based on level of family income

Class	Annual family income (in Rupees)			Total
	Up to 50000	50000 to 100000	>100000	
I	27 (61 36)	15 (34 09)	2 (4 55)	44 (100 00)
II	14 (36 84)	20 (52 63)	4 (10 53)	38 (100 00)
III	3 (16 66)	10 (55 56)	5 (27 78)	18 (100 00)
Aggregate	44 (44 0)	45 (45 0)	11 (11 0)	100 (100 0)

*Figures in parenthesis are percentage to the total

The respondents were classified into three income groups viz less than Rs 50 000 between Rs 50 000 and Rs 1 00 000 and above one lakh rupees The percentage of respondents having an annual income between Rs 50 000 and one lakh rupees was 45 The proportion of respondents who earned an income less than Rs 50 000 per annum was 44 per cent and only 11 per cent obtained an annual income above one lakh rupees The analysis also revealed that in class I 61 36 per cent respondents had annual family income below Rs 50 000 while only 4 55 per cent enjoyed an annual income above one lakh At the same time in class III 16 66 per cent had an annual income less than Rs 50 000 while 27 78 had an income above one lakh rupees

5 4 7 Cropping pattern

Cropping pattern of the sample respondents is presented in Table 5 10

Table 5 10 Cropping pattern of the respondents

(Area in hectare)

Sl No	Crop	Class I	Class II	Class III	Total
1	Cashew	30 16 (38 04)	50 64 (50 31)	55 38 (61 53)	136 18 (50 45)
2	Rubber	24 04 (30 32)	24 10 (23 94)	16 90 (18 78)	65 04 (24 09)
3	Coconut	16 74 (21 11)	17 40 (17 29)	7 56 (8 40)	41 70 (15 45)
4	Arecanut	3 19 (4 02)	3 77 (3 75)	2 24 (2 49)	9 20 (3 41)
5	Pepper	1 68 (2 12)	1 85 (1 84)	0 54 (0 60)	4 07 (1 50)
6	Rice	0 20 (0 25)	0 88 (0 87)	1 00 (1 11)	2 08 (0 77)
7	Ginger	0 62 (0 78)	0 46 (0 46)	1 40 (1 56)	2 48 (0 92)
8	Turmeric	0 34 (0 43)	0 04 (0 04)	1 18 (1 31)	1 56 (0 58)
9	Banana	2 02 (2 55)	1 16 (1 15)	1 80 (2 0)	4 98 (1 84)
10	Others	0 30 (0 38)	0 36 (0 35)	2 00 (2 22)	2 66 (0 99)
	Gross cropped area	79 29 (100 00)	100 66 (100 00)	90 00 (100 00)	269 95 (100 00)

*Figures in parenthesis are percentage to the total

The major crops grown by sample cashew cultivators were perennials like cashew rubber coconut arecanut pepper and annuals like rice ginger turmeric and miscellaneous crops which include both annuals and perennials The gross cropped area of the respondents was 269 95 hectares At the aggregate level perennial crops like cashew rubber coconut arecanut and pepper together accounted for over 90 per cent of the gross cropped area, while cashew alone accounted for 50 45 per cent The relative share of rice ginger turmeric banana and other miscellaneous crops in the aggregate cropped area were 0 77 0 92 0 58 1 84 and 0 99 per cent respectively Classwise cropping pattern showed that

cashew accounted more than 50 per cent of the total cropped area in class II and class III The proportion of area under cashew to the gross cropped area in class I was 38 04

Thus the analysis shows the relative importance of cashew in the cropping pattern of sample cashew growers and also the relative rigidity in the cropping pattern as the perennial crops accounted over 90 per cent of the gross cropped area

5 5 Production and cost of maintenance of cashew

5 5 1 Production and productivity per hectare

Production and productivity of cashew among the sample respondents during the year 2000 2001 are presented in Table 5 11

Table 5 11 Production and productivity of cashew nuts among sample cultivators

Class	Production in qumtals	Productivity (kg/hectare)
I	216 3 (20 45)	717 2
II	375 5 (35 43)	741 5
II	467 75 (44 12)	844 6
Total	1059 55 (100)	768 0

*Figures in parenthesis are percentage to the total

The total quantity of raw nuts produced by all the 100 sample cultivators was 1059 55 quintals with an average of 768 0 kg per hectare Class III accounted 44 12 percent of the total production followed by class II and class I with 35 43 and 20 45 per cent respectively Average production also was high in class III It recorded an average of 844 60 kg per hectare Next to it class II produced 741 5 kg nuts per hectare followed by class I with 717 2 kg

5 5 2 Cost of maintenance

The total maintenance cost of cultivation consists mainly of the cost incurred for the material inputs and labour charges The estimated operational costs of cultivation per hectare of cashew for the three classes and the aggregate level as presented in Table 5 12 revealed that the total maintenance cost was Rs 7709 77 at the aggregate level while it was Rs 7608 26 Rs 7471 29 and Rs 7969 19 in Class I II and III respectively

Table 5 12 Maintenance cost of cultivation per hectare of cashew

(Rupees per hectare)

Item of cost	Class I	Class II	Class III	Aggregate
I Material Costs				
a) Cost of organic manure	927 (12 18)	842 22 (11 27)	562 77 (7 06)	747 90 (9 70)
b) Cost of Fertilisers	513 29 (6 75)	555 38 (7 44)	611 77 (7 68)	569 41 (7 38)
c) Cost of Plant protection chemicals	245 04 (3 22)	331 9 (4 44)	665 3 (8 35)	448 58 (5 82)
Sub Total	1685 33 (22 15)	1729 5 (23 15)	1839 84 (23 09)	1765 89 (22 90)
II Labour costs				
a Application of organic manure	474 06 (6 23)	324 64 (4 35)	292 84 (3 67)	345 05 (4 48)
b Application of fertilisers	126 7 (1 66)	145 93 (1 95)	175 96 (2 21)	154 00 (2 00)
c Application of plant protection chemicals	192 38 (2 53)	204 98 (2 74)	375 18 (4 71)	271 60 (3 52)
d Weeding	1907 2 (25 07)	1986 14 (26 58)	2105 9 (26 42)	2018 84 (26 19)
e Harvesting	3222 59 (42 36)	3080 1 (41 23)	3179 47 (39 90)	3154 38 (40 91)
Sub Total	5922 93 (77 85)	5741 79 (76 85)	6129 35 (76 91)	5943 88 (77 10)
Grand Total	7608 26 (100 00)	7471 29 (100 00)	7969 19 (100 00)	7709 77 (100 00)

*Figures in parenthesis are percentage to the total

5 5 2 1 Material costs

The material costs include costs incurred for manures fertilisers and plant protection chemicals At the aggregate level material cost was worked out to Rs 1765 89 which accounted for 22 9 per cent of the total maintenance cost

In class I the total material coat was Rs 1685 33 and cost of organic manure and fertiliser accounted 12 18 and 6 75 per cent of the total Expenditure on plant protection chemicals was only 3 22 per cent of the total cost The proportion of material costs to the total operational cost of cultivation was 22 15 per cent

In class II out of the total cost of Rs 1729 50 organic manure contributed 11 27 per cent which was less compared to that of class I At the same time costs incurred for fertilisers and plant protection chemicals were computed to be 7 44 and 4 44 per cent respectively which were higher than the corresponding figures in class I The relative share of material costs to the total maintenance cost was found to be 23 15 per cent For class III cost of fertilisers and plant protection chemicals contributed 7 68 and 8 35 per cent of the total cost The share of cost incurred in plant protection chemicals which was a very critical input in cashew cultivation was the highest in this class Material costs accounted for 23 09 per cent of the total maintenance cost

5 5 2 2 Labour costs

Labour costs include costs incurred in weeding harvesting nuts and application of organic manure fertilizer and plant protection chemicals At the aggregate level labour costs came to Rs 5943 88 which was 77 10 per cent of the total cost

In class I total labour cost (Rs 5922 93)accounted 77 85 per cent of the total cost incurred Cost for application of organic manure fertilisers and plant protection chemicals contributed 6 23 1 66 and 2 53 per cent respectively to the total cost Harvesting costs were the largest contributor to the total operational cost (42 36) followed by costs for weeding (25 07)

In class II out of the total labour cost of Rs 5741 79 the share of application charges of organic manure fertilisers and plant protection chemicals came to 4 35 1 95 and 2 74 per cent respectively Harvesting charges accounted the highest share (41 23 per cent) followed by weeding (26 58 per cent) The share of labour costs towards the total maintenance cost was worked out to 76 85 per cent

Class III with a total labour cost of Rs 6129 35 also followed the same pattern as above Harvesting charges contributed the highest share to the total operational cost with 39 90 per cent followed by weeding charges (26 42 per cent) The costs for application of organic manure fertiliser and plant protection chemicals were found to be 3 67 2 21 and 4 71 per cent of the total operational costs

5 5 3 Gross and net returns

The returns from the sale of raw cashew nuts are presented in Table 5 13

Table 5 13 Average yield and returns per hectare of cashew

Particulars	Class I	Class II	Class III	Aggregate
Average Yield(in kg)	717 2	741 5	844 6	768 00
Average price (Rs /kg)	27 9	27 9	27 9	27 90
Total value (Rs)	20009 90	20687 84	23564 34	21427 00
Total cost (Rs)	7608 26	7471 29	7969 19	7709 77
Net returns (Rs)	12401 64	13216 55	15595 15	13717 23

It was found that the average yields per hectare ofcashew for class I II and III were 717 2 741 5 and 844 6 kg respectively The average price per kg of raw cashew nut for the season was computed at Rs 27 90 The gross return for class I II and III were worked out to Rs 20009 90 Rs 20687 84 and Rs 23564 34 respectively The net returns were estimated at Rs 12401 64 Rs 13216 55 and Rs 15595 15 respectively in class I II and III The gross and net returns at the aggregate level was worked out to Rs 21427 and Rs 13717 23 respectively

5 6 Marketing

Cashew is a commercial crop which is mainly grown for the market The income of the cashew farmers depends not only on the technology of production but on the method of marketing and the facilities available for marketing including processing In this section an attempt has been made to study the marketing practices to identify the market intermediaries as the cashew nut flows from the producer to the processor to estimate costs and returns of various market functionaries and to determine the price spread in the marketing of cashew nuts

5 6 1 Marketing practices

In Kerala flowering in cashew begins during November and the fruits start maturing by December January The marketing of raw nuts starts by December and continues up to the second week of June But a major portion of the raw nuts is marketed during the period March to May

By the time the nuts start maturing the cashew growers will clear the ground under the trees All the grasses leaves etc will be removed Farmers collected matured fallen fruits daily or once in two days Both family and hired labourers were engaged in the collection of fruits The nuts were removed from the

fruits by hand and the collected nuts were sold immediately Storing of nuts was not a very common practice as it may result in loss in weight Very few farmers stored raw nuts so as to have sufficient quantity for transportation using a vehicle The nuts were transported by head load Jeep and Auto At the farmer level no attempt has been made to grade the nuts on account of the fact that the buyers were buying the nuts in single lots and the prices quoted were for ungraded nuts

5 6 2 Market functionaries

The major market functionaries and their role as the raw nuts move from the producer to the processors are described below

a) *Village traders*

They are the licensed merchants operating at the village level with shops and collecting nuts from the producers They also deal with agricultural produces like rubber arecanut ginger pepper etc Raw nuts were brought to their shops by the farmers They purchased raw nuts every day and sold on the same day or once in two days They sold raw nuts to semi wholesalers or wholesalers

b) *Primary wholesalers*

They are also licensed merchants and act as the intermediary between village traders on the one hand and the secondary wholesale dealers on the other They purchased nuts from farmers also

c) *Secondary wholesalers*

Secondary wholesalers purchased nuts from farmers village traders and primary wholesalers They sold raw nuts to processors through commission agents

d) *Commission agents*

Commission agents acted on behalf of processors They do not take title to the product but receive commission from both wholesalers and processors

e) *Processors/Exporters*

In Kerala cashew nut processing factories are located mainly in Kollam district Processors purchased raw nuts from the wholesalers through commission agents The nuts were transported to the drying yards of the processors located at different places in the state After drying nuts were again transported to the processing factories According to the processors the raw nuts purchased from Kerala are just sufficient to operate the factories for 2 3 months The processors resorted to import of the raw nuts from African countries to operate the factories during the remaining months As stated earlier grading of nuts is not done by the farmers Processors were invariably exporters of cashew kernels Therefore in addition to processing grading packing and transportation of kernel to the port were done by the processors themselves

5 6 3 Marketing channels and market structure

Cashew trade in the state is mainly in the hands of private parties Usually farmers sell raw nuts which are being processed by the processors and further marketed in the form of processed kernels both in the domestic and in the foreign markets Here an attempt has been made to identify the marketing channels involved in the marketing of raw nuts

In Kannur district the marketing of raw nuts started by the end of December and continued till the second week of June Farmers collected fallen nuts and removed the apples by hand and sold the raw nuts on the same day without resorting to drying The present study revealed the following marketing

channels through which cashew nuts flow from the point of production to the stage of export

Channel I	Producer village trader – primary wholesaler secondary wholesaler processor
Channel II	Producer – primary wholesaler secondary wholesaler processor
Channel III	Producer secondary wholesaler processor
Channel IV	Producer village trader secondary wholesaler processor

The quantity of raw nuts sold by the sample farmers to the various intermediaries as shown in Table 5 14 revealed that out of the 100 respondent farmers 55 per cent farmers sold their produce to village traders which formed 40 55 per cent of the total quantity of raw nuts sold 28 per cent farmers sold directly to the primary wholesalers and this constituted 39 34 per cent of the total sales of the sample farmers Eight per cent farmers sold the nuts to both village traders and primary wholesalers and the quantity sold by them was only 6 49 per cent of the total Nine per cent farmers directly sold to the secondary wholesalers and this constituted 13 62 per cent of the total sales of the sample farmers

Table 5 14 Farmers sale to different types of buyers

Type of buyers	Number of farmers	Quantity sold (Quintals)
i) Village traders	55 (55 0)	429 70 (40 55)
ii) Primary wholesalers	28 (28 0)	416 8 (39 34)
iii) Both Village traders and Primary wholesalers	8 (8 0)	68 75 (6 49)
iv) Secondary wholesalers	9 (9 0)	144 3 (13 62)
Total	100 (100 0)	1059 55 (100 0)

*Figures in parenthesis are percentage to the total

The average prices per quintal received by the farmers from selling the raw nuts to village traders primary wholesalers and secondary wholesalers were found to be Rs 2820 Rs 2845 and Rs 2870 respectively The secondary wholesalers purchased raw nuts from farmers village traders and primary wholesalers and in turn sold to the processors through commission agents The raw nuts were transported to the drying yards of the various processors which are located at various parts of the state

5 6 4 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 the farm produce is often known as price spread Marketing cost is an important component of price spread which is the cost involved in moving the product from the point of production to the point of consumption In this section marketing costs of various intermediaries and subsequently gross margin and net margin are also worked out

5 6 4 1 Marketing costs of farmers

Marketing costs of respondents in various channels were computed and summarised in Table 5 15

Table 5 15 Marketing costs of respondents

(Rupees per quintal of raw nuts)

Item of cost	Channel I	Channel II	Channel III
i) Cost of transportation	31 03 (83 91)	32 07 (83 30)	37 77 (84 88)
ii) Cost of packing material	2 10 (5 68)	2 01 (5 22)	2 18 (4 90)
ii) Loading/Unloading	3 85 (10 41)	4 42 (11 48)	4 55 (10 22)
Total	36 98 (100 00)	38 50 (100 00)	44 50 (100 00)

*Figures in parenthesis are percentage to the total

Marketing cost was the highest in channel III with an average of Rs 44 50 per quintal of raw nuts In channels II and I it was worked out to Rs 38 50 and Rs 36 98 respectively Cost of transportation formed the major item of cost which contributed more than 80 per cent of the total marketing cost in all the three channels Loading and unloading formed the next major item of cost which was worked out to Rs 3 85 Rs 4 42 and Rs 4 55 per quintal in channels I II and III respectively

5 6 4 2 Marketing costs of traders

Marketing costs incurred by the traders include cost of loading nuts in trucks handling charges given for filling and weighing the nuts cost of transport permanent labour charges rent telephone and electricity charges etc Marketing costs of various intermediaries were computed and presented in Table 5 16

Table 5 16 Marketing cost of intermediaries

(Rupees per quintal of raw nuts)

Item of cost	Village trader	Primary wholesaler	Secondary wholesaler
a) Loading	3 75 (31 6)	4 10 (30 9)	4 5 (13 6)
b) Handling charges	4 5 (37 9)	4 5 (33 6)	5 5 (16 6)
c) Cost of transport	0 (0 0)	0 (0 0)	5 (15 0)
d) Permanent labour charge	1 1 (9 3)	2 0 (14 9)	2 1 (6 3)
e) Rent of the shop	1 1 (9 3)	1 25 (9 0)	1 35 (4 1)
f) Electricity charges	0 21 (1 8)	0 2 (1 5)	0 25 (0 8)
g) Telephone charges	1 2 (10 1)	1 35 (10 1)	1 5 (4 5)
h)Miscellaneous cost	0 (0 0)	0 (0 0)	3 0 (9 0)
i) Commission to commission agent	0 (0 0)	0 (0 0)	10 0 (30 1)
Total	11 9 (100)	13 4 (100)	33 2 (100)

*Figures in parenthesis are percentage to the total

Rent of shop permanent labour charges telephone and electricity charges were computed taking into account the proportion of cashew nut business in the overall business of the traders

1) *Marketing costs of village trader*

Village trader incurred Rs 11 9 per quintal as the total marketing cost Loading and handling charges were the major item of cost to village traders which contributed 31 6 and 37 9 per cent of the total Usually village traders do not incur transportation costs

2) *Marketing cost of primary wholesalers*

Primary wholesalers purchased nuts from the farmers as well as village traders and sold to the wholesalers As seen in the case of village traders the major item of cost to them was loading and handling charges which contributed 30 9 and 33 6 per cent of the total cost

3) *Marketing costs of secondary wholesalers*

Secondary wholesalers incurred a higher marketing cost compared to village traders and primary wholesalers Total marketing cost incurred by the secondary wholesalers was estimated as Rs 33 20 per quintal of cashew nuts They purchased raw nuts from farmers village traders and primary wholesalers and sold to the processor through commission agents The commission formed the major items of cost with a share of 30 1 per cent of the total marketing cost Loading handling and transportation charges were the next major items of cost which contributed 13 6 16 6 and 15 0 per cent to the total cost Secondary wholesalers incurred transportation cost only for collecting raw nuts from various village traders and primary wholesalers while the transportation cost to the processor s site will be paid by the processor himself

5 6 5 Processing of cashew nuts

Processing of cashew nuts refers to the conversion of raw cashew nuts in shell to its blanched kernel form Various stages involved in the processing of cashew are the following

1) *Drying of raw cashew nuts*

Drying seeks to reduce the moisture content to facilitate storage without rapid deterioration Moisture loss at this stage ranges between 3 to 10 per cent depending on the time of harvest

2) *Roasting or steaming is employed to facilitate the removal of the shell in the subsequent process*

A Roasting Roasting could be done in two ways

(i) *Drum roasting*

This is one of the oldest and most widely used methods The raw nuts are passed through a heated drum where it catches fire The whole process takes about two minutes About eight to ten bags can be roasted in one hour This is one of the cheapest methods available though shell recovery is not possible

(ii) *Oil (plant) roasting*

In this method dried nuts conditioned with water are passed through hot oil (cashew nut shell liquid CNSL) bath by conveyor buckets Shell oil can be recovered at this point and also later by crushing the shell However this method involves higher initial investment Moreover unless the raw nuts are of good quality and well dried the colour of the processed kernels would be poor This method is generally not being used now

B Steaming

Steaming is an alternative to roasting Well dried raw nuts are steam cooked at about 120 140 pounds/sq inch pressure About six bags can be cooked in an hour Shell oil can be extracted in later stages by crushing

3) *Removal of the shell*

A Shelling Roasted nuts are shelled by workers using wooden mallets

B Cutting Steamed nuts are cut by workers with blades mounted on wooden tables

4) *Drying and cooling of shelled kernels*

The shelled kernels are dried in a Borma (oven) at 80 to 90 degrees centigrade The process takes about 6 to 12 hours depending on the kernels and the type of Borma used Drying makes the kernels harder the moisture level being 5 to 6 per cent The kernels are later cooled using humidifiers Drying and cooling facilitates the removal of testa (skin) in the peeling process Proper drying and cooling is necessary to maintain the white color of the kernels and to reduce excessive breakage in the subsequent process

5) *Peeling*

The testa is peeled off and initial grading as wholes and brokens and by colour is done The peeling worker has to be experienced and skilled if breakages are to be kept to a minimum

6) *Grading*

The kernels undergo a final grading by hand/or sieve (mesh) The Cashew Export Promotion Council (CEPC) specifications are adopted for export grades

7) *Filling*

The graded kernels are filled in 25 lb tin containers after vaccumizing and infusing carbon dioxide to prevent infestation (Vitapacking)

8) *Packing*

Two 25 pound tins are packed in a corrugated box and strapped The whole process takes about 6 days from roasting/steaming to packing and is highly labour intensive

5 6 6 Processing cost

Processing of raw cashew nuts is done in the cashew processing factories located mainly in Kollam district Though there are some factories operating in other districts the majority of the factories in Kerala are located in Kollam district Therefore processing costs are estimated on the basis of information obtained from the selected factories in Kollam district Processors purchased raw cashew nuts from different producing areas within the state during the harvest season These nuts are dried and stored in the factories for the subsequent processing The cost of processing one quintal of raw nuts was worked out and is presented in Table 5 17 The total processing cost incurred per quintal of raw nuts was estimated to 1892 82 The major cost included transportation cost of raw nuts cost of packing material of raw nuts loading and unloading charges purchase tax wages to labourers establishment charges interest packing and export charges etc

Out of the different items of cost listed wages including bonus and other benefits given to the labourers working in the processing factories accounted for the highest share (54 48 per cent) of the processing cost

Table 5 17 Processor s cost

(Rupees per quintal of raw nuts)

Items of cost	Rupees
a) Transportation cost of raw nuts	75 00 (3 96)
b) Cost of packing material of raw nuts(Gunny bags)	15 00 (0 79)
c) Loading & unloading drying cost etc	25 00 (1 32)
d) Taxes (@ 8% of the value of raw nuts)	337 5 (17 83)
e) Wages including bonus & other benefits	1031 25 (54 48)
f) Establishment charges (including fuel electricity etc)	75 00 (3 96)
g) Interest	125 (6 60)
h) Packing and export charges	187 5 (9 92)
i) Depreciation	21 57 (1 14)
Total	1892 82 (100 00)

*Figures in parenthesis are percentage to the total

Purchase tax for raw kernels paid by the processors at the rate of 8 per cent of the value of the nuts was the next major item of cost with a share of 17 83 per cent to the total Packing and export charges of processed kernels accounted 9 92 per cent of the aggregate cost Interest which was paid for the amount drawn from the bank for the purpose of purchasing raw nuts from different localities had a share of 6 60 per cent to the total cost Transportation cost involved in transferring raw nuts from wholesaler s place to the drying yards or factory was paid by the processor himself and this cost worked out to 3 96 per cent of the aggregate cost Establishment charges which include fuel electricity charges etc also had a share of 3 96 per cent to the total Depreciation on machinery and buildings was worked out to 1 14 per cent of the aggregate cost

5 6 7 Grading of cashew kernels

The standard specification for Indian cashew kernels for export has been laid down by the Government of India under the Export (Quality Control and Inspection) Act 1963 The Act prescribed 33 grades of cashew kernels Only 26 grades are commercially available and exported Specifications of cashew kernel for export have been shown in Table 5 18

Table 5 18 Export grades of cashew kernels

I Wholes

White wholes	Scorched wholes	Dessert wholes	Dessert pieces
W180 W210 W240 W320 W450 W500	SW SW180 SW210 SW240 SW320 SW450 SW500	SSW (Scorched wholes seconds) DW (Dessert wholes)	SPS (Scorched pieces seconds) DP(Dessert pieces)

II Brokens

White pieces	Scorched small pieces
B(Butts) S(Splits) LWP(Large white pieces) SWP(Small white pieces) BB(Baby bits)	SB(Scorched butts) SS(Scorched splits) SP(Scorched pieces) SSP(Scorched small pieces)

5 6 8 Quality assurance

Export of cashew kernels from India is normally subjected to voluntary quality control and pre shipment inspection Inspection of cashew is being conducted under the consignment wise inspection It is ensured that the product is

processed and packed as per the standard prescribed by drawing samples from the finished product

5 6 9 Packing and standard weight

Cashew kernels in bulk are packed in four gallon prime tins with a net weight of 11 34 kg in each tin The filled tins are then vacuumed and filled with carbon dioxide gas and sealed Two such tins of the same grade are packed in a carton for export The net weight of each carton is thus 22 68 kg (50 pounds) In recent years the importers/buyers in major markets abroad requesting for change over to new generation flexible packaging for cashews The exporters are now changing from tin containers to flexible packaging cashew kernels are filled in flexible bags of either 25 or 50 pound packs which are vacuumed and gas flushed

5 6 10 Processor's revenue

Cashew kernel is the major source of revenue for the processor So its recovery is an important variable determining the revenue of the processor Average cashew kernel recovery per quintal of raw nuts was estimated based on the information furnished by the factory owners Wholes and Brokens are normally exported which came to 24 5 per cent of the weight of raw nuts Total kernel recovery was found to be 26 00 per cent The rejected constituted 1 5 per cent of the weight of raw nuts Table 5 19 provides grade wise recovery of kernels

Byproducts formed in the cashew processing are cashew nut shell liquid (CNSL) shell and the skin (testa) of kernel The demand for cashew nut shell liquid has been declining over the years in the domestic as well as the international market So none of the processors from whom information on processing was collected was found producing and selling cashew nut shell liquid Cashew shell and skin were the major items of byproduct

Table 5 19 Gradewise recovery of cashew kernels per quintal of raw nuts

Grade	kg/quintal of raw nuts	Percent of recovery
W210	0 13	0 50
W240	1 38	5 30
W320	10 13	38 96
W450	3 13	12 14
SW	0 56	2 15
SW240	1 31	5 04
SW320	2 13	8 19
SSW	0 81	3 14
B	0 5	1 56
S	1 88	7 30
SB	0 25	0 96
SP	0 50	1 92
SSP	0 13	0 50
SPS	0 13	0 50
Others	1 53	5 98
Total	24 50	94 24
Rejected	1 50	5 76
Total	26 00	100

The used gunny bags are sold after the completion of the processing work These bags are not reused in the following season Details of realisation from the byproducts are given in Table 5 20

Total revenue apart from the sale of kernels i e from sale of shell skin and empty gunnies was worked out to Rs 43 75 per quintal of raw nuts The cashew nut shell liquid (CNSL) another byproduct usually obtained could not be accounted as the processors adopted drum roasting method for processing in which CNSL cannot be recovered

Table 5 20 Returns from byproducts

Item	kg/quintal of raw nuts	Total realisation(Rs)
a Shell b Skin(testa) c Empty gunny bag	43 75 1 0	28 75 2 50 12 5
Total		43 75

5 6 11 Price spread

In the marketing of agricultural commodities price spread (also referred to as marketing margin) consists of the difference between the price paid by the consumer and the price received by the producer for an equivalent quantity of farm produce The price spread consists of the cost involved in moving the produce from the point of production to the point of consumption and the profits of the various market functionaries involved in transferring the produce from the initial point of production till it reaches the ultimate consumer

In the present study marketing margins were computed from the stage of selling of raw nuts by the farmer to the export of cashew kernels in the international market About 44 per cent of the cashew kernels produced in India are exported to the New York Kernel market Other countries include Japan the Netherlands Gulf countries etc Since the major portion of kernels is exported to the USA marketing margins are computed based on the prices of kernels prevailing in the New York market It may be mentioned that the movement of cashew kernels after the export could not be traced and hence the costs and margins thereafter were not estimated

As mentioned earlier skin(testa) and shell are obtained in the processing of cashew nuts and therefore income derived from the sale of shell skin and used gunny bags was also taken into account in computing marketing margin

The recovery rate of kernel varies among the cashew nuts produced from place to place Raw nuts produced in India have a higher recovery rate than the nuts imported from African countries On the basis of discussion with factory owners average kernel recovery rate was estimated The revenue from the sale of shells testa and gunny bags has also been computed on the basis of average rates prevalent in Quilon district

Price spread was worked out on the basis of monthly average prices Margins have been worked out from January to May which correspond to the marketing season of raw nuts in Kerala Marketing margins n the important channels have been worked out and are presented below

Producer village trader primary wholesaler secondary wholesaler retailer (Channel I)

The major intermediaries in the above channel were village trader primary wholesaler secondary wholesaler and processor Marketing costs and margins worked out for this channel have been given in Table 5 21 It could be seen that average net share of the producer is 48 26 per cent of the total returns received by the processor The price spread was estimated as 51 09 per cent of the total realisation The total marketing cost was worked out to 34 20 per cent The net margin was 16 89 per cent in which a major share was received by the processor

Producer primary wholesaler secondary wholesaler processor (Channel II)

The main functionaries involved in this channel were primary wholesaler secondary wholesaler and processor The price spread and marketing costs incurred in this channel are presented in Table 5 22 The net share of the producer was 48 58 per cent of the returns of the processor

Table 5 21 Price spread in channel I (Rupees per quintal of raw nuts)

Items	January	February	March	April	May	Average
a) Selling Price of Producer	3125 0 (50 59)	3025 0 (51 93)	2725 0 (47 39)	2550 0 (44 35)	2525 0 (50 28)	2790 0 (48 91)
b) Marketing cost of Producer	36 98 (0 60)	36 98 (0 63)	36 98 (0 64)	36 98 (0 64)	36 98 (0 74)	36 98 (0 65)
c) Net share of producer	3088 2 (49 99)	2988 02 (51 29)	2688 02 (46 75)	2513 02 (43 71)	2488 02 (49 54)	2753 02 (48 26)
d) Village traders total cost	11 5 (0 19)	11 8 (0 20)	12 0 (0 21)	12 15 (0 21)	12 2 (0 24)	11 93 (0 21)
e) Selling price	3150 0 (51 00)	3050 0 (52 36)	2750 0 (47 83)	2575 0 (44 78)	2550 0 (50 78)	2815 0 (49 35)
f) Profit of village trader	13 50 (0 22)	13 2 (0 23)	13 0 (0 23)	12 85 (0 22)	12 80 (0 25)	13 07 (0 23)
g) Primary wholesalers total cost	13 25 (0 21)	13 30 (0 23)	13 3 (0 23)	13 40 (0 23)	13 45 (0 27)	13 34 (0 26)
h) Selling price of primary wholesaler	3175 0 (51 40)	3075 0 (52 79)	2775 0 (48 26)	2606 0 (45 22)	2575 0 (51 28)	2840 0 (49 79)
i) Profit of primary wholesaler	11 5 (0 19)	11 7 (0 20)	11 7 (0 20)	11 60 (0 20)	11 55 (0 23)	11 60 (0 21)
j) Secondary wholesalers total cost	33 10 (0 54)	33 15 (0 57)	33 2 (0 58)	33 25 (0 58)	33 25 (0 66)	33 19 (0 58)
k) Selling price of secondary wholesaler	3225 (52 21)	3125 00 (53 65)	2825 0 (42 13)	2650 0 (46 09)	2625 0 (52 27)	2890 0 (50 67)
l) Secondary wholesalers profit	16 90 (0 27)	16 85 (0 29)	16 8 (0 29)	16 75 (0 29)	16 75 (0 33)	16 81 (0 30)
m) Processors total cost	1892 82 (30 64)	1892 82 (32 49)	1892 82 (32 92)	1892 82 (32 92)	1892 82 (37 69)	1892 82 (33 33)
n) Processors profit	1059 01 (17 14)	807 48 (13 86)	1032 16 (17 95)	1206 98 (20 99)	503 99 (10 04)	921 99 (16 00)
o) Total realisation of the processor	6176 83 (100 00)	5825 30 (100 00)	5749 98 (100 00)	5749 8 (100 0)	5021 81 (100 0)	5704 74 (100 00)

*Figures in parenthesis are percentage to the total

Table 5 22 Price spread in channel II (Rupees per quintal of raw nuts)

Items	January	February	March	April	May	Average
a) Selling price of producer	3145 0 (50 92)	3045 0 (52 27)	2745 0 (47 74)	2570 0 (44 70)	2545 0 (50 68)	2810 (49 26)
b) Marketing cost of producer	38 50 (0 62)	38 50 (0 66)	38 50 (0 67)	38 50 (0 67)	38 50 (0 77)	38 50 (0 68)
c) Net share of producer	3106 5 (50 29)	3006 5 (51 61)	2706 50 (47 07)	2531 5 (44 03)	2506 50 (49 91)	2771 5 (48 58)
d) Primary wholesalers total cost	13 25 (0 21)	13 30 (0 23)	13 30 (0 23)	13 40 (0 23)	13 45 (0 27)	13 34 (0 26)
e) Selling price of primary wholesaler	3175 0 (51 40)	3075 0 (52 79)	2775 0 (48 26)	2600 0 (45 22)	2575 0 (51 28)	2840 0 (49 79)
f) Profit of primary wholesaler	16 75 (0 27)	16 7 (0 29)	16 70 (0 29)	16 60 (0 29)	16 55 (0 33)	16 66 (0 29)
g) Secondary wholesalers total cost	33 10 (0 54)	33 15 (0 57)	33 20 (0 58)	33 25 (0 58)	33 25 (0 66)	33 19 (0 58)
h) Selling price of secondary wholesaler	3225 (52 21)	3125 00 (53 65)	2825 0 (49 13)	2650 0 (46 09)	2625 0 (52 27)	2890 0 (50 67)
i) Secondary wholesalers profit	16 90 (0 27)	16 85 (0 29)	16 80 (0 29)	16 75 (0 29)	16 75 (0 33)	16 81 (0 30)
j) Processors total cost	1892 82 (30 64)	1892 82 (32 49)	1892 82 (32 92)	1892 82 (32 92)	1892 82 (37 69)	1892 82 (33 33)
k) Processors profit	1059 01 (17 14)	807 48 (13 86)	1032 16 (17 95)	1206 98 (20 99)	503 99 (10 04)	921 92 (16 00)
l) Total realisation of the processor	6176 83 (100 00)	5825 30 (100 00)	5749 98 (100 00)	5749 8 (100 0)	5021 81 (100 0)	5704 74 (100 00)

*Figures in parenthesis are percentage to the total

The price spread was worked to 50 74 per cent The marketing costs and net margin were estimated as 34 67 and 16 74 per cent respectively

Producer secondary wholesaler processor (Channel III)

The price spread worked out for this channel are presented in Table 5 23

Table 5 23 Price spread in channel III (Rupees per quintal of raw nuts)

Items	January	February	March	April	May	Average
a) Selling Price of Producer	3170 0 (51 32)	3070 0 (52 70)	2770 0 (48 17)	2595 0 (45 13)	2570 0 (51 18)	2835 0 (49 70)
b) Marketing cost of Producer	44 50 (0 72)	44 50 (0 76)	44 5 (0 77)	44 50 (0 77)	44 50 (0 77)	44 5 (0 78)
c) Net share of producer	3125 5 (50 60)	3025 5 (51 94)	2725 5 (47 4)	2550 5 (44 36)	2525 5 (50 29)	2790 5 (48 92)
d) Secondary wholesalers total cost	33 10 (0 54)	33 15 (0 57)	33 2 (0 58)	33 25 (0 58)	33 25 (0 66)	33 19 (0 58)
e) Selling price of secondary wholesaler	3225 (52 21)	3125 00 (53 65)	2825 0 (49 13)	2650 0 (46 09)	2625 0 (52 27)	2890 0 (50 67)
f) Secondary wholesalers profit	21 90 (0 35)	21 85 (0 38)	21 8 (0 29)	21 75 (0 38)	21 75 (0 43)	21 81 (0 38)
g) Processors total cost	1892 82 (30 64)	1892 82 (32 49)	1892 82 (32 92)	1892 82 (32 92)	1892 82 (37 69)	1892 82 (33 33)
h) Processors profit	1059 01 (17 14)	807 48 (13 86)	1032 16 (17 95)	1206 98 (20 99)	503 99 (10 04)	921 94 (16 00)
i) Total realisation of the processor	6176 83 (100 00)	5825 30 (100 00)	5749 98 (100 00)	5749 8 (100 0)	5021 81 (100 0)	5704 74 (100 00)

*Figures in parenthesis are percentage to the total

It was found that producer got a net share of 48 92 per cent of the total income received by the processor Total marketing margin was worked out to 50 30 per cent The marketing cost was 34 54 per cent and net margin was 15 76 per cent of the total realisation of the processor

5 6 12 Marketing efficiency

In the present study marketing efficiency in various channels was computed by Shepherd s formula The ratio of the total value of goods marketed

(V) to the marketing cost (I) may be used as a measure of efficiency It is expressed as index of marketing efficiency (ME)

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

Marketing efficiency index of various channels is presented in Table 5 24

Table 5 24 Marketing efficiency of different channels

Particulars	Channel		
	I	II	III
Value of commodity sold (Rs)	5704 74	5704 74	5704 74
Total marketmg cost (Rs)	1988 26	1977 85	1970 51
Marketing efficiency	1 86	1 88	1 90

Marketing efficiency indices for channels I II and III were computed to 1 86 1 88 and 1 90 It was the highest in channel III indicating the highest efficiency in this channel followed by channel II and channel I

5 7 Constraints experienced by the farmers

Cashew growers experience a large number of constraints that limit the production of cashew nuts The major constraints experienced by the sample respondents were identified during the pilot study The constraints were incidence of pests/diseases unavailability of grafts at proper time lack of technical guidance low price of raw nuts lack of labourers for various operations lack of plant protection equipment not getting sufficient protection even after spraying plant protection chemicals lack of knowledge about various government schemes high cost of inputs marketing problems and soil erosion The response of the cashew grower regarding these problems was gathered in order of their importance

classified as most important important somewhat important less important and least important The scores assigned to these classes were 5 4 3 2 1 in the order of their rank The cumulative score for each constraint was estimated and the results are presented in Table 5 25

Table 5 25 Major constraints perceived by respondents in the study area

Constraints	5 Most important	4 Important	3 Some what important	2 Less important	1 Least important	Cumulat ve score
a) Incidence of pests/diseases	86	14				486
b) Unavailabil ty of grafts	19	50	16	10	5	368
c) Lack of technical guidance	36	33	13	8		367
d) Low price of raw nuts	81	19	0			481
e) Lack of labourers for various operations	12	35	26	17	10	322
f) Lack of plant protection equipments	1	13	10	42	34	205
g) Not getting sufficient protection even after spraying with plant protection chemicals	26	22	11	16	25	308
h) Lack of knowledge about various government schemes	39	30	16	9	7	380
i) High cost of inputs	38	30	16	9	7	373
j) Marketing problems	4	3	1	29	63	156
k) So l erosion	8	19	14	18	41	235

It was found that pests and diseases were the most important constraints felt by the farmers in the study area with a score of 486 The cashew is subjected to the attack by a large number of pests and diseases Major pests identified were tea mosquitoes and cashew stem borer Every year both pests and diseases affect the production adversely if the prophylactic measures are not adopted Next important constraint was the low price of raw nuts with a total score of 481 Cashew price is

subjected to wide year to year fluctuations A steady and economic price is essential to keep the farmers in the cultivation of cashew Lack of awareness about various government schemes was also found to be an important problem with a score of 380 Other important problems faced by the farmers were non availability of grafts lack of technical guidance lack of labourers for various operations high cost of inputs and not getting sufficient protection even after spraying with plant protection chemicals with a score over 300 Lack of plant protection equipment and soil erosion was less severe with scores 205 and 235 Most of the respondents did not experience any difficulty in marketing their produce as indicated by a low score of 156

Discussion

6 DISCUSSION

The results on the present study Economic analysis of production and marketing of cashew nut in Kerala are discussed in this chapter under the following heads

6 1 Trend analysis
6 2 Growth rate analysis
6 3 Supply response
6 4 Maintenance cost of cultivation
6 5 Marketing
6 6 Constraints

6 1 Trend analysis

Growth pattern of cashew with respect to area, production and productivity over the period (1952 53 to 1999 2000) has been analysed The index numbers for area, production and productivity were constructed keeping triennium ending 1955 56 as the base The study revealed that area under cashew has shown an increasing trend until the year 1983 84 and a gradual decline thereafter Production also showed a steady increase till 1975 76 and a declining trend afterwards The productivity showed a stagnation between two successive periods i e 1952 53 to 1961 62 and 1962 63 to 1975 76 followed by a decline in later periods

As reported by George (1965) the increase in area under cashew in the early period might be due to the relative increase in its price It may be noted that increase in area had contributed to the increase in production till the year 1975 76 Though area has been increasing until 1983 84 production showed more or less a declining trend This might have occurred due to the declining trend shown by the

productivity during the period The increase in production till the year 1988 89 was mainly due to the improvement in productivity though the area showed a declining trend during this period The decline in production from 1988 89 was contributed by the decreasing trend in both area and productivity The decline in area under cashew from 1983 84 might be due to the large scale conversion of cashew plantations into the rubber plantation Similar results on trend analysis were reported by Salam *et al* (1992) They suggested that the stagnation in productivity during early period might be due to an error that might have occurred in the methodology followed in the estimation of productivity than any other factor

6 2 Growth rate analysis

Growth rates have been estimated for area, production and productivity of cashew using two functions viz exponential and kinked exponential The whole period under study (1952 53 to 1999 2000) was divided into two sub periods period I (from 1952 53 to 1975 76) and period II (from 1976 77 to 1999 2000)

The estimates using exponential function showed that during the whole period under study the area expanded by 2 22 per cent per annum whereas productivity declined by 2 11 per cent The decline in productivity caused a stagnation in the production as it increased only by 0 02 per cent per annum during the period

The sub period analysis provided a more clear picture in the growth rates In the period I area registered a significant increase by 5 97 per cent per annum At the same time productivity declined by 2 08 per cent But the increase in area during this period has contributed to the increase in production by 3 76 per cent per annum During the second period the area showed a decline by 1 82 per cent while the productivity increased by 0 87 per cent The increase in productivity

was not sufficient to offset the effect of decline in area and hence the production declined by 1 18 per cent Similar results have been obtained by Salam *et al* (1992) while examining the growth rates in area production and productivity of cashew in Kerala for the period (1961 62 to 1987 88) and two subperiods (1962 62 to 1974 75 and 1975 76 to 1987 88) They found that during the whole period under study the acreage of cashew expanded by 2 68 per cent per annum whereas the productivity declined by 3 66 per cent The study also estimated a fall in production by 1 08 per cent The estimates obtained in the present study are slightly different from the above study which was mainly due to the difference in the time period selected

The kinked exponential model was also fitted to get a more clear picture about growth rates as it yields continuous estimates This methodology was widely used to estimate continuous growth rates Some of the studies are by Boyce (1982) for comparing the estimates of agricultural output growth rates in Bangladesh and West Bengal Kannan and Pushpangadan (1988) to find out the growth rates of area, production and productivity of important crops in Kerala and Jeromi and Ramanathan (1993) for examining the export performance of Indian pepper

The results obtained using kinked exponential model were more or less close to the results in exponential model The area expanded by 6 35 per cent per annum during the first sub period but declined by 1 43 per cent in the second period Contrary to the results obtained in exponential model the productivity showed a decline in both sub periods i e a decline by 3 54 per cent in the first sub period and by 0 76 per cent in the second This decline in productivity caused the production to increase only by 2 62 per cent in the first subperiod The decline in production in the second sub period by 2 37 per cent was due to the effect of decline in both area and production

In general trend analysis based on index numbers and growth rates gave comparable results It was also evident that the efforts for the development of cashew initiated during the mid seventies have not brought out any significant influence on area production and productivity of cashew

6 3 Supply response

Formulating a supply function for perennial crops is confronted with many problems One of the most important obstacles is the lack of systematic data on agewise distribution of plants area replanted and area expanded in each year In perennial crops like rubber coffee and tea more reliable data will be available with the respective commodity boards In cashew data on area newly planted replanted and removed etc are absent but it is highly essential to develop a suitable supply response model As a result one has to formulate a set of over simplified models which fails to capture the essential features of the problem Given these limitations the supply behaviour of cashew was sought to be explained by means of the available data with the help of traditional multiple regression model The results of the two supply models viz area response model and yield response model presented in the previous chapter are discussed in detail in this section

6 3 1 Yield response models

Multiple regression model was fitted to the yield of cashew per hectare in order to study its response to change in various explanatory variables The variables selected for the study were price of cashew lagged by one year yield risk relative yield lagged by one year rainfall and trend In the first model were trend was not included as one of the explanatory variables a positive relationship between yield and price of cashew was obtained The coefficient of relative yield was significant and positive But the yield risk and rainfall showed negative influence on yield But the model lacked explanatory power due to low value of R^2

(0 3997) When the trend was included as one of the explanatory variables the R^2 value improved to 0 8108 and there was no indication of auto correlation among the disturbance term So the independent variables included in the second model could explain the variation in the dependent variable significantly to the extent of 81 per cent However the price coefficient showed an insignificant negative relationship with yield It could be suggested that in the short run the price of cashew lagged by one year does not have a significant impact on the yield of cashew Contrary to the above results Mini (1996) in her study on time series modelling in the yield of cashew over the period 1956 57 to 1975 76 obtained a positive relationship between price of cashew lagged by one year and yield But results similar to the present study have been obtained in the past Chowdhary and Ram (1978) in their study on the price response of Indian tea using the price of tea lagged by one year and deflated by the corresponding index of input prices (considered a proxy for profitability) observed negative relationship with productivity Prakash (1986) obtained a negative relationship between the yield of arabica coffee and price of coffee lagged by one year in his study on supply response of Indian coffee Several authors in the past who studied yield variations were of the view that price is not a significant explanatory variable in yield models due to standardisation of cultural practices (Alston 1980)

6 3 2 Area response models

Multiple regression models were fitted to study the response of area to various explanatory variables The variables selected for the study were average of the relative price of cashew in the previous three years average of the price of rubber in the previous three years price risk yield risk and trend

In model 1 and 2 where the trend was not included as an explanatory variable the coefficient of average relative price and average price of rubber were found to be significant The coefficient of the average price of rubber had the

desired negative sign In model 3 it was observed that average relative price of cashew nuts in the previous three years had a significant influence on area The other significant variable was trend which showed a negative influence on area The results obtained were contrary to the results of Nair (1970) who got negative relationship between area under cashew and average relative price in the previous three years This might be due to the difference in the time period selected for the study and the difference in the competing crop selected He considered tapioca the competing crop for cashew At the same time in the area response function for coconut he obtained a positive relationship between area under coconut in Kerala and the average relative price of coconut in the previous three years Maji *et al* (1972) in their study on supply response of major food grains in the Punjab region obtained a positive and significant influence of relative price on the acreage of maize and wheat In the case of rice the influence was positive but not significant Singh and Kumar (1976) reported the positive and significant influence of relative price on area of wheat and bajra in Haryana

In the fourth model when average price of rubber in the previous three years was included as one of the explanatory variables its coefficient had the desired negative sign and was significant This was in conformity with the hypothesis that a high price of rubber may contribute to a decline in the area of cashew since the farmers will shift to the cultivation of rubber Similar observations were obtained by Janaiah *et al* (1992) in the case of tobacco crop has been noticed It was evident from the models three that cashew farmers were not significantly influenced by the price risk and yield risk The trend showed a negative and significant influence in the third model whereas a negative influence in the fourth model The elasticity of area with respect to relative price was estimated to 0 0133 which indicates the inelastic

nature Mini (1996) in her study on time series modelling and forecasting the yield of cashew obtained a negative response in area to the price of cashew lagged by one year and the short run elasticity was estimated to 0 0438 Similar result with very low elasticity was obtained by Prabhakaran (1987) in his study on cashew The elasticity of area with respect to price of rubber was worked out to 0 2343 Its magnitude is higher than the elasticity with respect to relative price and indicated that the price of rubber had more pronounced influence on area of cashew than the relative price

6 4 Maintenance cost of cultivation

The total maintenance cost of cultivation includes cost incurred for material inputs and costs of labour for various operations At the aggregate level material cost accounted for 22 9 per cent of the total maintenance cost and labour cost accounted for 77 10 per cent Similar results as above were reported by Srinivas *et al* (1994) who found that labour cost accounted for 63 7 per cent and material cost contributed 36 3 per cent of the annual maintenance cost It may be mentioned that the share of labour cost to total cost was lower in their study probably due to the difference in wage rates in the two areas Another study on cash flow analysis in cashew plantation by Senthilnathan and Balamohan (1992) revealed still lower share of labour cost to total maintenance cost (50 72 per cent) with a higher share of material cost (38 68 per cent) along with other costs like depreciation interest contributing to 10 60 per cent of the total cost

Among the different cost components harvesting cost accounted the highest share with 40 91 per cent of the aggregate cost Classwise analysis revealed a higher percentage share for class I followed by class II and class III indicating a lower percentage of expenses on this item as size of holding increases Srinvas *et al* (1994) reported a share of 51 43 per cent for harvesting which is higher than the results in the present study On the contrary Senthilnathan and Balamohan

(1992) reported a lower share of harvesting expenses (35 99 per cent) The variation in figures in the above studies might be due to the difference in farming situation time period and the study area

6 5 Marketing

The present study identified the following marketing channels as the produce moved from the producer to the processor

Channel I → Producer village trader primary wholesaler secondary wholesaler processor

Channel II → Producer primary wholesaler secondary wholesaler processor

Channel III → Producer secondary wholesaler processor

Channel IV → Producer village trader secondary wholesaler processor

The channels identified are similar to the findings of past studies on cashew nut marketing Ravi *et al* (1995) in their study on marketing channels and price spread in marketing of cashew nut in Dakshina Kannada district of Karnataka found that as many as six channels were involved in the marketing of cashew nuts The pre harvest contractors village merchants commission agents and wholesalers were the major intermediaries involved It may be noted that pre harvest contractors are one of the intermediaries involved in the marketing of cashew nuts in the study area but the uncertainty on the price of cashew nut in the last production season when the study was conducted made the pre harvest contractors keep away from their operation This uncertainty arose due to the fall in the price of cashew kernels in the international market Rajasekharan (1987) also reported that itinerant traders village traders wholesalers and processors were the major intermediaries involved in the marketing of cashew nuts

The results on the mode of sale of respondents revealed that 55 per cent of respondents sold their produce to the village traders which formed 40 55 per

cent of the total quantity of raw nuts sold by them 28 per cent sold the produce directly to primary wholesalers and this constituted 39 34 per cent of the total quantity sold Eight per cent sold to both village traders and primary wholesalers and the quantity sold by them was 6 49 per cent of the total Nine per cent sold directly to secondary wholesalers The average prices per quintal of raw nuts realised by selling to village trader primary wholesaler and secondary wholesaler was Rs 2820 Rs 2845 and Rs 2870 respectively The major factor that determined the selling behaviour of farmers to various intermediaries was the distance to the market The difference between prices given by secondary wholesaler and village trader was only Rs 50 per quintal Since the secondary wholesalers operated in towns the farmers in remote areas will incur higher marketing cost if they want to sell the produce to the secondary wholesalers Undulating topography of the area also added to the marketing cost of the producers So the farmers invariably sold their produce to the buyer nearest to their place so that they incurred lesser marketing cost

6 5 1 Marketing costs

Marketing costs of respondents included cost of transport unloading charges and cost of packing material The marketing costs of respondents in the three channels ranged from Rs 36 98 to Rs 44 80 Marketing costs in channel three were high due to high amount of transportation cost incurred Cost of transportation contributed to over 80 per cent of the total marketing cost in all the marketing channels Loading and unloading formed the next major share ranging from Rs 3 85 to Rs 4 55 in the three channels Similar results on the higher share of transportation cost to the total marketing cost were reported by Rajasekharan (1987) which came to over 95 per cent

For village traders and primary wholesalers loading and handling charges were the major item of cost They are not incurring any transportation cost

because secondary wholesalers take the produce from their place The transportation cost would be borne by the secondary wholesaler or processor The secondary wholesalers incurred highest amount of marketing cost This is mainly due to the cost of transport and the commission g ven to the commiss on agents Generally cost incurred in transporting the produce from the secondary wholesalers place to the processors site will be borne by the processor himself Transportation cost incurred by the secondary wholesalers was mainly in collection of nuts from local places The commission formed 30 1 per cent of the marketing cost of secondary wholesalers

6 5 2 Price spread

Price spread was worked out on the basis of monthly average prices It has been computed for the months of January to May which corresponds to the marketing season of raw nuts in Kerala The study on the marketing costs and margins of the three different channels revealed that the average net share of the producer was the highest in channel III which accounted for 48 92 per cent of the total realization of the processor It was followed by channel II and I with 48 58 and 48 26 per cent respectively This difference in net share is only due to the difference in the average price received by the farmers in these channels The average price spread was the highest in channel I which came to 51 09 per cent of the total realisation of the processor followed by channel II and III with 50 74 and 50 30 per cent A higher price spread indicated lower share of the producer on the consumer s rupee The net profit of the intermediaries like village traders primary wholesalers and secondary wholesalers was less than one per cent of the total returns of the processor Regarding processors profit a wide fluctuation has been noticed during the months from January to May The major factor influenc ng the profit of the processor is the price of cashew kernels in the international market A higher price assures a higher profit to the processor The price of cashew kernels in the international market declined steadily from 2 46$ per pound in January to 2 0$ per pound in May and it affected the profit of the processors So the profit of the

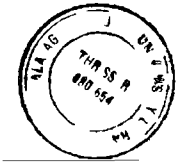
processors varied from 10 04 to 20 99 per cent of the total realisation and averaged to 16 per cent

The above results are in line with the findings of Rajasekharan (1987) where the net share of producer was found to be 59 50 per cent of the total income of the processor The marketing margin ranged between 40 and 43 per cent in various channels identified The net profit of the processors averaged at 18 57 per cent of the total realization of the processor

Balamohandas and Rao (1982) in a study on the marketing of cashew nut in Srikakulam district found that the growers got a net share of 95 22 and 96 53 per cent of the processors purchase price in two different marketing channels The net share of the producer was very high as the percentage has been worked out on the basis of the processors purchase price where as in the present study the producer s share was worked out on the basis of processor s total return which involved a change in the form of the produce

6 6 Constraints experienced by the farmers

Cashew growers experience an array of constraints that limit the production of cashew nuts Farmers views on some important problems revealed that incidence of pests and diseases was the most important constraint faced by them causing great loss to them Most important pests include cashew stem borer and tea mosquito bug Spraying against tea mosquito the dreaded enemy of cashew is beneficial not only in controlling tea mosquito but also other pests of minor importance But spraying only isolated pockets by individual farmers does not bring desirable results There is no agency at present to organise a collective spraying Most of the farmers suggested that there should be a programme through Krishi Bhavans to organise spraying against tea mosquito Lack of technical guidance in identifying pests and diseases was also a major problem faced by the



farmers Many farmers complained that activities of Krishi Bhavan were not satisfactory and they were not getting appropriate guidance in controlling pests and diseases Similar views were expressed in the earlier studies also Dixit and Rao (1999) opined that cashew farmers lacked correct information about pests and diseases and the extension system failed to keep them well informed about the pest damage They also suggested that efforts of the extension and research agencies are needed to step up farmers knowledge on damage symptoms and pest surveillance

Low price of raw nuts was another important problem faced by the farmers Price of cashew nuts depends upon many factors Most important are the price of cashew kernels in the international market and the availability of raw nuts in the domestic as well as world market So the price of cashew nuts is subjected to wide fluctuation year to year At present the cashew grower is totally depending upon the processing industries for getting remunerative prices In the years of unremunerative prices as suggested by Nambiar (1977) Government intervention in the market by fixing floor price is highly essential Unavailability of grafts in sufficient number was also a problem felt by the farmers It appears as a major constraint in increasing production Lack of awareness about various government schemes lack of labourers for various operations and high cost of inputs were other important problems faced by cashew growers in the study area The earlier studies by Srinivas *et al* (1994) and Senthilnathan and Balamohan (1992) also revealed the existence of similar constraints to farmers in the study area

Suggestions for improvement

1 Most of the plantations are unproductive and raised with inferior seedling progenies Systematic replanting programmes with high yielding grafts must be taken up to enhance the production Government support for such replanting programme should be extended similar to the one now being implemented in rubber To coordinate the development efforts research and

extension setting up of a Cashew Board as in the case of other plantation crops can be done by the Central Government

2 Subsidies should be provided to farmers for reducing the cost incurred in purchasing manures fertilisers and pesticides

3 For effective pest control the possibility of organising community spraying through Krishi Bhavan is to be employed

4 Integrated pest management strategies should be developed with priorities given for biological control of major pests

5 To increase the availability of cashew grafts necessary financial assistance or institutional support should be given to establish registered nurseries in different cashew growing tracts

6 Research on byproduct utilisation with specific reference to cashew apple should be strengthened

7 Priority should be given to evolve high yielding varieties with tolerance or resistance to pests

8 Quality of nuts produced varies from place to place Nuts produced in Konkan and Malabar coasts were found to be superior to those produced in other areas A systematic grading procedure for raw nuts should be adopted for the benefit of the producers as well as processors

9 Profitable prices to raw nuts have to be ensured to the growers which should be arrived at taking into consideration the international prices of the cashew kernels processing cost and other cost factors

10 For increasing the return to the farmers suitable intercropping models should be demonstrated in farmers fields The crops which are suitable to the region should be identified and popularised

Summary

7 SUMMARY

Cashew is one of the most important commercial crops in Kerala It has gained significant economic and social importance as it provides employment to large number of people in farms and factories The present study on Economic analysis of production and marketing of cashew nuts in Kerala was an attempt to examine the supply response of cashew nuts to study the marketing channels and margins and to identify the constraints experienced by the farmers in the production and marketing of cashew nuts

The study was based on both primary and secondary data The secondary data have been used to analyse the trend in area production and productivity of cashew in Kerala and to estimate the supply response of cashew nuts The data was collected from the various publications of the Directorate of Economics and Statistics and the State Planning Board Thiruvananthapuram

Kannur district which occupied the largest area under cashew in Kerala was selected as the study area for the collection of primary data Multistage random sampling technique was adopted for the selection of sample respondents Two blocks were selected based on the probability proportional to the area under cashew From each block two panchayats were selected randomly and from each panchayat 25 cashew growers were selected at random thus making a total sample size of 100 farmers

The selected respondents were grouped into three classes on the basis of area of cashew possessed Those farmers having an area of cashew less than one hectare formed class I those with area between one and two hectares were grouped in class II and those who possessed more than two hectares formed class III In order to collect information on market structure and other marketing aspects five

respondents from each category of intermediaries viz village traders and pr mary wholesalers from each block have also been included as the sample along with five secondary wholesalers from the study area In addition to this five processors in the state were also interviewed for gathering information on processing and exports

The growth rates in area production and productivity of cashew in Kerala were estimated using two functions viz exponential and k inked exponential The whole period under study (1952 53 to 1999 2000) has been divided into two subperiods period I extending from 1952 53 to 1975 76 and period II extending from 1976 77 to 1999 2000 The results of the growth rate analysis using exponential function revealed that during the whole period under study the area under cashew expanded by 2 22 per cent per annum Periodwise analysis showed a significant increase in area by 5 97 per cent per annum in the first period followed by a decline by 1 82 per cent in the second Regarding production a stagnation was noticed during the whole period as indicated by a low growth rate of 0 02 per cent The first period registered an annual compound growth rate of 3 76 per cent while the second period showed a decrease by 1 18 per cent per annum The productivity showed a decline during the whole period under study by 2 11 per cent per annum The period I registered a decrease by 2 08 pei cent while the period II recorded a low growth rate of 0 87 per cent per annum

Kinked exponential models provided a more clear picture about subperiod growth rates as they estimated continuo is growth rates The res lts indicated that in the period I area expanded by 6 35 per cent per annum followed by a decline by 1 43 per cent in the second period In the case of production the first period showed an increase by 2 62 per cent per annum while the second period registered a decrease by 2 37 per cent Regarding productivity both periods showed decline by 3 54 per cent in the first and 0 76 per cent in the second period

The producers response to price and non price factors was examined by studying the response in terms of area and yield The study used time series data on area and yield for the period 1976 77 to 1999 2000 Multiple regression model with appropriate lag in variables was used to examine the degree of responsiveness in yield and area The price of cashew lagged by one year yield risk relative yield lagged by one year trend and rainfall were the explanatory variables selected The results revealed that coefficient of price of cashew was negative and insignificant It indicated that price of cashew did not have a significant impact on the yield while the relative yield showed a positive and significant influence on yield

Area can be considered a better proxy for planned output The producers would adjust the area under cashew by taking the prices of cashew nuts and rubber (competing crop) in previous years into consideration The various independent variables considered for the area response studies were average relative price of cashew nuts in the previous three years average of the price of rubber in the previous three years price risk yield risk and trend

The results showed that relative price showed a positive and significant influence on area under cashew Another model including average price of rubber as an explanatory variable obtained the desired negative relationship between the price of rubber and the area under cashew which was in accordance with the hypothesis that a high price of rubber would result in decline in the area under cashew

The annual maintenance cost per hectare of cashew plantation has been estimated At the aggregate level annual maintenance cost was estimated to Rs 7709 77 per hectare Material cost which included the cost incurred for purchasing manures fertilisers and plant protection chemicals was worked out to Rs 1765 89 and it accounted for 22 9 per cent of the total Labour cost for various

cultural operations was computed to Rs 5943 88 which contributed 77 10 per cent to the total The estimated maintenance cost for class I II and III were Rs 7608 26 Rs 7471 29 and Rs 7969 17 respectively The material cost accounted 22 15 23 15 and 23 09 per cent respectively and labour cost contributed 77 85 76 85 and 76 91 per cent to the total respectively in class I II and III

The study on marketing was conducted to examine the market structure and to compute the marketing costs and margins of each intermediaries involved The marketing channels through which the produce moved from the producer to the consumer as identified in the study were Producer village trader primary wholesaler secondary wholesaler processor Producer primary wholesaler secondary wholesaler Processor Producer secondary wholesaler processor and Producer village trader secondary wholesaler processor The first two channels were most important as far as marketing of cashew nuts was concerned since a good proportion of farmers marketed through this channel Fifty five per cent of the total respondents sold their produce to village traders which accounted for 40 55 per cent of the total quantity of nuts sold Twenty eight per cent farmers sold directly to the primary wholesalers and this constituted 39 34 per cent of the quantity sold Eight per cent farmers sold to both village traders and primary wholesalers whereas 13 per cent sold directly to secondary wholesalers The average price per quintal received by the farmers from selling the nuts to village traders primary wholesalers and secondary wholesalers were found to be Rs 2820 Rs 2845 and Rs 2870 respectively

The marketing costs incurred by the respondents in channels I II and III were worked out to Rs 36 98 Rs 38 50 and Rs 44 50 respectively Cost of transportation was the major item of cost which contributed more than 80 per cent of the total marketing cost in all the three channels Marketing costs of intermediaries viz village trader primary wholesaler and secondary wholesaler were worked out to Rs 11 90 Rs 13 40 and Rs 33 20 respectively

The processors purchased raw nuts from the wholesalers through commission agents from different producing areas within the state during the production season These nuts are dried and stored in the factories for subsequent processing The cost incurred by the processors per quintal of raw nuts was estimated to Rs 1892 82 Processors exported cashew kernels in the international markets and the path of the kernels thereafter could not be traced Hence the present study was limited to the processors realisation only The producers average net share in the processors revenue was estimated to 48 26 48 58 and 48 92 per cent respectively in marketing channels I II and III The net profit of the village traders primary wholesalers and secondary wholesalers was less than one per cent of the total returns of the processor The profit of the processor was averaged to 16 per cent of their total realization

The most significant constraint faced by cashew growers was the incidence of pests and diseases which severely affected their production Low price of the produce was another important problem faced by the farmers Other important constraints included non availability of grafts lack of technical guidance high cost of inputs lack of awareness about various government schemes and insufficient protection even after spraying with plant protection chemicals

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ECONOMIC ANALYSIS OF PRODUCTION AND MARKETING OF CASHEW NUT IN KERALA

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ABSTRACT OF THE THESIS

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ABSTRACT

The present study on the economic analysis of production and marketing of cashewnut in Kerala was aimed to examine the supply response of cashew nuts to study the marketing channels and margins and to identify the constraints experienced by the producers in the production and marketing of cashew nuts

The growth rate analysis using exponential function revealed that during the whole period under study (1952 53 to 1999 2000) the area under cashew expanded by 2 22 per cent per annum Period wise analysis showed a significant increase in area by 5 97 per cent per annum in the first period followed by a decline by 1 82 per cent in the second period (1976 77 to 1999 2000) Regarding production a low growth rate of 0 02 per cent per annum was observed during the whole period while the first period registered a growth rate of 3 76 per cent per annum and a decline by 1 18 per cent in the second period But the productivity showed a decrease by 2 11 per cent in the whole period The first sub period registered a decline in productivity by 2 08 per cent while the second period recorded a slight increase by 0 87 per cent per annum The analysis using kinked exponential model also yielded more or less similar results

The producers response to price and non price factors was examined by studying the response in terms of area and yield The analysis revealed that the price of cashew did not have a significant impact on yield while the relative yield showed a positive and significant influence on yield The relative price and the price of rubber showed a significant influence on area under cashew

The annual maintenance cost at the aggregate level was computed to Rs 7709 77 per hectare The material cost was worked out to Rs 1765 89 and

labour cost was computed to Rs 5943 88 The gross and net returns per hectare at the aggregate level was worked out to Rs 21427 and Rs 13717 23 respectively

The major marketing channels identified in the study were Producer village trader primary wholesaler secondary wholesaler processor Producer primary wholesaler secondary wholesaler processor and Producer secondary wholesaler processor The producers net share in the processors revenue was estimated to 48 26 48 58 and 48 92 per cent respectively in marketing channels I II and III Marketing efficiency indices for channels I II and III were computed to 1 86 1 88 and 1 90 respectively The constraint analysis revealed that pests diseases and low price of the produce were the most important problems faced by the producers in the study area